

TREES AND SHRUBS OF MEXICO.

ADVERTISEMENT.

The United States National Herbarium, which was founded by the Smithsonian Institution, was transferred in the year 1868 to the Department of Agriculture and continued to be maintained by that department until July 1, 1896, when it was returned to the official custody of the Smithsonian Institution. The Department of Agriculture, however, continued to publish the series of botanical reports entitled "Contributions from the United States National Herbarium," which it had begun in the year 1890, until on July 1, 1902, the National Museum, in pursuance of an act of Congress, assumed responsibility for the publication. The first seven volumes of the series were issued by the Department of Agriculture.

ALEXANDER WETMORE,
Assistant Secretary, Smithsonian Institution.

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SMITHSONIAN INSTITUTION

UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23

TREES AND SHRUBS OF MEXICO

By PAUL C. STANDLEY



WASHINGTON
GOVERNMENT PRINTING OFFICE
1920-1926

NOTE.

The 5 parts of volume 23 of the Contributions were issued as follows:


Part 1, pages 1 to 170, October 11, 1920.

Part 2, pages 171 to 515, July 14, 1922.

Part 3, pages 517 to 848, July 18, 1923.

Part 4, pages 849 to 1312, December 31, 1924.

Part 5, pages 1313 to 1721, November 15, 1926.

 The indexes for parts 1 to 4 should be bound with the complete volume, since in the index of part 5 there are reprinted only the generic names of the earlier parts.

PREFACE.

The present volume consists of an account of the trees and shrubs of Mexico, by Mr. Paul C. Standley, Associate Curator of the United States National Herbarium. The work is based wholly upon the extensive series of Mexican plants in the National Herbarium, a large proportion of which have been obtained by special investigators sent out by the United States National Museum and the United States Department of Agriculture. The flora of Mexico, especially the arborescent flora, includes many species of great economic value. They furnish many products of commercial importance, such as henequen and ixtle fiber, palm oil, lumber, cacao, rubber, drugs, alcohol, and many fruits.

Heretofore no descriptive flora of any portion of tropical continental North America has been published, and the identification of the species of plants yielding important products has often been very difficult. Identification of material has been possible only by comparison with extensive series of herbarium specimens, such as are to be found only in the larger botanical institutions, or by reference to isolated descriptions, many of them available only in the largest libraries. The present work brings together all the published species of woody Mexican plants and furnishes keys for their identification as well as brief descriptive notes. Much information is presented also concerning commercial and local uses of the plants. The vernacular names of the trees and shrubs are given, and since these are fairly well standardized by local usage they will be found helpful as guides to the identity of fragmentary or otherwise difficult material.

Several collaborators have aided in the preparation of this volume by contributing the accounts of certain groups in which they are particularly interested, as follows: Dr. William R. Maxon, *Gleicheniaceae* and *Cyatheaceae*; Dr. A. S. Hitchcock, *Poaceae*; Dr. William Trelease, *Agave* and *Quercus*; Dr. S. F. Blake, *Meliaceae*, *Polygalaceae*, *Violaceae*, and *Asteraceae*; Mr. Ellsworth P. Killip, *Passifloraceae*; Dr. N. L. Britton and Dr. J. N. Rose, *Cactaceae*; Dr. B. L. Robinson, *Eupatorium* and *Ophryosporus*; Dr. J. M. Greenman, *Senecio*.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23, PART 1

TREES AND SHRUBS OF MEXICO (GLEICHENIACEAE-BETULACEAE)

By PAUL C. STANDLEY



WASHINGTON
GOVERNMENT PRINTING OFFICE

1920

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

II



PREFACE.

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The account of the ferns of the families Gleicheniaceae and Cyatheaceae has been furnished by Mr. William R. Maxon, Associate Curator of the National Herbarium; that of the Poaceae, or grasses, by Prof. A. S. Hitchcock, Systematic Agrostologist of the Department of Agriculture; and that of the Amaryllidaceae, which includes the difficult genus *Agave*, or century plants, by Dr. William Trelease, Professor of Botany, University of Illinois.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

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TREES AND SHRUBS OF MEXICO.

By PAUL C. STANDLEY.

INTRODUCTION.

The most interesting regions of the earth from a botanical standpoint are those which possess a tropical climate. There physical conditions are most favorable for the growth of plants, and not only is vegetation much more luxuriant than in temperate countries, but the number of species, especially of trees and shrubs, is vastly greater. West Virginia and Costa Rica, for instance, are temperate and tropical areas of approximately equal size; but only 1,600 species of ferns and flowering plants are known from West Virginia, while the flora of Costa Rica includes more than three times and probably four times that number. Large areas in Mexico are neither tropical nor even subtropical, but no region of the globe, probably, possesses a richer or more interesting flora. Mexico has an area of 767,000 square miles, which, although only about one-fifth that of the United States, exhibits a greater range of climatic conditions. The extremes of elevation much exceed those of the United States, ranging from sea level to over 5,200 meters. Almost every conceivable plant formation is represented—the wet tropical forests of the southern lowlands, the temperate deciduous and coniferous forests of the central plateau and of the ranges of the Sierra Madre, the alpine zones of the high peaks like Orizaba, Popocatepetl, and Ixtaccihuatl, and the great barren or cactus deserts which reach their best development in the northern states.

The botanical features of Mexico have attracted attention from the days of the earliest explorers. Many botanists have visited the country in the last hundred years, yet the flora is still but imperfectly known. Almost every collector at the present day makes discoveries of remarkable species previously unknown to science, and some plants are still unknown botanically although their supposed medicinal properties, or their products, such as fruit, lumber, fiber, and gum, are well known locally and are frequently even of com-

mercial importance. In the immense mountain ranges there are hundreds of difficult peaks and almost inaccessible canyons whose exploration is extremely tedious; in the south the tropical forests are penetrated with difficulty, and the lofty branches of their trees are almost inaccessible to the collector; away from the Sierra Madre are innumerable isolated masses of mountains and hills, still unvisited by a botanist, which must yield a host of localized species. Consider, in addition, the fact that México is still very imperfectly supplied with transportation facilities and it becomes evident that many years must elapse before a comprehensive knowledge of the flora is possible.

It is unfortunate, and at the same time remarkable, that no flora of any part of tropical continental North America has ever been prepared. Indeed, in this respect all of North America has made little progress as compared with Europe, some parts of Asia, Australia, and Africa, or even South America. The flora of tropical Africa, the most recent of all the great regions of the earth to be explored by European peoples, has been adequately treated in botanical literature; and the flora of Brazil has been described in a monumental series of volumes, of which any country might well be proud, but whose equal no other country possesses. For no political unit of North America has a modern descriptive or even a synoptical flora ever been published.

The only publication approaching a flora of Mexico which has ever been completed is the Botany of the *Biologia Centrali-Americana*, compiled by Hemsley and issued from 1879 to 1888. This, though including no descriptive notes (except incidentally) nor any means of identifying the species, is a comprehensive work, listing all the species of the higher plants known at that time from Mexico (excluding Baja California) and Central America. Ranges and definite localities are given for all the species, together with the more important synonymy. It is superfluous to state that after almost 40 years this work has lost much of its former usefulness, as a result of recent botanical discoveries. Nevertheless the five volumes of the *Biologia* will always remain an invaluable and classic work upon tropical American plants.

Botanical exploration in Mexico has now progressed to the point where a descriptive flora of the region is practicable, and such a compilation is urgently needed. The work here offered is intended to include a complete list of the woody plants known from Mexico, with keys for their determination. This arbitrary and artificial division of the Mexican flora was chosen for treatment because it contains those species which are the most conspicuous elements of the vegetation, as well as those which are of most importance from an economic standpoint. It includes, moreover, the larger portion of the Mexican

species. Later, it is to be hoped, someone else may have an opportunity to treat at length the herbaceous species or the flora as a whole. While it is only too evident that the available collections of Mexican plants are inadequate to furnish a complete illustration of the flora of the country, the offering of such a work as can be prepared with the material at hand needs no apology, for it is certain that the larger part of the woody plants, and especially those of economic importance, have already been collected.

It is not deemed advisable to include in the present publication an account of the general features of the flora. These have already been dealt with at length by other authors, particularly Hemsley¹ and Ramírez.²

PLAN OF THE WORK.

COLLECTIONS STUDIED.

In this list of Mexican plants it is intended, of course, to account for all the trees and shrubs which have been collected in Mexico or reported from that country. The account is based wholly upon the collections in the United States National Herbarium, although the published species not represented there have been included in the keys when possible. The National Herbarium contains the largest and most complete representation of Mexican plants that has been assembled, a large proportion of the material having been obtained by special collectors sent into the field by the United States National Museum and the United States Department of Agriculture. In addition, the herbarium contains many collections received from other institutions and individuals, the more important of which were obtained by the following collectors: F. Altamirano, F. W. Anthony, Brother G. Arsène, J. L. Berlandier, M. Botteri, M. Bourgeau, T. S. Brandegee, G. N. Collins, C. Conzatti, O. F. Cook, F. V. Coville, C. K. Dodge, C. B. Doyle, H. Galeotti, G. F. Gaumer, E. A. Goldman, J. M. Greenman, C. V. Hartman, A. S. Hitchcock, E. W. D. Holway, M. E. Jones, E. Kerber, E. Langlassé, F. M. Liebmann, F. E. Lloyd, D. T. MacDougal, F. S. Maltby, E. A. Mearns, C. F. Millspaugh, Charles Mohr,³ E. W. Nelson, Brother Nicolas, C. R. Orcutt,

¹ Biol. Centr. Amer. Bot. 4: 138-315. 1887.

² La vegetación de México, pp. 1-271, with 2 maps. Mexico, 1899.

³ Charles Mohr (1824-1901) was a native of Germany, who came to the United States in 1848. He visited Mexico in 1857 and was a guest of Sartorius at his home in Mirador. He made botanical collections in the region of Orizaba. Here he was associated with Botteri, and his collection numbers, in some cases at least, are the same as Botteri's. His collections are in the United States National Herbarium. Dr. Mohr is best known for his "Plant Life of Alabama," published as volume 6 of the Contributions from the United States National Herbarium.

Edward Palmer, C. C. Parry, Henry Pittier, C. G. Pringle, C. A. Purpus, B. P. Reko, J. N. Rose, J. N. Rovirosa, H. H. Rusby, W. E. Safford, H. C. Seaton, J. G. Schaffner, Arthur Schott, C. L. Smith, L. C. Smith, C. H. T. Townsend and C. M. Barber, Charles Wright, W. G. Wright, L. J. Xantus.

SPECIES INCLUDED.

It is manifest that the group here chosen for treatment is an artificial one. It is impossible to draw a sharp line between the woody and herbaceous plants, although in the vast majority of cases such a classification is easily made. Many truly woody plants are so small that they are not looked upon commonly as shrubs, and many herbaceous plants become so large as to remind one of small trees. Plants which are essentially annuals, and which in regions where freezing temperatures occur never live more than one season, may in tropical regions develop more or less woody stems. Moreover, in herbarium specimens, which as a rule consist merely of terminal portions of branches, it is often impossible to conclude that a plant is a shrub except from analogy or from information furnished by collectors. The writer would have preferred to treat only of the trees of Mexico, which are far less numerous than the shrubs and would have required less space for their elaboration; but the separation in the herbarium of trees and shrubs involves still greater difficulties than the separation of woody and herbaceous plants. We have so little published information regarding the size of Mexican plants, and most collectors show such an aversion to furnishing notes concerning their collections, that the classification of woody plants as trees and shrubs is evidently quite impracticable with our present knowledge. The writer's policy as to the species to be included has been a liberal one, and although it is possible that some species have been omitted which should have been included, it is certain that their number is small. On the other hand, many species have probably been included which should have been omitted, but this fact will increase rather than detract from the usefulness of the work. Some species have been listed as shrubs, rather against the judgment of the writer, because of data reported by collectors.

The statements given here concerning size are the best that can be compiled from published notes and from information furnished by collectors' labels. The information available is not so complete as is desirable and in some cases may be misleading. It has not been the intention to publish a descriptive manual, and the brief descriptive notes given under most of the species are intended merely to supplement the keys and to indicate the most striking features of each species. Keys are given for the determination of genera and

species and one for the determination of families. The last is adapted from a key to the families of tropical American plants published recently by Mr. Henry Pittier.¹ It is very difficult, if not impossible, to prepare a key to the families of tropical plants which will enable one always to refer a plant to its family, because many of the plants are still imperfectly known, and because there are in some families many exceptions to the typical plan of organization of the group. With complete material of a given plant, however it is hoped that the present key will usually be adequate for indicating its family position.

It has been intended to give references to the names of all woody plants published or reported from Mexico, disregarding, however, certain obviously incorrect names which have not received notice in more recent or important works. Casual references are made in addition to the more common cultivated exotic species. Published names not illustrated by material examined by the writer or not identifiable from the descriptions accompanying them have been listed as "doubtful species" at the end of their respective genera. The plan has been to list as a valid species or as a synonym each specific name based upon Mexican material, but it has not been deemed necessary to list all the combinations under various genera, unless their citation seemed to serve some useful purpose. The writer has not attempted to classify all the names of Mociño and Sessé, which occur in their *Plantae Novae Hispaniae* and *Flora Mexicana*, for these names have justly received little attention from taxonomists, and their determination would require an amount of labor quite inconsistent with any advantage that would result. Some of these names, however, have been referred to in their proper places. A very few of Mociño and Sessé's names are valid, but it is only by accident that such is the case.

RANGES OF THE SPECIES.

The range in Mexico ascribed to each species is based chiefly upon material in the National Herbarium, but reliable published reports have been taken into account when they indicated noteworthy extensions of range. It is probable that in many cases the species have wider ranges than is indicated, but the limits of distribution can not be determined definitely until more extensive explorations have been carried out. Much more comprehensive collections are needed from all parts of Mexico, but especially from the states of Tabasco, Michoacán, Guerrero, Oaxaca, and Chiapas. Those available from

¹Clave analítica de las familias de plantas fanerógamas de Venezuela y partes adyacentes de la América Tropical. Pp. 1-108. Caracas, 1917.

Tabasco and Chiapas are particularly inadequate, and doubtless many of the listed species occur there, even if the ranges as here stated do not indicate the fact. If a species occurs in Oaxaca and also in Guatemala, it may safely be assumed that it is found in Chiapas, although the writer has not felt at liberty to report its occurrence there unless he has actually seen specimens from that State. The range outside Mexico is given for those species which extend into other countries, and when no such range is indicated it is to be assumed that the species is endemic.

TYPE LOCALITIES.

For the majority of the species there has been included a statement concerning the type or the type locality. The nomenclatorial type of a species is the specimen which served as the basis of the original description of the species, and the type locality is the one at which the specimen was collected. A knowledge of type localities is of great importance in taxonomic work, especially when it becomes necessary to divide into two or more species material which has been referred previously to a single one. It is of interest also to collectors who may visit these places and who may take an interest in recollecting such plants at their original stations. It is to be expected, generally, that the form of a species occurring in the region of the type locality is the typical one. In the case of many species described from Mexico, particularly the earlier ones, the source of the specimens on which they were based was given merely as "Mexico," without indication of any precise locality. In such instances the writer has made no reference to the type locality, which is, of course, practically unknown. Neither has it seemed worth while to refer to the type locality in the case of species described from "tropical America," "West Indies," or other similarly vague regions.

VERNACULAR NAMES.

The vernacular names listed have been gathered from various sources. Many have been taken from the labels accompanying herbarium specimens. All those found in literature which has come to the writer's attention have been listed if there was reason to suppose them accurate. The most extensive work dealing with Mexican vernacular plant names is the "*Sinonimia vulgar y científica de las plantas Mexicanas*," compiled by Dr. José Ramírez, with the assistance of Señor Gabriel V. Alcocer, published in the City of Mexico in 1902. This is a very extensive list and a valuable one, based partly upon the investigations of the authors, and also upon many previously published lists. It is unfortunate that many of the Latin

names are obviously erroneous and others doubtful, but the same statements are likely to be true of most lists of similar nature. The present writer is under particular obligations to Dr. Blas P. Reko, who has kindly permitted the use of a very extensive list of the vernacular names current in Oaxaca, which he has compiled. Valued assistance has been rendered likewise by Dr. Alfonso Herrera, Director de Estudios Biológicos, of the Mexican Government.

The names applied to plants vary greatly in different parts of Mexico, largely because of the diverse languages which preceded Spanish in different parts of the country, and which are still spoken in many regions, notwithstanding that Spanish is the language used by the great majority of the inhabitants. The Spanish names are the most generally used, as a rule. Many of them date back to the time of the Conquest, and are the same as names in common use for Spanish plants of more or less similar aspect, although often of no close relationship. In many instances the Carib names of West Indian plants were brought to Mexico by the early explorers and applied to the same or similar plants growing in the latter region. In the case of plants first discovered in Mexico, and quite unlike anything previously known to them, the Spaniards often adopted the native Mexican names, especially those of Nahuatl origin. It is interesting to observe how generally some of the Nahuatl names—often greatly modified in spelling and pronunciation, it is true—are now used among the Spanish-speaking people of North America, often in regions far remote from those where the Nahuatl language was ever spoken. Many of them are in common use among the Spanish-speaking people of Arizona and New Mexico, and some, like “mesquite,” have become recognized English words.

A large number of Nahuatl plant names are known, and many are listed here. Many more have been reported—particularly by Hernández—whose application is obscure or unknown. The Nahuatl language was the one spoken at the time of the Conquest by the inhabitants of the Valley of Mexico. The people of this prosperous region possessed a great love for flowers as objects of admiration and adornment, and were familiar with the properties and uses of many plants, consequently their botanical vocabulary was a remarkably large one. Less is known of the plant names of other parts of Mexico. Many names are known, however, from the Maya, which is the original and more or less current language of the Yucatán Peninsula and adjacent regions. Some names are available, also, from the Tarascan language of Michoacán; the Otomí, of north-central Mexico; and the Mixtec and Zapotec, of Oaxaca and Chiapas. Besides the vernacular names employed in Mexico, the writer has listed those from Central America, Colombia, and Venezuela, and from those islands of the West Indies in which Spanish is spoken, excluding, so

far as possible, those of local native dialects. The importance of recording native names can not be urged too strongly upon collectors. These names are often used very uniformly over wide areas and are, on the whole, probably better standardized than the English names employed in the United States. This is perhaps not remarkable, in view of the fact that many of the Spanish names have been in use for four centuries, and the native names much longer.

The vernacular names here cited are followed by parentheses in which are listed the states or countries in which they are known or reported to be used. If there is no further comment or indication, it may be assumed that the names are correctly applied. In many cases the vernacular names have been reported by a single authority, and in some cases the propriety of their application is doubtful; in such instances the vernacular name is followed by the name of the authority (in italics) to whom the writer is indebted for it.

ECONOMIC NOTES.

The economic notes also have been gathered from a wide variety of sources. A large amount of information concerning the uses of plants has been published in Mexico, and these data have been used freely. References have been given to the uses made of the plants in other regions, particularly Central America and the West Indies. Some of the information here presented is taken from the published and unpublished notes of Dr. Edward Palmer, who was engaged for many years in the botanical exploration of Mexico and made extensive observations on the local uses of plants. The Mexican flora contains a very large number of species of economic value, some of which, like the cacao and Mexican rubber tree, are of great commercial importance. The number of plants which yield edible fruit is very large. It would seem, also, that almost every species is employed locally for medicinal purposes, but too much importance should not be attached to the data reported regarding such uses, for, although many of the plants do possess therapeutic properties, in the far greater majority of cases the properties attributed are chiefly or wholly fictitious.

The Republic of Mexico, the region which is covered by the present work, is not a natural phytogeographic area, its boundaries being nowhere coincident with those of any limit of vegetation. It would be very difficult to draw a natural boundary along the northern frontier, and equally so on the south. There is no sharp break in the continuity of specific distribution on the south until the Isthmus of Panama is reached, and even here the break is not too pronounced, for a large number of species of woody plants are known to range from the arid regions of Colombia and Venezuela

to the similar arid areas of western Mexico. It would have been desirable to extend the scope of the present work to include Central America, but such an extension would have doubled, probably, the number of species treated. As the work now stands, it will be found useful for determination of a large proportion of the species native to Central America, as well as of those occurring in the United States in the region of the Mexican border.

To facilitate more thorough taxonomic study of the groups here treated, there have been listed, when practicable, references to monographic accounts of each family or genus, in which there will generally be found complete descriptions of the species. In most cases only the most recent monograph has been listed, but in some instances earlier systematic accounts have been mentioned if they seemed to furnish useful information or to be more easily accessible.

HISTORY OF BOTANICAL EXPLORATION IN MEXICO.

Botanical history in Mexico may be considered to have begun with the landing of the Conquistadores, for the earliest letters of Cortés to the King contain references to the curious vegetable products of the country. The true history of botanical activity in Mexico begins at a much earlier date, for the native inhabitants, who had already reached a high degree of civilization, may be said to have begun scientific researches. No other primitive people, probably, ever took so great an interest in botanical matters, and at the time of the Conquest none of the nations of Europe were much superior to the Mexicans in botanical knowledge. In one respect, at least, the latter had made greater progress in botanical activity, for they had established a botanical garden, on an elaborate scale, something that was not attempted in Europe until a still later date. Not only had the Aztec people acquired an intimate knowledge of the economic qualities of the plants with which they came in contact, a knowledge possessed by all primitive peoples, but they had developed an esthetic appreciation of plants for their beauty alone, a fact which indicates a rather high state of moral development. Flowers were cultivated extensively in the Valley of Mexico, and were brought in great quantities to the markets, where they were purchased for personal adornment and for the decoration of residences and temples. This love of flowers has persisted to the present time among the Mexican people, and cut flowers still occupy much space in the markets everywhere in the Republic.

Beginning with Hernández, a large number of botanical explorers from Europe and from the United States have visited Mexico, and many native Mexicans have contributed to our knowledge of the

vegetable productions of the country. It is not the writer's purpose to enumerate the men who have assembled the collections upon which the scientific knowledge of the Mexican flora is based, but references to most of them will be found in footnotes scattered through the systematic account of the flora. The earlier collectors have been discussed by Hemsley,¹ and the most complete information upon the subject has been published by León.² Several of the earliest enterprises for the botanical exploration of Mexico are so remarkable, and must be referred to so frequently in the text, that it seems essential to describe them in some detail. These are discussed below.

FRANCISCO HERNÁNDEZ.

His interest in the North American colonies having been awakened, perhaps by the reports made by the civil and religious authorities of the region, Philip II of Spain gave orders to his physician, Francisco Hernández, to prepare an account of the natural history, antiquities, and political conditions of New Spain.³ In order to give him a rank suitable to the importance of the work he was to undertake, Hernández was honored with the title of Protomédico of the Indies. He sailed from Spain in 1570, accompanied by his son. Although Philip II was very liberal in his appropriations for the expenses of the expedition, he appears to have underestimated the magnitude of the task, and it seems that Hernández was often embarrassed by his lack of financial resources. Hernández, however, compensated for this by his intense application to his work. He visited almost all parts of New Spain, observing all matters of natural history and collecting a vast amount of information. His enthusiasm led him to risk his health and life with experiments made upon his own person to determine the medicinal properties of plants discovered in the course of his travels. While upon a journey to Michoacán, he narrowly escaped death as a result of an experiment with the latex of "chupire." His health was finally undermined by his excessive labors, the worry caused by his financial embarrassment, and the hostility shown by some of those in authority. Five years had been the period assigned for the completion of his task, and at the end of that time, in 1575, he had 16 folio volumes ready for publication. Two years longer, however, he remained in Mexico, continually engaged

¹ Biol. Centr. Amer. Bot. 4: 117-137. 1887.

² Nicolás León, Biblioteca Botánico-Mexicana, catálogo bibliográfico y crítico de autores y escritos referentes a vegetales de México y sus aplicaciones, desde la Conquista hasta el presente. México, 1895. This work contains a remarkably complete and very valuable bibliography of Mexican botany. It is unfortunate that so many of the publications listed are inaccessible in even the largest libraries of the United States.

³ The name formerly applied to Mexico.

with the objects of his commission, and refusing to practice his profession for lack of leisure from his researches, although he states that he thus lost the opportunity of gaining more than 20,000 pesos. Taking advantage of his title of Protomédico, he assembled many of the Mexican physicians and directed them to test the native drugs and to inform him of the results obtained. He himself carried on experiments in the hospitals with drug plants whose properties he wished to determine.

In September, 1577, Hernández returned to Spain. He left in Mexico three or four copies of his manuscripts and sketches. Besides his manuscripts and herbarium, he carried to Spain many seeds and living plants to adorn the royal gardens. His execution of his Mexican commission must have satisfied the Spanish authorities, for he was offered a similar mission to Peru and other parts of the Indies, which he refused because of a desire to attend to the printing of his reports. His expectations in this direction, however, were destined to be sadly disappointed, for instead of being sent to the printer the manuscripts were buried in the library of the Escorial, although, as a Mexican writer remarks, "*with every honor*," for they "were beautifully bound, in blue leather covered and worked with gold, with clasps, corners, and ornaments of silver, all very heavy and of excellent workmanship and design." Notwithstanding this unfortunate and ironical conclusion of Hernández's expectations, Colmeiro asserts that he had seen "a sample impression of the colored plates which were projected for his natural history, with an estimate of the cost, to judge from which the edition would have been of uncommon beauty, and perhaps the first of its kind for that time."

Wearied by his disappointments, Hernández survived only a short time, and died January 28, 1578. Neither the exact date of his birth nor his birthplace is known, nor the place where his remains rest. He left 16 folio volumes, six of text, describing the animals, plants, and minerals of Mexico, and 10 of drawings representing these objects; also various miscellaneous manuscripts dealing with medicine, Mexican antiquities, and moral and religious philosophy. He had prepared a translation of Pliny's National History, and had written at least two philosophical works in verse. Except for a few fragments, all these works were destroyed by the fire which consumed the Royal Monastery of the Escorial in June 1671. Of the manuscripts left in Mexico nothing is known, and it is probable that all were lost within a few years after their preparation.

Soon after Hernández's death the King moved to remedy the delay in the publication of his works by commissioning another of his physicians, Dr. Nardo Antonio Recchi, a native of Naples, to take

charge of them. The latter apparently extracted from the manuscripts the portion which he believed would be most useful to the medical profession, for it is evident that most of the matter he selected was of this sort. Some doubts have been raised regarding Recchi's competency to perform the task assigned him; nevertheless except for his connection with the matter it is improbable that any portion of Hernández's work would ever have been published. Recchi's manuscript, however, met with no better treatment than the original one, for it too remained unpublished, and was taken later by its compiler to Naples. After Recchi's death it came into the possession of his nephew, from whom it was purchased by Prince Federico Cesi, a devoted student of natural history. By him it was turned over to the Accademia dei Lyncei, whose members undertook the arrangement and annotation of the manuscript and finally prepared it for publication. Through the Spanish ambassador at Rome funds for printing were secured, and the work of Hernández, thus modified, was at last given to the public. There is considerable uncertainty regarding the actual date of publication, but the date of completion is believed to have been 1651.¹ An abridged edition appeared as early as 1628, and extracts had been published by various authors at still earlier dates. An edition of the work prepared by Ortega was issued at Madrid in 1780.

Hernández's work is of great historic interest because of the fact that it is the first extensive publication dealing with the botanical features of Mexico. It contains a great mass of information regarding the plants of that country, some of which, relating to practices of the early inhabitants, had been forgotten before other botanists visited the region. A large part of the observations relate to medicinal properties of plants, and these are interesting even if not of much practical importance. It is unfortunate that the identity of many of Hernández's plants must remain a matter of conjecture, because his descriptions are usually drawn in such general terms, and the illustrations accompanying them are often equally vague. The book, however, will always possess an attraction for those interested in herb lore if not for the taxonomist. It must be remembered that the work, as we have it, is not that of Hernández himself, but only a compilation or an extract, and that the original manuscript if it

¹ *Rerum medicarum Novae Hispaniae thesaurus, seu plantarum animalium, mineralium mexicanorum historia ex Francisco Hernández, novi orbis medici primarii, relationibus in ipsa mexcana urbe conscriptis a Nardo Antonio Reccho collecta ac in ordinem digesta: a Joanne Terrentio, Joanne Fabro et Fabio Columna Lynceis notis et additionibus illustrata. Cui accessere aliquot ex Principis Federici Caesii frontispiciis theatri naturalis phytosophicae tabulae una cum quam plurimis iconibus.* Pp. 1-950+1-90, ill. Rome, 1651.

could have been published as prepared would doubtless have been of much greater value.

In recent years Mr. W. E. Safford, of the U. S. Department of Agriculture, has spent much time in identifying the plants treated by Hernández. He has published numerous papers upon the subject, and references to some of these will be found in the body of the present paper.

EXPEDITION OF CHARLES III.

The most elaborate botanical undertaking in the history of Mexico was undoubtedly the famous expedition of Charles III of Spain. That ruler decided to institute a survey of the natural resources of his extensive dominions beyond the sea, and for the execution of the project explorers were chosen from among the most learned scientists of Spain, parties of whom were sent to several of the Spanish possessions. One of these expeditions was dispatched to the Philippines and another, headed by Ruiz and Pavón, to Peru. Since Mexico was one of the two most important of the Spanish possessions, the party sent to that country, New Spain, as it was then known, was chosen with particular care.

It was headed by Dr. Martín Sessé y Lacasta, who was to have charge of a proposed botanical garden. The other members of the commission were D. Juan Diego del Castillo; D. José Longinos; D. Juan Cerda, a draftsman; and Dr. Vicente Cervantes, who was to establish a chair of botany in the City of Mexico. The members were chosen by D. Casimiro Gómez Ortega, the director of the botanical garden of Madrid.

The commission arrived in Mexico in 1788, and on the 1st of May at 5 in the evening there was inaugurated with great solemnity a department of botany in the University. Sessé delivered an inaugural dissertation which was preceded by the installation of the men chosen for the various professorships, conducted by the rector of the University. There were present the royal audience, the doctors, all of the religious societies, the regidores, military officials, and many members of society. The viceroy was unable to be present, but he was represented by D. Francisco Xavier Gamboa.

The University was illuminated at night and after a brilliant concert, according to a contemporaneous newspaper account, "there were lighted magnificent fireworks, ingeniously executed by that pyrotechnic artist, D. Joaquín Gavilán. Three trees, known in this kingdom under the name of papayo, closely imitating nature in the delineation of their leaves, flowers, and fruits, gave a clear picture of the sex of plants, which, being separated in this genus, was represented in the following manner: Two female trees, clothed with their respective flowers, and fruits of different stages of devel-

opment, indicated the method by which the latter take their development from the flowers of the male plant, which, as such, was without fruits and occupied the center, sending out sparks of fire, which, directed to the female plants, represented perfectly the pollen transported through the air to fertilize the female flowers.

“At the foot of the male tree were placed various decorations alluding to the features of a garden, which illuminated the Plaza with brilliant, spectacular, and fascinating lights of different colors and changed gradually into others no less entertaining. As the three trees disappeared there appeared an inscription in letters of fire which said, AMOR URIT PLANTAS, which is what the illustrious Carolus Linnaeus holds in his ingenious dissertation, *Sponsalia Plantarum*.”

At the same hour on the following day the botanical course was opened under the direction of Cervantes in the residence of the chief engineer of the city, D. Ignacio Castera, who also offered his garden as a laboratory. The botanical lectures were attended not only by the young students of the University but by numerous professional men, one of whom was D. José Mariano Mociño. The city government lent assistance to the new undertaking by setting apart for a botanical garden a parcel of land, a portion of which is now occupied by the home of the Instituto Médico Nacional.

Mociño was a young physician, native of Mexico, who so distinguished himself in his botanical studies that only seven months after the establishment of the botanical course he was appointed member of the scientific commission. A fellow student, Maldonado, was given a like appointment, that he might engage in the work of dissections. These two, besides Castillo and Longinos, were directed to explore the more remote parts of New Spain, while Sessé reserved for himself the exploration of the central regions of Mexico, and Cervantes confined his attention to his professorial duties.

Mociño's explorations extended on the south to the coast of Tabasco, which he visited in December, 1794, continuing his course into Guatemala. In company with Castillo he went north to the Tarahumare country, into what is now Chihuahua, and later he traveled in California, and as far as Nootka Sound, and still later in Jalisco, Michoacán, and other regions. Mociño survived the peril and fatigue of his travels, but not so Castillo, who died in the City of Mexico, July 26, 1793.

Besides Cerda, the official artist of the expedition, D. Atanasio Echeverría,¹ a native of Mexico, was employed in making drawings of botanical and other objects. A pharmacist, D. Jaime Senseve, also was appointed to the commission, and likewise D. José Antonio

¹ The genus *Echeveria*, of the family Crassulaceae, was named in his honor.

Alzate y Ramírez, the latter a distinguished scientist, born in Mexico, who published numerous articles dealing with Mexican plants.

Longinos engaged in the formation of collections of various objects and explored many parts of New Spain, his route extending even to the Californias. He visited also Guatemala and Yucatán, and died in the port of Campeche in 1803. Some of his collections were sent to Madrid and part remained in Mexico.

Mociño was the most enthusiastic and diligent of all the members of the commission. He was likewise the most adventurous, and in the ascent of the Volcán de Tuxtla, in 1793, he came near losing his life. He ended his field work in 1801, and in the Hospital de San Andrés he conducted experiments with the medicinal plants he had collected. He was able to communicate to others some of his enthusiasm for natural history, and many people began to take an interest in the subject, one of the results of which was the formation of an extensive museum. His chief interest, however, was the task, in association with Sessé, of arranging and describing his botanical collections, with the view of publishing a work entitled *Plantae Novae Hispaniae*. He had already prepared a *Flora Mexicana*, and specimens from his collections had been sent to Lagasca and Cavanilles, who described some of them as new species. In addition, living plants and seeds were forwarded to the Botanical Garden of Madrid.

Finally, in 1804, Sessé and Mociño made an end of their explorations and set sail for Madrid, with a rich herbarium and a series of 1,400 colored drawings, as well as their precious manuscripts. Cervantes remained in Mexico as director of the botanical garden and professor of botany.

Sessé and Mociño were filled with hope of the immediate publication of the results of their labors, but the bitter disappointment experienced by Hernández was to be the share of these two botanists also. They were given a cool reception and no facilities whatever for printing their reports. Hope of soon meeting with success in his ambitions induced Mociño to accept a meager pension from the Government, and he lived as a member of Sessé's family until the death of the latter in 1809. He manifested a deep interest in all scientific matters; he was appointed director of the cabinet of natural history of Madrid, gave courses in zoology, and with the assistance of another Mexican, D. Pablo de La Llave, arranged the zoological collections of the museum.

Mociño seems to have been on good terms with the French, who invaded Spain about this time, but he became involved in difficulties because of his refusal to recognize one Barrois as president of the Academy of Medicine, of which he was a member. When the French Army withdrew from Madrid, Mociño remained, presuming that he had not compromised himself by acting as a teacher of nat-

ural history during the occupation, but in this he was mistaken, for soon after he was seized, thrown into prison, and placed in chains, and thus he remained until the French Army returned. Thereupon he was released and permitted to return to the museum. Again the French retreated, and Mociño, who was now far advanced in years (the date of his birth is not known), resolved not to risk his fortunes again with the Spanish authorities, and took his departure, bearing with him in a cart his manuscripts and drawings. By night he slept in the cart, and by day he walked beside it, until it was taken from him by a French officer. He managed, however, to save his possessions and to escape from Spain, and as it was evidently unsafe for him to return to Madrid he took refuge at Montpellier. He was nearly blind and was reduced to beggary, from which he was rescued by certain French scientists.

In Montpellier he became acquainted with De Candolle and Dunal, who joined with him in assigning names to the new species of plants he had discovered. To De Candolle he turned over his manuscripts and drawings, and that famous Swiss botanist seems to have been the first of those who had seen them to have formed an adequate idea of their value. Mociño often visited De Candolle's lecture room, and one day the latter had occasion to deliver a eulogy of the Mexican botanist, unaware that the subject of his praise was present. When the latter's presence was pointed out to him, De Candolle embraced Mociño effusively and pressed him to take the chair and elucidate the subject that had suggested his name. Overcome by the occasion, Mociño burst into tears and was unable to speak a word.

After passing a few years at Montpellier, the adoption of the constitution in Spain gave Mociño hope that he might be permitted to return to Madrid. He besought such permission of the government, and it was finally granted. In April, 1817, consequently, he asked of De Candolle, who was now in Geneva, the return of his papers. The request was evidently made in urgent terms, but De Candolle was determined to keep copies of the drawings and descriptions, and hastened to have these made. De Candolle says that "About 120 persons came voluntarily to offer me their time and brushes; most of them were ladies of society; but there were also professional artists and a multitude of persons who were strangers to me. The young people united in the common task. The whole city was busy for 10 days, and the diligence of all those who knew how to use a brush or pencil was really affecting. * * * As a result of this diligence the collection of Mociño was almost wholly copied in the time fixed." "De Candolle never recounted this affectionate demonstration of his fellow citizens," says Dunal, "but his eyes filled with tender tears." The number of drawings thus copied

was 1,100, and from them 274 new*species were published in the *Prodromus*. Tracings of the sketches were distributed to many of the herbaria of Europe.

Mociño returned to Spain, where he received a warm welcome from the Minister of Marine, D. Juan Sabat, who gave him lodging in his home and assisted him in other ways. Mociño later started upon a voyage, but had proceeded only as far as Barcelona when he was overcome by illness, and he died in that city in 1819. Thus he failed to realize any of his hopes for the publication of the results of his long years of exploration and study, nor were the fruits of his labors destined to reach the public until still many more years had passed.

His drawings passed into the possession of the physician who attended him in his final illness, and it is not known what finally became of them. His manuscripts and other papers, including a "Flora de Guatemala," are in the Botanical Garden of Madrid, where the herbarium of the expedition is said to have been deposited in 1820. Some of the specimens reached the Lambert Herbarium, and it is believed that Mexican specimens at Kew and at the British Museum, labeled as having been collected by Pavón, are from the Sessé and Mociño collections. Presumably they were distributed by Pavón, and his name was affixed to the labels through some error. Pavón is not known to have visited Mexico.

The Sociedad Mexicana de Historia Natural learned that the manuscript of the *Flora Mexicana* existed at Madrid, and as early as 1870 made an attempt to secure a copy of it, but it was 15 years before the attempt was successful. It was desired also to secure the illustrations for publication, but this was found impracticable. The *Flora Mexicana* was finally published in the City of Mexico in 1888 by the Sociedad Mexicana de Historia Natural, and a second edition, with numerous corrections, was printed by the Instituto Médico Nacional in 1894. The *Plantae Novae Hispaniae* was printed by the former society in 1886, and was reprinted by the Secretaría de Fomento for the Chicago Exposition of 1893.

It was thus more than a hundred years after the organization of the expedition that the results of its investigations were finally made public. Perhaps no other botanical project has ever had so interesting a history, and none, it may safely be said, has ever been attended with so many dramatic incidents. If they had been published when first written, the two floras would have become historic. They were better prepared than most of the botanical works of their day, although their authors had a very broad conception of specific limits and referred many of the Mexican plants to species of the Old World tropics with which they were not even congeneric. When the works were actually printed they had long been obsolete, and most

of the plants dealt with had been described years before by other authors, sometimes under the same names but usually not. Aside from the sentimental interest that was gratified by the publication of the manuscripts, it is a matter of regret that botanical nomenclature was further taxed with so many useless synonyms. Indeed, but little attention has ever been paid by botanists to the numerous new names recorded in these two works.

ALEXANDER VON HUMBOLDT.

Alexander, Baron von Humboldt, one of the most illustrious men of his period, was born in Berlin in 1769. He was granted permission by the court of Spain to explore the Spanish possessions in America, and in 1799, in company with Aimée Bonpland, he sailed from Coruna. He landed at Cumaná, Venezuela, and starting from that point he explored New Andalusia (Venezuela) and Spanish Guiana. Thence he went to Cuba, and later to other parts of South America. In March, 1803, he landed at Acapulco, and followed the usual route of that day to the capital, where he made the acquaintance of Cervantes, Cal, Alzate, and many other scientists. He explored thoroughly the Valley of Mexico, and made collections also in Hidalgo, Querétaro, Guanajuato, Puebla, Jalisco, Michoacán, Guerrero, and other regions. Altogether, ten months were spent in Mexico, and in 1804 Humboldt and Bonpland returned to Paris, where the former remained for many years. He died in Berlin in 1850.

The rich material obtained by the expedition was sufficient to occupy the many years which Humboldt devoted to scientific study. The botanical collections were gathered chiefly by Bonpland, but the senior member of the expedition made extensive observations upon vegetation which served as the basis for classic works upon phytogeography. The Mexican collections included about 950 species, a large proportion of which were described as new. Along with the material from other regions they were turned over to Kunth, who published seven volumes describing them.¹ Humboldt and Bonpland also published jointly two large volumes dealing with some of the most interesting of their discoveries.² So far as modern botanical

¹ Nova genera et species plantarum quas in peregrinatione ad plagam aequinoctialem orbis novi collegerunt, descripserunt, partim adumbraverunt Amat. Bonpland et Alex. de Humboldt. Ex schedis autographis Amati Bonpland in ordinem digessit Carolus Siegesmund Kunth. Accedunt Alexandri de Humboldt notationes ad geographiam plantarum spectantes. Vols. 1-7. *pl.* 1-700. Paris, 1815-1825.

² Plantae aequinoctiales, per regnum Mexici in provinciis Caracarum et Novae Andalusiae, in Peruvianorum, Quitensium, Novae Granatae Andibus, ad Orenoci, Fluvii nigri, fluminis Amazonum ripas nascentes. In ordinem digessit Amatus Bonpland. Vols. 1, 2. *pl.* 1-143. Paris, 1808-1809.

work is concerned, the *Nova Genera et Species* is the first important work treating of Mexican plants. The collections obtained in South America were much more extensive than those from Mexico, and for Venezuela, Colombia, Ecuador, and Peru the work is of even greater importance than for Mexico. Humboldt and Bonpland were the first to make known to science many of the most common and characteristic Mexican plants.

Besides these and other systematic works, Humboldt published accounts of his voyages, which are replete with original observations upon matters of natural history. He was the father of the science of plant geography, and published several classic works upon the subject, the best known of which is his *Essai sur la Géographie des Plantes*.¹

Bonpland was born in 1773 in the French city of Rochelle. Some time after his return to Europe, in 1816, he decided to establish himself in America, and went to Buenos Aires, where he gave courses in natural history. He traveled in the more remote parts of Argentina, Paraguay, and Bolivia, and finally settled in Paraguay where he established a factory for the preparation of maté. This act seems to have aroused the jealousy of the dictator Francia, and in 1821 a band of his agents attacked the finca, killed some of the employees, and wounded Bonpland himself. The latter was put in chains and kept nine years in captivity, but later was released and devoted his attention to agricultural pursuits. He died in 1858.

SYSTEMATIC TREATMENT.

KEY TO THE FAMILIES.

Subkingdom Pteridophyta.

Plants without flowers or seeds, but producing spores. Ferns.

Rhizomes creeping, very slender, producing mostly ascending or reclining vinelike leaves of indeterminate growth; sporangia relatively few, subglobose to pyriform, dehiscing vertically; sori flattened.

GLEICHENIACEAE.

Rhizomes erect or ascending, mostly arborescent, bearing a terminal crown of large leaves; sporangia numerous, ovoid, dehiscing horizontally; sori essentially globose.-----CYATHEACEAE.

¹Friederich Alexander von Humboldt et Aimé Bonpland. *Essai sur la géographie des plantes; accompagné d'un tableau physique des régions équinoxiales, fondé sur des mesures exécutées depuis le dixième degré de latitude boréale jusqu'au dixième degré de latitude australe pendant les années 1799-1803.* Pp. 1-155. Paris, 1805.

Also, Friederich Alexander von Humboldt. *De distributione geographica plantarum secundum coeli temperiem et altitudinem montium, prolegomena.* Pp. 1-249. *pl.* Paris, 1817.

Subkingdom Spermatophyta.

Plants with flowers which produce seeds. Flowering plants.

KEY TO THE CLASSES.

Ovules and seeds borne on the face of a bract or scale; stigmas wanting.

1. GYMNOSPERMAE.

Ovules and seeds borne in a closed cavity; stigmas present.

2. ANGIOSPERMAE.

CLASS 1. GYMNOSPERMAE.

Leaves pinnate, broad; cotyledons united.....CYCADACEAE.

Leaves entire or denticulate, narrow, usually needle-like or scalelike; cotyledons distinct.

Stems jointed. Leaves reduced to whorled scales.....GNETACEAE.

Stems not jointed.

Ovulate flowers solitary; fruit baccate, small. Leaves short, linear.
TAXACEAE.

Ovulate flowers few or numerous; fruit a dry or fleshy cone, often large.
PINACEAE.

CLASS 2. ANGIOSPERMAE.

KEY TO THE SUBCLASSES.

Cotyledon 1; stems endogenous; leaves parallel-veined.

1. MONOCOTYLEDONEAE.

Cotyledons normally 2; stems exogenous; leaves not parallel-veined.

2. DICOTYLEDONEAE

Subclass 1. Monocotyledones.

Ovary inferior. Leaves mostly basal, often spine-toothed.

AMARYLLIDACEAE.

Ovary superior.

Perianth rudimentary, of scales, green or greenish, never corolla-like.
Grasses.....POACEAE.

Perianth of 2 distinct series, the inner series usually corolla-like.

Ovules solitary in each cell of the ovary. Palms; leaves usually compound or deeply lobed.....PHOENICACEAE.

Ovules 2 to many in each cell.

Inflorescence a fleshy spadix surrounded by a spathe; leaves succulent.

Plants usually epiphytic and scandent.....ARACEAE.

Inflorescence not a spadix.

Styles present; stems not scandent, unarmed; leaves linear or dagger-shaped.....LILIACEAE.

Styles none; stems scandent, armed with spines; leaves broad.

SMILACACEAE.

Subclass 2. Dicotyledones.

KEY TO THE SERIES.

Perianth segments wanting or all similar (especially in texture and color), rarely somewhat unequal, 5 or fewer.....1. APETALAE.

Perianth segments in 2 series, calyx and corolla, rarely similar but then more than 5.

Petals distinct, rarely coherent above but distinct below.

2. POLYPETALAE.

Petals united below (at least at the base) or throughout.

3. GAMOPETALAE.

Series 1. APETALAE.

Ovary superior, almost superior, or naked.

Perfect and pistillate flowers without a perianth.

Ovary with 2 or more cells.

Ovary 2-celled, with 1 ovule in each cell; styles 2. Leaves alternate, simple; flowers in catkins.....**BETULACEAE.**

Ovary 3 or 4-celled.

Ovary 3-celled; styles 3, or 1 but with 3 or 6 stigmas; fruit a 3-celled capsule.....**EUPHORBIACEAE.**

Ovary 4-celled; styles 2 or 4, or a 2-lobed sessile stigma; fruit 4-celled, indehiscent. Leaves fleshy, terete.....**BATIDACEAE.**

Ovary 1-celled.

Leaves reduced to whorled scales. Fruit conelike.....**CASUARINACEAE.**

Leaves not reduced to whorled scales.

Ovule 1 in each cell.

Leaves opposite, stipulate; stamen 1; ovule pendulous.

CHLORANTHACEAE.

Leaves alternate, or opposite and estipulate; stamens 2 to 16; ovule erect.

Fruit a drupe, covered with pale wax; seeds without endosperm; leaves estipulate, dentate.....**MYRICACEAE.**

Fruit a small berry; seeds with endosperm; leaves stipulate, entire. Flowers in long slender dense spikes.....**PIPERACEAE.**

Ovules more than 1 in each cell. Seeds with a tuft of hairs; leaves stipulate.....**SALICACEAE.**

Perfect and pistillate flows with a perianth.

A. Ovary 1, 1-celled.

B. Ovule 1.

Leaves stipulate.

Leaves deeply lobed, alternate.....**ROSACEAE.**

Leaves simple.

Styles 3, distinct or connate at the base. Stipules often sheath-like.....**POLYGONACEAE.**

Style 1 and undivided, or bipartite, or of 1 or 2 sessile stigmas.

Flowers perfect, racemose. Leaves alternate.

PHYTOLACCACEAE.

Flowers unisexual.

Stamens more numerous than the perianth segments; staminate flowers with a perianth.....**EUPHORBIACEAE.**

Stamens as many as the perianth segments or fewer; staminate flowers sometimes without a perianth. Leaves alternate.

Flowers solitary or clustered; juice not milky.....**ULMACEAE.**

Flowers spicate, racemose, or capitate; juice milky.

MORACEAE.

Leaves estipulate.

Perianth imbricate in bud. Leaves entire or dentate, simple.

Perianth segments 6, rarely fewer, the stamens then more numerous than the segments but not twice as many.

Anthers dehiscent by recurved valves; style 1; seeds without endosperm. Leaves alternate, aromatic.---**LAURACEAE.**

Anthers dehiscent by longitudinal slits; styles 2 or 3; seeds with endosperm. Leaves usually alternate.---**POLYGONACEAE.**

Perianth segments 2 to 5; stamens as many as the segments or fewer. Leaves alternate or opposite.

Flowers with thin chaffy bracts; filaments united, at least at the base.---**AMARANTHACEAE.**

Flowers with herbaceous bracts; filaments distinct. Leaves often succulent.---**CHENOPODIACEAE.**

Perianth valvate or open in bud. Style 1 or none; stigma 1.

Stamens inserted on the perianth. Leaves deeply lobed, alternate. **PROTEACEAE.**

Stamens free from the perianth.

Filaments wholly connate; anthers dehiscent extrorsely. Leaves alternate, entire.---**MYRISTICACEAE.**

Filaments free or connate only at the base; anthers dehiscent introrsely or laterally.

Stamens 3 or 4, equal in number to the perianth segments and opposite them. Leaves alternate; plants often with stinging hairs.---**URTICACEAE.**

Stamens more numerous or fewer than the perianth segments, rarely of the same number, but the plants then with opposite leaves, and the stamens 5 or alternate with the perianth lobes. Leaves alternate or opposite, entire.

ALLIONIACEAE.

BB. Ovules 2 or more in each cell.

Ovules 2 in each cell.

Flowers dioecious; styles 3, or the stigma sessile.

EUPHORBIACEAE.

Flowers perfect or polygamous; style 1.

Stamens 3 or 4; style terminal; leaves estipulate, alternate.

PROTEACEAE.

Stamens 8 or more, rarely fewer, but the style then basal; leaves usually stipulate, alternate.

Style basal, or if terminal the stamens numerous; leaves simple.

ROSACEAE.

Style terminal; stamens 8 or 10; leaves pinnate.

MIMOSACEAE.

Ovules 3 or more in each cell: Leaves alternate.

Ovules attached to the ventral suture of the ovary.

Stamens 4, without filaments; leaves simple, estipulate.

PROTEACEAE.

Stamens 5 or more, with filaments; leaves compound, stipulate.

MIMOSACEAE.

Ovules attached to several parietal placentae or to a basal or central placenta.

Stamen 1. Leaves entire, estipulate; flowers spicate.

LACISTEMACEAE.

Stamens numerous.

Ovary borne on a long gynophore; seeds without endosperm.

CAPPARIDACEAE.

Ovary sessile or nearly so; seeds with endosperm.

FLACOURTIACEAE.

AA. Ovary 1, several-celled, or the carpels several and distinct.

Ovaries several, distinct.

Stamens with connate filaments, hypogynous. Leaves alternate, stipulate.....STERCULIACEAE.

Stamens with distinct filaments, or the filaments wanting, the stamens in the latter case perigynous.

Perianth segments distinct; leaves opposite, compound; plants scandent.....RANUNCULACEAE.

Perianth segments of the perfect and pistillate flowers more or less united, those of the staminate flowers sometimes distinct but the plants then with alternate leaves; plants erect.

Ovules 2; leaves stipulate, pinnate.....SIMAROUBACEAE.

Ovule 1; leaves estipulate, simple.....MONIMIACEAE.

Ovary 1.

Ovule 1 in each cell.

Flowers perfect.....RHAMNACEAE.

Flowers polygamous or dioecious.

Leaves compound, estipulate; stamens 8.....SAPINDACEAE.

Leaves simple, stipulate; stamens 4 or 5, or 10 to 20.

Stamens 4 or 5.....RHAMNACEAE.

Stamens 10 to 20.....BUXACEAE.

Ovules 2 or more in each cell.

Ovules 2 in each cell.

Leaves stipulate.

Style 1, undivided; ovary 5-lobate. Leaves alternate.

STERCULIACEAE.

Styles several; ovary usually 3-lobate.....EUPHORBIACEAE.

Leaves estipulate.

Flowers perfect; seeds without endosperm.....ACERACEAE.

Flowers unisexual; seeds with endosperm.....BUXACEAE.

Ovules 3 or more in each cell.

Stamens 15 or fewer.....TILIACEAE.

Stamens very numerous.....ELAEOCARPACEAE.

Ovary inferior, almost inferior, or half inferior.

Ovary 1-celled, or sometimes incompletely several-celled.

Ovule 1.

Stamens as many as the perianth segments and alternate with them; perianth corolla-like. Flowers in involucrate heads.

ASTERACEAE.

Stamens as many as the perianth segments and opposite them, or fewer or more numerous; perianth calyx-like or wanting.

Leaves stipulate.

Leaves opposite.....CHLORANTHACEAE.

Leaves alternate.....MORACEAE.

Leaves estipulate.

Leaves pinnate. Plants trees or shrubs; flowers in catkins.

JUGLANDACEAE.

Leaves simple, sometimes reduced to scales.

Plants trees; fruit winged.....HERNANDIACEAE.

Plants small shrubs, often parasitic; fruit not winged.

Leaves opposite or verticillate, sometimes reduced to scales;
plants parasitic-----**LORANTHACEAE.**

Leaves mostly alternate; plants not parasitic.

CHENOPODIACEAE.

Ovules 2 or more.

Ovules 2 to 4. Leaves alternate, simple-----**COMBRETACEAE.**

Ovules 6 or more.

Plants erect trees; fruit an acorn; flowers in catkins----**FAGACEAE.**

Plants scandent shrubs; fruit not an acorn; flowers not in catkins.

ARISTOLOCHIACEAE.

Ovary completely several-celled.

Ovule 1 in each cell; leaves simple, stipulate.

Ovary cells and styles or stigmas 3 or 4. Leaves opposite or alternate,
entire or dentate-----**RHAMNACEAE.**

Ovary cells and styles or stigmas 2. Leaves entire, opposite.

RUBIACEAE.

Ovules 2 or more in each cell; leaves simple, estipulate.

Plants scandent; perianth 3-lobed or 1 or 2-lipped; leaves alternate.

ARISTOLOCHIACEAE.

Plants erect; perianth 4 to 8-lobed or parted; leaves opposite or alternate.

MYRTACEAE.

Series 2. POLYPETALAE.

A. Ovary wholly or half inferior.

B. Perfect stamens 10 or fewer.

Ovule 1 in each cell of the ovary.

Stamens as many as the petals and opposite them.

Ovary 1-celled; plants parasitic. Leaves opposite or verticillate, entire.
LORANTHACEAE.

Ovary 2 to 4-celled; plants not parasitic. Leaves opposite or alternate,
entire or dentate-----**RHAMNACEAE.**

Stamens as many as the petals and alternate with them, or fewer or
more numerous.

Style 1, simple or cleft only at the apex, or the stigma 1 and sessile.

Fruit an achene. Flowers in dense globose heads; leaves alternate,
usually lobate-----**PLATANACEAE.**

Fruit not an achene. Leaves alternate or opposite.

Petals contorted in bud. Leaves simple, entire or dentate.

ONAGRACEAE.

Petals valvate in bud.

Leaves entire; flowers not in umbels-----**CORNACEAE.**

Leaves lobed or compound; flowers in umbels--**ARALIACEAE.**

Styles 2 or more, free or connected only at the base, or the stigmas 2
or more and sessile. Leaves alternate.

Ovary half inferior; fruit capsular; flowers in globose heads.

Leaves palmately lobed-----**HAMAMELIDACEAE.**

Ovary wholly inferior; fruit baccate; flowers in umbels.

ARALIACEAE.

Ovules 2 or more in each cell of the ovary.

Styles 2 or more, united only at the base.

Leaves alternate-----**FLACOURTIACEAE.**

Leaves opposite-----**HYDRANGEACEAE.**

Style 1, simple or cleft only at the apex, or stigma 1 and sessile.

Petals valvate in bud.

Stamens 8 to 10, twice as many as the petals; calyx lobes valvate in bud; leaves alternate or opposite-----**COMBRETACEAE**.

Stamens 2 to 6, as many as the petals or fewer; calyx lobes open or imbricate in bud; leaves alternate-----**OLACACEAE**.

Petals imbricate or contorted in bud.

Ovary 1-celled, the ovules suspended from the apex of the cell.

COMBRETACEAE.

Ovary 1-celled, with basal, central, or parietal ovules, or several-celled.

Ovary 4 or 5-celled.

Perfect stamens 10; leaves opposite-----**MYRTACEAE**.

Perfect stamens 5; leaves alternate--**PTEROSTEMONACEAE**.

Ovary 1-celled, or incompletely several-celled.

Anthers dehiscent by terminal pores; leaves usually with longitudinal ribs, opposite-----**MELASTOMATACEAE**.

Anthers dehiscent by longitudinal slits; leaves without longitudinal ribs.

Seeds with endosperm; petals imbricate or open in bud; fruit baccate; leaves alternate----**GROSSULARIACEAE**.

Seeds without endosperm; petals contorted; fruit capsular; leaves alternate or opposite-----**ONAGRACEAE**.

BB. Perfect stamens more than 10.

Style 1, simple or cleft only at the apex, or stigma 1 and sessile.

Leaves stipulate. Leaves opposite, entire-----**RHIZOPHORACEAE**.

Leaves estipulate.

Plants very succulent and spiny, the leaves usually absent.

CACTACEAE.

Plants neither succulent nor spiny; leaves well developed.

Stamens usually twice as many as the petals; leaves usually with longitudinal ribs-----**MELASTOMATACEAE**.

Stamens more than twice as many as the petals; leaves without longitudinal ribs.

Sepals 2 to 4, or more and imbricate; leaves usually punctate.

MYRTACEAE.

Sepals 5 to 8, valvate; leaves not punctate-----**PUNICACEAE**.

Styles 2 or more, free or united only at the base, or the stigmas 2 or more and sessile.

Leaves estipulate, opposite.

Flowers borne upon the leaves; petals valvate in bud.

ESCALLONIACEAE.

Flowers not borne upon the leaves; petals valvate or imbricate.

HYDRANGEACEAE.

Leaves stipulate, alternate. Petals imbricate in bud.

Ovary 1-celled; petals usually 6 to 8-----**FLACOURTIACEAE**.

Ovary several-celled; petals 5-----**MALACEAE**.

AA. Ovary superior or nearly so.

C. Ovary 1, 1-celled or incompletely several-celled.

Sepals 2, distinct or rarely connate and forming a cap. Leaves estipulate.

Leaves entire; plants with colorless juice-----**PORTULACACEAE**.

Leaves dentate or lobate; plants with colored juice--**PAPAVERACEAE**.

Sepals 3 or more.

D. Perfect stamens 1 to 10.

E. Style 1, simple, with 1 stigma or with several connected stigmas, or stigma 1 and sessile.

F. Ovules 1 or 2 in each cell.

Leaves stipulate, alternate.

Style basal-----**ROSACEAE.**

Style terminal or nearly so.

Flowers papilionaceous (like that of the bean or pea), the upper petal outside-----**FABACEAE.**

Flower not papilionaceous, the upper petal innermost.

CAESALPINIACEAE.

Leaves estipulate.

Leaves simple.

Flowers regular.

Sepals and petals 3; anthers dehiscent by valves. Leaves alternate, aromatic-----**LAURACEAE.**

Sepals and petals 4 to 6; anthers dehiscent by longitudinal slits.

Petals valvate in bud; endosperm copious **OLACACEAE.**

Petals imbricate in bud; endosperm scant or none.

Ovule 1; leaves usually compound.

ANACARDIACEAE.

Ovules 2; leaves simple-----**ICACINACEAE.**

Flowers distinctly irregular.

Fruit covered with barbed spines. Leaves entire.

KRAMERIACEAE.

Fruit without barbed spines.

Stamens 4 to 8, hypogynous; anthers dehiscent by pores.

Leaves entire; flowers racemose **POLYGALACEAE.**

Stamens 9 or 10, usually perigynous; anthers dehiscent by longitudinal slits-----**FABACEAE.**

Leaves compound.

Ovule 1-----**ANACARDIACEAE.**

Ovules 2.

Ovules ascending; stamens 10, perigynous, 5 of them often sterile-----**CONNARACEAE.**

Ovules descending; stamens 3 to 8, hypogynous, all perfect.

Stamens 3 to 5; seeds with endosperm; leaves with transparent glands-----**RUTACEAE.**

Stamens 8; seeds without endosperm; leaves without transparent glands-----**BURSERACEAE.**

FF. Ovules more than 2 in each cell.

Ovules attached to a basal or free central placenta. Leaves alternate.

Stamens alternate with the petals. Leaves simple.

OLACACEAE.

Stamens opposite the petals.

Petals valvate in bud; plants climbing, with tendrils.

VITACEAE.

Petals imbricate; plants erect.

Sepals and petals 4 or 5; leaves simple; fruit 1-seeded.

MYRSINACEAE.

Sepals 9; petals 6; leaves compound; fruit 3-seeded.

BERBERIDACEAE.

Ovules attached to a sutural placenta or to 2 or more parietal placentae.

Ovules attached to the ventral suture of the ovary. Leaves usually compound, alternate; fruit a legume.

Corolla regular or nearly so.....**CAESALPINIACEAE.**

Corolla very irregular, papilionaceous.....**FABACEAE.**

Ovules attached to 2 or more parietal placentae.

Calyx segments united. Leaves entire, small.

FRANKENIACEAE.

Calyx segments distinct.

Petals 4. Ovary stipitate.....**CAPPARIDACEAE.**

Petals 5.

Leaves pinnate.....**MORINGACEAE.**

Leaves simple.....**VIOLACEAE.**

EE. Styles 2 or more, free or partially united, with separate stigmas, or stigmas 2 or more and sessile.

Ovule 1.

Sepals and petals each 3. Leaves entire, stipulate, the stipules sheathing.....**POLYGONACEAE.**

Sepals and petals each 4 to 6.

Stamens opposite the petals and of the same number; style 5-parted. Leaves simple.....**PLUMBAGINACEAE.**

Stamens alternate with the petals, or more numerous; styles usually 3. Leaves usually compound.....**ANACARDIACEAE.**

Ovules 2 or more. Leaves alternate.

Plants with tendrils; ovary stipate.....**PASSIFLORACEAE.**

Plants without tendrils; ovary sessile.

Leaves not scalelike.....**TURNERACEAE.**

Leaves scalelike.....**TAMARICACEAE.**

DD. Perfect stamens more than 10

Ovule 1.

Leaves opposite.....**CLUSIACEAE.**

Leaves alternate.....**AMYGDALACEAE.**

Ovules 2 or more.

Ovules basal, apical, central, or sutural.

Petals and stamens hypogynous; sepals imbricate in bud. Leaves simple, alternate.....**DILLENACEAE.**

Petals and stamens perigynous, rarely almost hypogynous but the sepals then valvate.

Leaves estipulate, entire.....**LYTHRACEAE.**

Leaves usually stipulate, dentate to pinnate.

Ovules 2; leaves simple.....**BOSACEAE.**

Ovules usually more than 2; leaves pinnate.

CAESALPINIACEAE.

Ovules on several parietal placentae.

Filaments wholly connate. Leaves alternate, estipulate, transparent-dotted; fruit berry-like.....**CANELLACEAE.**

Filaments free or connate only at the base.

Leaves, at least the lowest, opposite, simple. Fruit a capsule; low shrubs.

Plants not gland-dotted.....**CISTACEAE.**

Plants gland-dotted.....**HYPERICACEAE.**

Leaves alternate.

Style usually wanting; endosperm scant or none. Petals 4;
ovary stipitate-----**CAPPARIDACEAE.**

Style evident; endosperm copious. Leaves simple.

Petals similar to the sepals, perigynous; stamens perigynous.
FLACOURTIACEAE.

Petals unlike the sepals, hypogynous; stamens hypogynous.

Ovary 1-celled; fruit spiny; seeds glabrous, arillate;
flowers pinkish white-----**BIXACEAE.**

Ovary incompletely 3 to 5-celled, smooth; seeds woolly;
flowers yellow-----**COCHLOSPERMACEAE.**

CC. Ovary 1, completely or almost completely several-celled, or the ovaries
several and distinct.

D. Ovaries several, distinct or connate only at the base, with wholly dis-
tinct styles and stigmas.

Petals and stamens perigynous.

Leaves stipulate, alternate.

Seeds not arillate -----**ROSACEAE.**

Seeds arillate. Leaves entire-----**CROSSOSOMATACEAE.**

Leaves estipulate.

Leaves compound, not fleshy; ovules 2-----**CONNARACEAE.**

Leaves simple, fleshy; ovules numerous-----**CRASSULACEAE.**

Petals and stamens hypogynous. Leaves estipulate.

Stamens twice as many as the sepals or fewer.

Ovule 1 in each carpel. Leaves simple.

Leaves opposite or verticillate; flowers perfect or polygamous;
petals 5; carpels 5 to 10; plants not scandent.

CORIARIACEAE.

Leaves alternate; flowers dioecious; petals 6 or rarely 3; plants
scandent -----**MENISPERMACEAE.**

Ovules 2 or more in each carpel.

Petals 6, twice as many as the sepals. Leaves entire.

ANNONACEAE.

Petals as many as the sepals, 3 or more, usually 5.

Plants leafless or nearly so-----**KOEBERLINIACEAE.**

Plants with well-developed leaves. Leaves compound.

Stamens and staminodia together 3 to 8; ovules descending;
leaves with translucent glands-----**RUTACEAE.**

Stamens and staminodia together 10; ovules ascending; leaves
without glands-----**CONNARACEAE.**

Stamens more than twice as many as the petals.

Perianth usually composed of 4 or more sepals and an equal or lesser
number of petals. Seeds arillate; leaves entire, alternate.

DILLENACEAE.

Perianth composed of 3 sepals and 6 or more (rarely 3) petals.
Leaves entire.

Sepals valvate in bud; leaves estipulate-----**ANNONACEAE.**

Sepals imbricate in bud; leaves usually stipulate.

MAGNOLIACEAE.

DD. Ovaries several, with connate styles or stigmas, or ovary 1.

E. Ovule 1 in each cell.

Stamens distinctly perigynous.

Stamens 10 or more. Leaves alternate, stipulate-----**ROSACEAE.**

Stamens 4 or 5. Leaves simple, entire or dentate.

Calyx valvate in bud; stamens opposite the petals and often adnate to them-----**RHAMNACEAE.**

Calyx imbricate; stamens alternate or opposite, but very rarely adnate to the petals-----**CELASTRACEAE.**

Stamens hypogynous.

Flowers unisexual.

Ovary 4 to 6-parted; leaves usually pinnate; alternate, estipulate.
SIMAROUBACEAE.

Ovary entire or slightly lobed; leaves simple or digitate.

Ovules pendulous or descending; ovary usually 3-celled.

Cells of the ovary 3; fruit usually a capsule.

EUPHORBIACEAE.

Cells of the ovary 4 or more; fruit a drupe.

AQUIFOLIACEAE.

Ovules ascending; ovary usually 4 or 5-celled. Fruit drupaceous.

CLUSIACEAE.

Flowers perfect or polygamous.

Flowers polygamous.

Leaves opposite or verticillate, entire. Stamens numerous.

CLUSIACEAE.

Leaves alternate, usually compound.

Stamens inserted within a disk; ovules ascending or horizontal; radicle inferior-----**SAPINDACEAE.**

Stamens inserted outside a disk; ovules pendulous or horizontal; radicle superior. Leaves pinnate.

Ovary entire or slightly lobed; styles several and distinct, or stigma 1 and sessile-----**ANACARDIACEAE.**

Ovary deeply divided; styles connate--**SIMAROUBACEAE.**

Flowers perfect.

Stamens more than 10. Leaves stipulate, simple.

Sepals valvate or open in bud, more or less united; anthers 1-celled-----**MALVACEAE.**

Sepals imbricate, free or nearly so; anthers 2-celled. Flowers yellow-----**OCHNACEAE.**

Stamens 10 or fewer.

Leaves simple and entire, toothed, or lobed.

Stamens 8; ovary 2-celled. Leaves entire; flowers racemose.
POLYGALACEAE.

Stamens 2 to 6, or 10; ovary 3 to 6-celled.

Ovary 5 or 6-celled. Leaves alternate, stipulate; petals imbricate, yellow-----**OCHNACEAE.**

Ovary 2 to 4-celled. Leaves entire; plants often scandent.
MALPIGHIACEAE.

Leaves compound.

Filaments united. Leaves pinnate; ovary entire.

MELIACEAE.

Filaments free.

Leaves gland-dotted; filaments without scales; ovary entire-----**RUTACEAE.**

Leaves not gland-dotted; filaments usually with a basal scale; ovary usually divided---**SIMAROUBACEAE.**

EE. Ovules 2 or more in each cell.

F. Stamens hypogynous; disk none, but separate glands or a gynophore sometimes present.

Leaves opposite or verticillate, entire.

Flowers unisexual, regular-----**CLUSIACEAE.**

Flowers perfect, irregular-----**VOCHYSIACEAE.**

Leaves alternate.

Leaves stipulate.

Calyx segments imbricate in bud.

Stamens more than 10. Petals 4; ovary borne on a long gynophore; stigma sessile-----**CAPPARIDACEAE.**

Stamens 10. Leaves entire-----**ERYTHROXYLACEAE.**

Calyx segments valvate or open in bud.

Petals valvate in bud. Stamens 4 or 5, free; ovary sessile, 2 or rarely 3 or 4-celled; vines with tendrils---**VITACEAE.**

Petals imbricate or convolute.

Ovary stipitate; petals (4) imbricate--**CAPPARIDACEAE.**

Ovary sessile or nearly so; petals usually convolute in bud.

Anthers 1-celled, dehiscent by a pore or a longitudinal slit.

Filaments adnate; petals 5; seeds sometimes covered with long hairs.

Leaves simple; flowers usually calyculate; filaments united to the apex or nearly so----**MALVACEAE.**

Leaves digitate or simple; flowers not calyculate; filaments united only at the base or in the lower half.

BOMBACACEAE.

Anthers 2-celled, dehiscent by 2 pores or longitudinal slits.

Filaments more or less united; staminodia present.

STERCULIACEAE.

Filaments free, or slightly united at the base, but staminodia then absent -----**TILIACEAE.**

Leaves estipulate.

Stamens more than twice as many as the petals.

Ovary long-stipitate; ovules numerous---**CAPPARIDACEAE.**

Ovary sessile; ovules 3 or few.

Style distinct; petals free or nearly so-----**THEACEAE.**

Style none; petals united at the apex.

MARCGRAVIACEAE.

Stamens as many or twice as many as the petals.

Leaves compound.

Filaments free; leaves gland-dotted-----**RUTACEAE.**

Filaments united; leaves not gland-dotted.

Leaflets 3, entire-----**OXALIDACEAE.**

Leaflets 5 or more-----**MELIACEAE.**

Leaves simple.

Ovary 1-celled. Leaves entire---**ERYTHROXYLACEAE.**

Ovary 2 to 7-celled.

Calyx lobes valvate in bud-----**STERCULIACEAE.**

Calyx lobes imbricate in bud.

Stamens 5-----**MARCGRAVIACEAE.**

Stamens 10 to 14-----**CLETHRACEAE.**

FF. Stamens hypogynous, but inserted at the base or on the surface of a disk, or perigynous.

G. Leaves stipulate.

Stamens twice as many as the petals or more.

Styles 2 to 5.

Styles 2; stamens 8 to 12; leaves compound, usually opposite.

CUNONIACEAE.

Styles 5; stamens usually numerous; leaves simple or compound, alternate.....ROSACEAE.

Style 1, simple or bilobulate.

Leaves compound; stamens 8 to 10.....ZYGOPHYLLACEAE.

Leaves simple; stamens usually numerous.

Stamens inserted on a disk; ovules numerous; leaves opposite or alternate.....ELAEOCARPACEAE.

Stamens inserted on the calyx tube; ovules 2 in each cell; leaves opposite, entire.....RHIZOPHORACEAE.

Stamens as many as the petals or fewer.

Stamens as many as the petals and opposite them. Vines with tendrils; leaves alternate.....VITACEAE.

Stamens as many as the petals and alternate with them, or fewer.

Leaves compound. Flowers perfect.

Ovary 2 to 4-lobate; seeds without endosperm.

SAPINDACEAE.

Ovary 3-celled; seeds with endosperm.....STAPHYLEACEAE.

Leaves simple.

Style 1, simple; ovules erect or ascending; flowers usually perfect.....CELASTRACEAE.

Style 1 and divided, or styles 3; ovules pendulous or inverted; flowers unisexual.....EUPHORBIACEAE.

G. Leaves estipulate.

Leaves simple; disk present or absent.

Leaves alternate. Stamens 2 to 10, twice as many as the petals or fewer.

Stamens 5, opposite the petals, only 2 of them fertile. Ovary 2-celled, each cell with 2 ovules.....SABIACEAE.

Stamens 3 to 10, alternate with the petals, or less or more numerous.

Leaves with translucent glands.....RUTACEAE.

Leaves without glands.....CELASTRACEAE.

Leaves opposite or whorled.

Stamens 3, less numerous than the petals. Leaves entire.

HIPPOCRATEACEAE.

Stamens as many as the petals or more numerous.

Ovules 2 in each cell.

Ovary 2-celled; leaves without translucent glands. Fruit a double samara.....ACERACEAE.

Ovary 3 to 5-celled; leaves with translucent glands.

RUTACEAE.

Ovules more than 2 in each cell.

Styles or stigmas 5 to 10; leaves entire.....CLUSIACEAE.

Style 1, simple.

Calyx lobes imbricate or open in bud; leaves with longitudinal ribs.....MELASTOMATACEAE.

Calyx lobes valvate; leaves not ribbed.....LYTHRACEAE.

Leaves compound; disk always present.

Stamens inserted within the disk. Flowers usually polygamous.

Petals usually 5; plants often scandent-----**SAPINDACEAE.**

Petals 4; plants erect. Leaves digitate----**AESCULACEAE.**

Stamens inserted outside the disk.

Fertile stamens 2; petals 5, 1 or 2 of them much reduced.

SABIACEAE.

Fertile stamens as many as the petals, rarely fewer, but the
4 or 5 petals then subequal.

Stamens as many as the petals and opposite them; flowers
dioecious. Leaves alternate -----**SIMAROUBACEAE.**

Stamens as many as the petals and alternate with them, or
more or less numerous; flowers usually perfect or
polygamous.

Filaments united -----**MELIACEAE.**

Filaments free.

Leaves with translucent glands-----**RUTACEAE.**

Leaves without glands-----**BURSERACEAE.**

Series 3. **GAMOPETALAE.**

Ovary inferior or semi-inferior.

Stamens numerous.

Ovary 1-celled; plants succulent, usually armed with spines; leaves usually
absent -----**CACTACEAE.**

Ovary several-celled; plants not succulent, unarmed; leaves well developed.
SYMPLOCACEAE.

Stamens 10 or fewer.

Stamens twice as many as the corolla lobes. Fruit fleshy; anthers opening
by terminal pores; leaves alternate, simple-----**VACCINIACEAE.**

Stamens as many as the corolla lobes or fewer.

Stamens as many as the corolla lobes and opposite them. Corolla lobes
valvate in bud.

Plants parasitic; stigma entire; leaves opposite or verticillate, entire.
LORANTHACEAE.

Plants not parasitic; stigma bilobate; leaves alternate, estipulate.
OLACACEAE.

Stamens as many as the corolla lobes and alternate with them, or less
numerous.

Ovary 1-ovulate.

Anthers coherent; flowers in an involucrate head. Fruit an achene.
ASTERACEAE.

Anthers not coherent; flowers not in an involucrate head. Leaves
opposite.

Stipules present, free from the petiole. Leaves always entire.

RUBIACEAE.

Stipules none, or if present united with the petiole.

CAPRIFOLIACEAE.

Ovary containing 2 or more ovules.

Perfect stamens fewer than the corolla lobes. Leaves simple.

GESNERIACEAE.

Perfect stamens as many as the corolla lobes.

Ovaries 2, distinct. Leaves simple, entire-----**APOCYNACEAE.**

Ovary 1, entire.

Leaves alternate, often lobed or compound.....**ARALIACEAE.**

Leaves opposite or verticillate.

Leaves estipulate.....**CAPRIFOLIACEAE.**

Leaves stipulate, entire.....**RUBIACEAE.**

Ovary superior or nearly superior.

A. Perfect stamens as many as the corolla lobes and opposite them, or more numerous.

Ovary 1-celled.

Ovule 1. Leaves simple.

Styles 3, or style 1 but with 3 stigmas; flowers dioecious. Plants scandent.....**MENISPERMACEAE.**

Style 1, with 5 stigmas; flowers perfect.....**PLUMBAGINACEAE.**

Ovules 2 or more.

Fruit a legume; leaves compound, alternate.....**MIMOSACEAE.**

Fruit a drupe or capsule; leaves simple.

Plants armed with spines.....**FOUQUIERIACEAE.**

Plants unarmed.

Staminodia none in the staminate flowers; seeds small, black or dark brown.....**MYRSINACEAE.**

Staminodia always present; seeds large, yellow or orange.

THEOPHRASTACEAE.

Ovary perfectly, or sometimes imperfectly, 2 or more-celled.

Leaves stipulate (stipules sometimes minute or deciduous).

Flowers unisexual. Ovary 3-celled.....**EUPHORBIACEAE.**

Flowers perfect. Leaves alternate.

Anthers 2-celled; staminodia present.....**STERCULIACEAE.**

Anthers 1-celled; staminodia absent.

Leaves simple; flowers calyculate; filaments united almost throughout.....**MALVACEAE.**

Leaves digitate or simple; flowers not calyculate; filaments united only at the base or in the lower half.....**BOMBACACEAE.**

Leaves estipulate.

Flowers unisexual, rarely polygamous. Styles several, free or partially united.

Ovules 1 or 2 in each cell. Leaves entire.....**DIOSPYRACEAE.**

Ovules more than 2 in each cell.

Stamens 10; ovules parietal; juice milky; leaves compound or lobed.....**CARICACEAE.**

Stamens more than 10; ovules axial; juice not milky; leaves simple.....**THEACEAE.**

Flowers perfect.

Calyx segments free or united only at the base. Leaves simple.

Stamens more than twice as many as the corolla lobes, 9 or more.
THEACEAE.

Stamens as many or twice as many as the corolla lobes, 8 or fewer.

Flowers irregular. Leaves entire.....**POLYGALACEAE**

Flowers irregular.

Stamens as many as the corolla lobes; juice milky.

SAPOTACEAE.

Stamens more numerous than the corolla lobes; juice not milky.....**ERICACEAE.**

Calyx segments united to the middle or higher.

Leaves with translucent glands; ovary deeply lobate, the cells
2-ovulate-----**RUTACEAE.**

Leaves without translucent glands; ovary entire or scarcely lobate.
Leaves pinnate-----**MELIACEAE.**

Leaves simple.

Ovary 3-celled; anthers longitudinally dehiscent. Flowers
white, showy; pubescence of branched hairs.

STYRACACEAE.

Ovary with 4 or more cells; anthers dehiscent by apical pores.

ERICACEAE.

AA. Perfect stamens as many as the corolla lobes and alternate with them,
or less numerous.

B. Perfect stamens 3 or more, as many as the corolla lobes; corolla usually
regular.

C. Ovary simple and of 1 or 2 cells, or the ovaries 2 and distinct.

D. Ovules 2 to 4 in the whole ovary.

Leaves opposite or verticillate.

Style stigmatose only below the apex; corolla lobes contorted in
bud. Ovary 2-celled or the ovaries 2 and distinct; leaves
entire; juice usually milky-----**APOCYNACEAE.**

Style stigmatose at the apex or between the lobes; corolla lobes
imbricate or valvate.

Leaves stipulate; style simple-----**LOGANIACEAE.**

Leaves estipulate; style with 1 or 2 stigmas-----**VERBENACEAE.**

Leaves alternate.

Corolla valvate or plicate in bud.

Ovules erect; stigmas usually 2. Fruit a capsule.

CONVOLVULACEAE.

Ovules pendent; stigma 1.

Leaves compound; fruit a legume; plants often armed with
spines-----**MIMOSACEAE.**

Leaves simple; fruit not a legume; plants unarmed.

ICACINACEAE.

Corolla imbricate in bud.

Style stigmatose only below the apex; stigma 1. Leaves entire;
juice usually milky-----**APOCYNACEAE.**

Style stigmatose at the apex; stigmas 2. Leaves simple.

Ovary 1-celled-----**HYDROPHYLLACEAE.**

Ovary 2-celled-----**BORAGINACEAE.**

DD. Ovules more than 4 in the whole ovary.

Fruit a legume; leaves compound. Plants often armed with spines.

MIMOSACEAE.

Fruit not a legume; leaves simple.

Ovaries usually 2 and distinct; juice milky. Plants often
scandent; leaves entire.

Styles separate almost to the apex-----**ASCLEPIADACEAE.**

Styles separate only at the base, or completely united.

APOCYNACEAE.

Ovary 1, entire or slightly lobate; juice not milky. Leaves simple.

Leaves all opposite-----**LOGANIACEAE.**

Leaves alternate, or only the lowest opposite.

Style bifid-----**HYDROPHYLLACEAE.**

Style undivided.

Ovary 1-celled-----**GESNERIACEAE.**

Ovary 2-celled.

Corolla valvate or plicate in bud; fruit often baccate;
plants often armed with spines-----**SOLANACEAE.**

Corolla imbricate in bud; fruit a capsule with longitudinal
dehiscence; plants unarmed.

SCROPHULARIACEAE.

CC. Ovary simple and of 3 or more cells, or the ovaries 3 or more and
distinct.

Ovules 1 or 2 in each cell.

Leaves opposite or verticillate.

Cells of the ovary 3; stigmas 3; fruit a capsule.

POLEMONIACEAE.

Cells of the ovary 4 or 5; stigmas 1, 2, 4, or 5; fruit indehiscent
or divided into nutlets. Leaves simple.

Ovary entire. Stigmas 3, rarely 5-----**VERBENACEAE.**

Ovary 4-parted.

Stamens 4; stigmas 2 or rarely 1; corolla bilabiate.

MENTHACEAE.

Stamens 5; stigma 1; corolla regular-----**BORAGINACEAE.**

Leaves alternate.

Anthers basifixed, opening laterally or apically. Leaves entire.

DIOSPYRACEAE.

Anthers dorsifixed, or basifixed and opening internally.

Corolla united only at the base-----**AQUIFOLIACEAE.**

Corolla with a conspicuous tube.

Flowers mostly in 1-sided cymes; fruit not a capsule.

BORAGINACEAE.

Flowers not in 1-sided cymes; fruit a capsule.

CONVOLVULACEAE.

Ovules 3 or more in each cell.

Corolla valvate or plicate in bud; stamens inserted on the corolla;
calyx more or less united; plants often armed with spines.

SOLANACEAE.

Corolla imbricate or contorted; stamens often free from the corolla;
calyx segments often distinct or nearly so; plants unarmed.

Anthers dehiscent by longitudinal slits; ovary 3-celled.

POLEMONIACEAE.

Anthers dehiscent by terminal pores; ovary with 2 or 4 or more
cells-----**ERICACEAE.**

BB. Perfect stamens 2 to 4, fewer than the corolla lobes, or if of the same
number the stamens and lobes each 2; corolla nearly always irregular.

Ovules 1 or 2, rarely 3 or 4, in each cell.

Ovules 1 in each cell.

Ovary entire or obscurely 4-lobate-----**VERBENACEAE.**

Ovary 4-parted or deeply 4-lobate-----**MENTHACEAE.**

Ovules 2 to 4 in each cell.

Ovary 4 or 5-celled; leaves with translucent glands-----**RUTACEAE.**

Ovary 2-celled; leaves without translucent glands.

Stamens 2, regularly alternate with the cells of the ovary. Flowers
regular; leaves opposite-----**OLEACEAE.**

Stamens 4, or if 2 not alternate with the cells of the ovary.

Ovules 2 and collateral; fruit indehiscent or septicidal.

VERBENACEAE

Ovules 4, or 2 and superimposed; fruit loculicidal.

Seeds with endosperm, sessile or nearly so; stigma 1.

SCROPHULARIACEAE.

Seeds without endosperm, on conspicuous thick funicles; stigmas usually 2-----**ACANTHACEAE.**

Ovules more than 4 in each cell.

Ovary 1-celled; placentae central.

Seeds large; stamens 4; leaves compound. Plants often scandent.

BIGNONIACEAE.

Seeds small; fertile stamens 2; leaves simple-----**GESNERIACEAE.**

Ovary 2-celled; placentae axillary.

Leaves compound-----**BIGNONIACEAE.**

Leaves simple.

Corolla induplicate-valvate or plicate-imbricate---**SOLANACEAE.**

Corolla plicate (but not imbricate) in bud.

Seeds inserted on large thick funicles-----**ACANTHACEAE.**

Seeds sessile or nearly so -----**SCROPHULARIACEAE.**

ANNOTATED CATALOGUE.

1. **GLEICHENIACEAE.** Vine-fern Family.

(Contributed by Mr. William R. Maxon.)

REFERENCES: Sturm, *Gleicheniaceae*, in Mart. Fl. Bras. 1²: 217-238. pl. 17. 1859; Underwood, A preliminary review of the North American *Gleicheniaceae*, Bull. Torrey Club 34: 243-262. f. 1, 2. 1907; Maxon, *Gleicheniaceae*, N. Amer. Fl. 16: 53-63. 1909.

Xerophilous ferns, mostly with branched creeping rhizomes; fronds usually ascending or reclining, numerous, somewhat vinelike, of indefinite growth, entangled, often forming dense impenetrable low thickets; primary axis naked; primary branches 1 to many pairs, opposite, determinate or (in most species) once to several times dichotomous, the included bud dormant or producing secondary and tertiary axes like the primary one; ultimate branches (pinnae) usually in pairs, bipinnate, pinnate, or deeply pinnatifid, the segments mostly elongate in our species (minute and rounded in the Old World *Gleichenia*); veins free, forked; sori dorsal or (in *Gleichenia*) terminal upon the veinlets, nonindusiate; sporangia sessile, short, 2 to many, opening by a vertical fissure.

1. **DICRANOPTERIS** Bernh. Neues Journ. Bot.

Schrad. 1²: 38. 1806.

Widely distributed in tropical and subtropical regions of both hemispheres. In tropical America many of the species grow rankly in the greatest profusion, often occupying wide areas of open or thinly shaded mountain slopes to the exclusion of other vegetation. A mass of the wiry interlacing fronds, with a blanket thrown over it, makes an excellent bed for the collector.

Primary branches bipinnate, the rachis not forked-----1. **D. bancroftii.**

Primary branches once or several times forked.

Internodes of primary branches normally naked; veins 2 to 5-forked; sori multisporangiate; rhizomes with spreading articulate hairs.

Accessory pinnae (a pair) borne at all but the ultimate nodes.

2. **D. flexuosa.**

Accessory pinnae wanting-----3. **D. pectinata.**

Internodes of primary branches at least partially pectinate; veins once forked; sori 3 to 5-sporangiate; rhizomes with ciliate scales.

Segments closely tomentose beneath, rarely glabrate with age.—4. *D. bifida*.
Segments not tomentose beneath.

Pinnæ 2.5 to 3.2 cm. broad; segments narrowly oblong; veins 12 to 15 pairs, fibrillose with rusty scales; leaf tissues glabrous.

5. *D. underwoodiana*.

Pinnæ 3 to 5.5 cm. broad; segments linear; veins 20 to 28 pairs, these and the leaf tissues sparsely pilose with whitish stellate hairs.

6. *D. palmata*.

1. *Dicranopteris bancroftii* (Hook.) Underw. Bull. Torrey Club 34: 252. 1907.

Gleichenia bancroftii Hook. Sp. Fil. 1: 5. 1844.

Mertensia bancroftii Kunze, Linnaea 18: 307. 1844.

Gleichenia brunei Christ, Bull. Herb. Boiss. II. 5: 13. 1905.

Dicranopteris brunei Underw. Bull. Torrey Club 34: 253. 1907.

Mountains of Veracruz and Chiapas, southward to the Andes of South America; also in the Lesser Antilles and Jamaica (the type locality), mainly at 1,000 to 1,800 meters elevation.

Primary pinnæ 1 to 3 pairs, oblong, 1 to 1.5 meters long, 30 to 50 cm. broad, bipinnate; pinnules very numerous; segments narrowly linear, 1.5 to 2.2 cm. long, herbaceous, glabrous or nearly so, glaucous beneath; sori 3 to 5-sporangiate.

2. *Dicranopteris flexuosa* (Schrad.) Underw. Bull. Torrey Club 34: 254. 1907.

Mertensia flexuosa Schrad. Gött. Anz. Ges. Wiss. 1824: 863. 1824.

Mertensia rigida Kunze, Linnaea 9: 16. 1834.

Gleichenia flexuosa Mett. Ann. Lugd. Bat. 1: 50. 1863.

Gleichenia rigida Bomm. & Christ, Bull. Soc. Bot. Belg. 35¹: 174. 1896. Not

G. rigida J. Smith, 1841.

Mountains of Veracruz, at about 1,300 meters altitude. Guatemala to Brazil; widely distributed in the West Indies, mainly at low elevations; near Mobile, Alabama; type from Brazil.

Leaf axis 2 to 4 mm. in diameter; primary branches several pairs, repeatedly dichotomous, never developing a secondary axis, the internodes unequal, naked; pinnæ glabrous; segments glaucous beneath, linear, retuse, narrowly connected at the dilatate base, revolute.

3. *Dicranopteris pectinata* (Willd.) Underw. Bull. Torrey Club 34: 260. 1907.

Mertensia pectinata Willd. Svensk. Vet. Akad. Handl. II. 25: 168. 1804.

Gleichenia nitida Presl, Rel. Haenk. 1: 70. 1825.

Mertensia elata Desv. Mém. Soc. Linn. Paris 6: 201. 1827.

Mertensia nitida Presl, Tent. Pter. 51. 1836.

Mountains of Veracruz. General throughout tropical America, the type from near Caracas, Venezuela.

Leaf axis 3 to 6 mm. in diameter; primary branches several pairs, stipulate, repeatedly and unequally dichotomous, a false flexuous secondary axis formed by the alternate production of the unequal secondary branches, the included bud of each dichotomy always abortive; segments oblong to linear-oblong, pruinose beneath, glabrous, or the costa and veins sparsely rusty-paleaceous.

A variable species.

4. *Dicranopteris bifida* (Willd.) Maxon, N. Amer. Fl. 16: 60. 1909.

Mertensia bifida Willd. Svensk. Vet. Akad. Handl. II. 25: 168. 1804.

Gleichenia bifida Spreng. Syst. Veg. 4: 27. 1827.

Mertensia fulva Desv. Mém. Soc. Linn. Paris 6: 201. 1827.

Dicranopteris fulva Underw. Bull. Torrey Club 34: 255. 1907.

Mountains of Veracruz. Common and generally distributed throughout the

West Indies and Central America, southward into South America; type from Caracas, Venezuela.

Leaf axis stout, light greenish brown; primary branches 2 or several pairs, these once or twice dichotomous (rarely developing a secondary axis), the internodes at least partially naked; segments mostly linear, dilatate (the sinuses obtuse), entire, revolute.

5. *Dicranopteris underwoodiana* Maxon, N. Amer. Fl. 16: 59, 1909.

Temperate region of Chiapas, the type locality. Also in the high mountains of Quiché, Guatemala.

Leaf axis reddish brown, 2 to 3 mm. in diameter; primary branches usually 2 pairs, twice dichotomous (not developing a secondary axis), the primary internode nearly naked, the secondary ones fully pectinate; pinnae linear, 18 to 30 cm. long, the rachises closely invested with short rusty scales.

6. *Dicranopteris palmata* (Schaffn.) Underw. Bull. Torrey Club 34: 259, 1907.

Mertensia palmata Schaffn.; Fée, Mém. Foug. 9: 40 (32). 1857, name only.

Gleichenia palmata Moore, Ind. Fil. 380. 1862, name only.

Mountains of Veracruz, the type from Orizaba. Also in Guatemala (Alta Verapaz), eastern Cuba, and the Blue Mountains of Jamaica, at altitudes of 900 to 1,650 meters.

Leaf axis olivaceous, opaque; primary branches 2 or 3 pairs, divergent, usually 2 to 4 times dichotomous (rarely developing a secondary axis), the first and second internodes usually naked; pinnae 20 to 25 cm. long.

2. CYATHEACEAE. Tree-fern Family.

(Contributed by Mr. William R. Maxon.)

REFERENCES: Cyatheaceae, Diels in Engl. & Prantl. Pflanzenfam. 1⁴: 113-139. 1899; Maxon, The tree ferns of North America, Ann. Rep. Smiths. Inst. 1911: 463-491. *pl. 1-15*. 1912.

Mainly treelike plants of moist tropical regions, the rhizome stout and woody, decumbent, oblique, or usually erect, and 1 to 15 meters high or more, naked, with smoothish, usually tessellate leaf scars, or rough and partially sheathed by the imperfectly deciduous stipe bases of the fronds of previous years; fronds borne in a terminal scaly crown, several or many, ascending to recurved, the blades 1 to 4-pinnate, up to 4 meters long, usually broad; sori indusiate or nonindusiate, nearly globose, borne dorsally upon the veins on the under surface of the blade or at the margin, the receptacle elongate, of various form and vestiture; sporangia numerous, crowded radially in several ranks, opening horizontally, the annulus oblique, with or without a stomium of thin-walled cells; spores triplanate.

The Cyatheaceae, or tree-fern family—the latter name given because, in contradistinction to all other families of ferns, the species are nearly all arborescent in habit of growth—are practically confined to tropical and subtropical regions and attain their best development, both as to luxuriant growth and as to number of species and individuals, in mountainous regions which have a nearly uniform, moist climate. Except in a very few cases they apparently can not endure extremes of either drought or cold. Thus in Mexico, as in Central America, they are practically confined to the Atlantic slopes and to the higher mountain regions that are constantly swept by the moisture-laden trade winds from the Gulf of Mexico. This territory embraces Veracruz and Tabasco and most of Oaxaca and Chiapas. From the arid interior plateau regions they are altogether lacking. Comparatively little material having been collected in extreme southeastern Mexico in recent years, our knowl-

edge, both of the species actually occurring there and of their geographic distribution, is very incomplete. Tree ferns are, as a rule, of restricted range, yet many of the Mexican species are known from Alta Verapaz, Guatemala, and of the remainder most, at least, may be expected to occur there. With a very few exceptions, the Mexican species are exclusively continental, and only a few extend as far south as Panama.

Aside from the attention attracted by their beauty and stately habit of growth, tree ferns are decidedly interesting because of their marked diversity in structural characters and, unfortunately, their difficult classification. Locally, at least, they serve varied economic uses also, the most important being the use of the trunks as building timbers. These are composed largely of a branched network of hard fibrovascular elements, resistant to decay and the attacks of termites alike, permitting the use of the trunks over and over again in the supporting framework of native houses. Occasionally they are made to serve as telegraph poles. Small pieces of the fibrovascular elements are employed in inlay work. In Costa Rica the succulent unrolling young fronds or "crosiers" of a *Cyathea* called "rabo de mico" are eaten as a salad. The scales of a related species (probably *Cyathea mexicana*), known in Veracruz as "ocopetate" or "cola de mono," are applied topically as a hemostatic. A like use of the matted capillary scales or "pulu" of Hawaiian species of *Cibotium* is, of course, well known. Several species of *Hemitelia* and *Alsophila* are known as "tatahueso" in Oaxaca, according to Reko.

Sori borne upon the back of the veins, commonly near the costule or at least not marginal; indusium (if present) not formed in part of the modified leaf margin.

Sori distinctly indusiate, the indusium attached at the base of the receptacle.

Indusia either (1) cup-shaped or saucer-shaped, never wholly inclosing the sporangia, persistent, or (2) globose, at first wholly containing the sporangia, rupturing at maturity, the divisions persistent to fugacious.

1. CYATHEA.

Indusia inferior, more or less semicircular in outline, often lobed and scale-like or sometimes cleft or lacerate, never inclosing all the sporangia.

2. HEMITELIA.

Sori usually nonindusiate, a very minute basal scale present in a few species.

3. ALSOPHILA.

Sori terminal upon the veins at or near the margin; indusium bilobate or bivalvate, the outer portion a more or less modified, concave lobule of the leaf margin.

Outer lip of the indusium formed of slightly modified leaf tissue, unlike the rigid brownish inner one-----

4. DICKSONIA.

Outer lip of the indusium formed of highly differentiated cartilaginous tissue, similar to the inner one-----

5. CIBOTIUM.

1. CYATHEA J. E. Smith, Mem. Accad. Sci. Torino 5: 416. 1793.

Caudex erect in most species, arboreous, bearing numerous adventitious roots in the basal part, in mature individuals usually smoothish above, with close-set to distant scars; fronds borne in a terminal crown, oblique, spreading, or rarely drooping, the stout stipes strongly aculeate to muricate, tuberculate, or nearly smooth, paleaceous toward the base; blades 2 or 3-pinnate, usually 1 to 3 meters long, lanceolate to oblong or ovate, the rachises variously pubescent, furfuraceous, or minutely paleaceous, glabrescent with age; pinnules subentire to pinnate, sessile to long-petiolate, deciduous or not; veins free, usually branched; sori dorsal, apart from the margin; indusium either (1) inferior and saucer-shaped, never wholly inclosing the sporangia, persistent,

with even margins, or (2) globose, at first wholly inclosing the sporangia, bursting irregularly at maturity, the divisions persistent or often disappearing. Indusia saucer-shaped, never inclosing the sporangia, with low even margins.

1. *C. arborea*.

Indusia at first globose and inclosing the sporangia, at length rupturing, the divisions persistent to fugacious.

Pinnules (secondary pinnae) distinctly petiolate, the lower ones with stalks 4 to 9 mm. long; leaf tissue coriaceous-----2. *C. tuerckheimii*

Pinnules mostly sessile or nearly so, membranous or herbaceous.

Rachises of the pinnae densely clothed with spreading or retrorse, linear, spinulose scales, sharply muricate from their persistent bases; pinnules cut to the costa nearly throughout-----3. *C. princeps*.

Rachises of the pinnae bearing a few deciduous scales, smooth or nearly so; pinnae very deeply pinnatifid, but the segments distinctly though narrowly joined.

Costae of the pinnules glabrous beneath; leaf tissue bright green beneath; sori large, apart from the costule-----4. *C. jurgensenii*.

Costae pilose or minutely squamulose beneath; leaf tissue much paler beneath than above; sori small, borne near or against the costule.

Pinnae long-petiolate (4 cm. or more); pinnules about 20 pairs; segments obtuse; veins 6 to 8 pairs, glabrous-----5. *C. trejoi*.

Pinnae subsessile or short-petiolate; pinnules 30 to 40 pairs; segments acute or acuminate; veins 8 to 12 pairs, usually minutely glandular-pubescent-----6. *C. mexicana*

1. *Cyathea arborea* (L.) J. E. Smith, Mem. Accad. Sci. Torino 5: 417. 1793.

Polypodium arboreum L. Sp. Pl. 1092. 1753.

Disphenia arborea Presl, Tent. Pter. 56. 1836.

Hemitelia arborea Fée, Mém. Foug. 5: 350. 1852.

Lowlands of eastern Mexico; rare. Generally distributed and common in the West Indies, the type from Martinique; variously reported from Central America and northern South America, probably in error.

Caudex erect, 4 to 12 meters high, usually with close-set, oval to broadly subhexagonal scars in 8 to 10 ranks, the apex clothed with large, lance-attenuate, dirty white scales; fronds 2.5 to 4 meters long; stipes stout, pale, low-tuberculate; blades 2 to 3 meters long, ovate, tripinnate, the rachises pale, glabrate; pinnae oblong, 40 to 80 cm. long, petiolate, or the shorter basal ones ovate and long-petiolate; pinnules numerous, mostly sessile, spreading, oblong-lanceolate, long-attenuate; segments linear-oblong, dilatate, sharply serrate, often revolute, the costule invariably with 1 or 2 white bullate scales at the base beneath; veins 1 to 3-forked.

This is one of the few species of Cyatheaceae which grow naturally in open sunny situations. It occurs often in colonies.

2. *Cyathea tuerckheimii* Maxon, Contr. U. S. Nat. Herb. 13: 4. 1909.

Region of Orizaba, Veracruz, at an altitude of about 1,300 meters. Also near Cobán, Alta Verapaz, Guatemala (the type locality), at 1,350 to 2,000 meters elevation.

Caudex erect, 3 to 4 meters high; fronds ample, at least 130 cm. broad, bipinnate-pinnatifid, the stout primary rachis deciduously furfuraceous, minutely spiny; pinnae oblong-lanceolate, acuminate, up to 65 cm. long, the rachis strongly muricate; pinnules 28 to 30 pairs, contiguous, short-petiolate, oblong-lanceolate, attenuate, up to 13 cm. long, pinnately cut nearly to the minutely and deciduously scaly costa; segments about 22 pairs, 10 to 12 mm. long, oblong, falcate, subacute, coriaceous, the crenate-serrate margins revo-

lute; sori large, 6 to 9 pairs, seated at the fork of the once-branched veins, the irregular divisions of the membranous indusium subpersistent.

3. *Cyathea princeps* (Linden) E. Mayer, Gartenflora 17: 10. 1868.

Cibotium princeps Linden; E. Mayer, Gartenflora 17: 10. 1868, as synonym.

Cyathea bourgaei Fourn. Mex. Pl. Crypt. 135. 1872.

Cyathea munchii Christ, Bull. Herb. Boiss. II. 7: 413. 1907.

Veracruz and Chiapas, the type from the Volcano Tuxetla, Veracruz. Also in the mountains of Alta Verapaz, Guatemala; ascribed also to Costa Rica, but probably erroneously.

Caudex erect, stout, said to reach a height of nearly 20 meters; fronds at least 4 meters long; stipes 1 to 1.5 meters long, together with the yellowish primary and secondary rachises densely clothed with narrow, yellowish, spinulose, spreading or retrorse scales; blades broadly ovate, 2 to 2.5 meters long, tripinnate; pinnae oblong-lanceolate, acuminate, up to 1 meter long and 35 cm. broad, long-stalked; pinnules very numerous, approximate, linear-oblong, up to 18 cm. long, narrowly long-acuminate, the costa minutely and deciduously scaly beneath; segments 25 to 32 pairs, linear-oblong, dilatate, falcate, subentire, acutish, pruinose beneath, the costa with a few minute, simple or cleft scales; sori large, 6 to 9 pairs, the coriaceous indusium splitting into 2 to 4 persistent saccate lobes.

4. *Cyathea jurgensenii* Fourn. Mex. Pl. Crypt. 135. 1872.

Mountains of Oaxaca and Veracruz, the type from Oaxaca; rare.

Caudex presumably erect and several meters high; fronds ample, the blades bipinnate-pinnatifid, 1 meter broad or more, the primary rachis pale, minutely spinose; pinnae oblong, abruptly acuminate, mostly petiolate, up to 65 cm. long, the rachis smooth or nearly so, glabrate beneath; pinnules about 25 pairs, articulate, petiolate, deltoid-lanceolate, long-acuminate, 10 to 12 cm. long, very deeply pinnatifid, the costa nearly or quite glabrous beneath; segments 18 to 20 pairs, close, oblong, falcate, acute, obscurely crenate-serrate, bright green and nearly or quite glabrous on both surfaces; sori 4 to 8 pairs, apart from the costule, only the flat lobate basal portion of the pale yellowish membranous indusium persistent.

5. *Cyathea trejoi* Christ, Bull. Herb. Boiss. II. 5: 733. 1905.

Known only from San Pablo, Chiapas, altitude 1,500 meters, the type locality.

Caudex erect, long and slender, very spiny; fronds rather small, the primary rachis stout, smooth, stramineous or reddish, shining; pinnae articulate, easily deciduous, narrowly ovate, acuminate, 30 cm. long or more, long-petiolate; pinnules about 20 pairs, approximate, readily separable, lanceolate, 5 to 6 cm. long, cut nearly to the scantily pilose costa; segments about 15 pairs, oblong, subfalcate, obtuse, slightly dilatate, crowded, light green beneath, lightly crenate; sori 2 or 3 pairs, very small, basal, close to the costule, the delicate indusium grayish.

6. *Cyathea mexicana* Schlecht. & Cham. Linnaea 5: 616. 1830.

Cyathea hexagona Fée & Schaffn.; Fée, Mém. Foug. 8: 111. 1857.

Cyathea articulata Fée, Mém. Foug. 8: 111. 1857.

Cyathea glauca Fourn. Mex. Pl. Crypt. 135. 1872. Not *C. glauca* Bory, 1804.

Alsophila mucronata Christ, Bull. Soc. Bot. Belg. 35: 178. 1896.

Cyathea arida Christ, Bull. Herb. Boiss. II. 6: 180. 1906.

Veracruz to Chiapas, the type from Jalapa. Also in Guatemala (Alta Verapaz), Costa Rica, and western Panama, at 120 to 1,300 meters.

Caudex 3 to 10 meters high, unarmed; fronds 2 to 3 meters long, the stipe clothed at the base with brown acicular scales about 1 cm. long and armed with a few sharp conical shining black spines; blade 1.5 to 2.5 meters long,

oblong, bipinnate-pinnatifid; primary rachis stout, usually castaneous, deciduously puberulo-furfuraceous; pinnae oblong-lanceolate, acuminate, up to 85 cm. long, short-petiolate, deciduous; pinnules articulate, readily separable, 30 to 40 pairs, often distant, oblong-lanceolate, up to 10 cm. long (usually smaller), sessile or short-stalked, the costa beneath bearing a few antrorse hairs and deciduously squamulose toward the base; segments narrowly oblong, oblique, subfalcate, obscurely serrulate, connected by a wing 1 to 1.5 mm. broad on each side of the costa; sori 4 to 7 pairs, close to the costule, the divisions of the pale membranous indusium mostly fugacious.

A variable species.

2. **HEMITELIA** R. Br. Prodr. Fl. Nov. Holl. 158. 1810.

REFERENCES: Maxon, The North American species of *Hemitelia*, subgenus *Cnemidaria*, Contr. U. S. Nat. Herb. 16: 25-49. pl. 18-26. 1912; Maxon, The North American species of *Hemitelia*, section *Euhemitelia*, Contr. U. S. Nat. Herb. 17: 414-420. pl. 17-22. 1914.

Similar in general to *Cyathea*, but having the indusium inferior, more or less hemispherical, and varying from lobed to lacerate; or, in the American subgenus *Cnemidaria*, the plants mostly with short ascending trunks, coarse, succulent, pinnate or rarely bipinnate fronds, free-veined or not, the indusium hemispheric, concave, often lobed.

Blades fully bipinnate, the pinnules sessile and very deeply pinnatifid; indusium deeply lacerate, the divisions with long filamentous apices.

1. *H. costaricensis*.

Blades pinnate, the pinnae lightly crenate to pinnatifid; indusia entire or merely lobed.

Veins all free; pinnae pinnatifid at least two-thirds the distance to the costa, the segments oblong, acuminate, aristate-----2. *H. apiculata*.

Veins (basal) united by a transverse veinlet, a single row of costal areoles thus formed; lobes or crenations low or short, not acuminate.

Pinnae lightly crenate-serrate, decurrent-----3. *H. decurrens*.

Pinnae deeply crenate to crenately lobed, not decurrent.

Larger crenations 5 to 7 mm. broad, acute distally; pinnae 2.5 to 3 cm. broad-----4. *H. mexicana*.

Larger crenations 9 to 12 mm. broad, rounded; pinnae 3.5 to 4.2 mm. broad-----5. *H. lucida*.

1. *Hemitelia costaricensis* (Klotzsch) Mett.; Kuhn, Linnaea 36: 159. 1869.

Cyathea costaricensis Klotzsch; Kuhn, Linnaea 36: 159. 1869, as synonym.

Mountains of Veracruz and Chiapas. Also in western Guatemala and in Costa Rica (the type locality), ascending to 1,000 meters.

Caudex erect, 1 to 2 meters high, or more; pinnae narrowly oblong, acuminate, mostly 50 to 70 cm. long; pinnules 23 to 27 pairs, mostly sessile, linear-oblong, long-acuminate or attenuate; segments 20 to 23 pairs, narrowly oblong, subfalcate, acute, connected by a narrow costal wing.

2. *Hemitelia apiculata* Hook. in Hook. & Baker, Syn. Fil. 29. 1868.

Mountains of Oaxaca, the type locality.

Blades 35 to 50 cm. broad; pinnae narrowly oblong-lanceolate, 18 to 30 cm. long, 2.5 to 4.5 cm. broad below the narrowly long-acuminate apex, pinnatifid at least two-thirds the distance to the costa, the sinuses linear and very acute.

3. *Hemitelia decurrens* Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 285. 1849.

Hemistegia decurrens Fourn. Mex. Pl. Crypt. 135. 1872.

Mountain forests near Lobani, District of Chinantla, Oaxaca, at 900 to 1,050 meters; known only from the type collection.

Caudex about 30 cm. high; blades ovate-lanceolate, about 75 cm. long; pinnae narrowly oblong-lanceolate, 12 to 15 cm. long, 2.5 to 3 cm. broad, the upper ones adnate and confluent, those below semiadnate, constricted, narrowly long-decurrent.

4. *Hemitelia mexicana* Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 287. 1849.

Hemistegia mexicana Fourn. Mex. Pl. Crypt. 135. 1872.

Oaxaca, in mountain forests near Cacolá, District of Chinantla, at 750 to 900 meters altitude; known only from the original collection.

Caudex about 30 cm. high; blades broadly lanceolate, 1.5 to 1.8 meters long; pinnae linear, about 30 cm. long; main veins 50 pairs, spreading, 4 to 7 mm. apart.

5. *Hemitelia lucida* (Fée) Maxon, Contr. U. S. Nat. Herb. 16: 39. 1912.

Hemistegia lucida Fée, Gen. Fil. 351. 1852.

District of Chinantla, Oaxaca, at 2,000 meters altitude; known only from the type collection.

Blades ovate-oblong, 2 meters long or less; pinnae numerous, linear-lanceolate, up to 45 cm. long; main crenations or lobes 28 to 34 pairs.

3. *ALSOPHILA* R. Br. Prodr. Fl. Nov. Holl. 158. 1810.

Similar to *Cyathea*, but having the indusia wholly lacking or, in a few species, represented by a very minute, concealed, vestigial, basal scale; receptacles often copiously long-paraphysate.

Two subgenera, *Lophosoria* and *Amphidesmium*, are unique in their silky capillary scales, which are similar to those of *Cibotium* and *Dicksonia*. They differ notably from typical *Alsophila* in other morphological characters also and possibly should be regarded as distinct genera. *Amphidesmium* is not known to occur in Mexico, though it occupies a wide range southward. *Lophosoria* is represented by the variable and widely distributed *A. quadripinnata*, the first-mentioned species below.

Blades waxy-pruinose beneath, the rachises, costae, and veins lanate with lax, tortuous, pale rusty, septate hairs; sori with low hemispheric receptacles; caudex and stipe bases densely clothed with silky capillary scales 1 cell broad.....1. *A. quadripinnata*.

Blades not waxy-pruinose beneath, the rachises and costae paleaceous or furfureous, with or without spreading hairs; sori with capitate or spheric receptacles; caudex and stipe bases bearing flat scales many cells broad. Primary and secondary rachises blackish; blades fully tripinnate, the segments stalked.....2. *A. salvinii*.

Primary and secondary rachises stramineous to yellowish or light brown; blades simply bipinnate or bipinnate-pinnatifid.

Blades bipinnate only, the pinnules sinuate to crenate...3. *A. marginalis*.

Blades bipinnate-pinnatifid, the segments connected by a narrow wing.

Segments rounded-obtuse, shallowly and broadly crenate.

4. *A. schiedeana*.

Segments acute or acutish, sharply incised to pinnatifid.

Costae of pinnules thinly squamulose, nearly devoid of long spreading septate hairs beneath; primary rachis with pungent, spreading or retrorse, scattered spines throughout, the secondary rachises similarly armed.....5. *A. microdonta*.

Costae with numerous spreading hairs beneath, these extending to the costules and often to the veins; primary rachis unarmed, or plainly aculeate only toward the base, the secondary rachises merely muricate.

Pinnae and pinnules petiolate; costae and costules devoid of bullate scales-----6. *A. myosuroides*.

Pinnae and pinnules sessile; costules bearing small, subpersistent, white or yellowish, bullate scales beneath.

Segments pinnatifid; primary and secondary rachises with occasional large flat persistent white scales-----7. *A. mexicana*.

Segments deeply incised to deeply crenate-serrate; rachises devoid of large whitish scales.

Bullate scales deciduous, few, confined to the base of the costules; segments sparsely hirsute above along the costules and veins-----8. *A. scabriuscula*.

Bullate scales persistent, numerous; segments glabrous above.

9. *A. bicrenata*.

1. *Alsophila quadripinnata* (Gmel.) C. Chr. Ind. Fil. 47. 1905.

Polypodium quadripinnatum Gmel. Syst. Nat. 2³: 1314. 1791.

Polypodium pruinaum Swartz, Journ. Bot. Schrad. 1800²: 29. 1801.

Alsophila pruinata Kaulf.; Kunze, Linnaea 9: 99. 1834.

Lophosoria pruinata Presl, Abh. Böhm. Ges. V. 5: 345. 1848.

Trichosorus glaucescens Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 283. 1849.

Trichosorus densus Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 284. 1849.

Trichosorus frigidus Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 284. 1849.

?*Alsophila schaffneriana* Fée, Mém. Foug. 8: 109. 1857.

Mountains of Veracruz, Puebla, Oaxaca, and Chiapas, ascending to 3,000 meters. Central America to Chile and Argentina; Greater Antilles, the type from Jamaica.

Rhizomes stout, up to 3 meters high (usually less than 1 meter), often multicipital, densely lanate with lax, tortuous, pale rusty, capillary scales; fronds 2 to 4.5 meters long, long-stalked, the blades subtriangular, tripinnate-pinnatifid.

2. *Alsophila salvinii* Hook. in Hook. & Baker, Syn. Fil. 36. 1866.

Alsophila munchii Christ, Bull. Herb. Boiss. II, 5: 734. 1905.

Region of San Pablo, Chiapas, at 2,200 meters altitude. Also in the mountains of Alta Verapaz, Guatemala, at 1,400 to 1,600 meters elevation, the type from Chilasco.

Trunk 1 to 1.5 meters high; blades very ample, at least 1.5 meters broad, the primary and secondary rachises blackish, polished, woody, nearly or quite smooth; pinnae 60 to 80 cm. long, 20 to 30 cm. broad; pinnules 22 to 25 pairs, close, spreading; segments 1 to 2 cm. long, 3 to 4 mm. broad, obtusely pinnatifid or crenately lobed; costae and costules deciduously paleaceous beneath, the scales minute, many of them substellate, with blackish spinous processes.

3. *Alsophila marginalis* Klotzsch, Linnaea 18: 542. 1844.

Hemitelia marginalis Jenman, Ferns Brit. W. Ind. Guian. 43. 1898.

Sierra San Nolasco, Oaxaca. Also in British Guiana, the type locality. Very rare.

Stipe sparsely short-aculeate, paleaceous above; blades 1.5 to 1.8 meters long, deciduously paleaceous; pinnae alternate, elongate-oblong, 20 to 38 cm. long, gibbose-articulate; pinnules sessile or short-petiolate, spreading, hastate-lanceolate, or ligulate from a cordate base, 2 to 8 cm. long, 8 to 15 mm. broad, sinuate to deeply crenate; sori in a continuous line 1 to 1.5 mm. from the margin.

4. *Alsophila schiedeana* Presl; Kunze, *Linnaea* 13: 149. 1839.

Mountains of Veracruz and Chiapas, the type from Veracruz. Also in eastern Guatemala, apparently common, at 275 to 1,000 meters altitude.

Arborescent; stipe dull brown, angulate, freely armed with stout straight spines up to 5 mm. long; blades ample, the rachis pale brown, aculeolate; pinnae spreading, linear-oblong to oblong, acuminate, up to 70 cm. long and 25 cm. broad, the secondary rachis deciduously squamulose-puberulous beneath; pinnules linear-oblong, acute or acuminate, spreading, with minute hairs and brown bullate scales beneath, the latter extending to the costules; veins simple or once forked, glabrous; sori nearly medial. "Malque" (Chiapas).

5. *Alsophila microdonta* Desv. Mém. Soc. Linn. Paris 6: 319. 1827.

Polypodium microdonton Desv. Ges. Naturf. Freund. Berlin Mag. 5: 319. 1811.

Polypodium aculeatum Raddi, Opusc. Sci. Bologna 3: 288. 1819. Not *P. aculeatum* L. 1753.

Alsophila armata Mart. Icon. Pl. Crypt. 72. pl. 28, 48. 1834. Not *A. armata* Presl, 1836.

Veracruz and Tabasco. Guatemala to Brazil, mainly at low elevations near the coast; known in the West Indies only from the Isle of Pines; type doubtfully South American.

Caudex 1 to 5 meters high; fronds arcuate-spreading, 2 to 2.5 meters long, the long brown stipes freely armed with very short, narrowly conical spines up to 1 cm. long, similar but smaller ones occurring sparsely on the primary and secondary rachises throughout; pinnae narrowly oblong, abruptly acuminate, 30 to 60 cm. long, 10 to 25 cm. broad; pinnules spreading, linear-oblong, attenuate; segments linear, falcate, obliquely incised except at the dilatate base, membranous, the costule bearing a few long septate hairs beneath and, with the veins, also thinly and laxly puberulous with minute tortuous hairs; sori numerous, nearly medial, often confluent.

6. *Alsophila myosuroides* Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 236. 1849.

Veracruz to Chiapas, at low elevations, the type from the region of Chinantla. British Honduras, eastern Guatemala, and Honduras, at 180 meters altitude or less; abundant in the province of Pinar del Río, Cuba, and the Isle of Pines, herbarium material having been widely distributed under the manuscript name *Alsophila wrightii* Underw.

Caudex 3 to 5 meters high; fronds ample, the stout brown stipes thickly aculeolate and clothed with copious stiff, acicular, bright brown scales at the base, muricate above; pinnae petiolate, narrowly oblong, long-acuminate, 40 to 65 cm. long, 15 to 22 cm. broad; pinnules stalked, linear-attenuate or oblong-linear and abruptly long-caudate, the costae sparsely hirsute beneath; segments linear, falcate, acutish, serrate, herbaceous, dull green; costules sparsely hirsute beneath; sori very numerous, usually confluent.

7. *Alsophila mexicana* Mart. Icon. Pl. Crypt. 70. pl. 45. 1834.

Alsophila godmani Hook. in Hook. & Baker, Syn. Fil. 36. 1866.

Mountains of Oaxaca and Chiapas, the type from San Pablo de Teoxomulco, Oaxaca. Also in Alta Verapaz, Guatemala, at 900 to 1,550 meters altitude.

Caudex arborescent, presumably several meters high; blades ample; primary rachis stout, apparently unarmed, subpersistently furfuraceous, bearing scattered large whitish scales, and hirsute with long inflated tawny septate hairs, their bases persistent, the rachis thus invariably scabrous in age; pinnae narrowly oblong, acuminate, 50 to 60 cm. long, 16 to 22 cm. broad, the rachis similar to the primary one; pinnules close or subimbricate, sessile, linear-oblong, rather abruptly long-acuminate; segments herbaceous, pinnatifid, sparsely hirsute along the costules and veins on both surfaces.

8. *Alsophila scabriuscula* Maxon, Proc. Biol. Soc. Washington 32: 125. 1919.

Region of Córdoba, Veracruz. Also in Alta Verapaz, Guatemala, the type from Cubilquitz, altitude 350 meters.

Caudex arborescent, presumably stout and several meters high; fronds very ample, the stout stipe bearing numerous slender conical spines about 4 mm. long; blades ample, the primary rachis sparsely aculeate toward the base, hirsute, scabrous from the persistent bases of the pale spreading septate hairs; pinnae narrowly oblong, acuminate, 50 to 75 cm. long, 18 to 30 cm. broad, the secondary rachis hirsute, scabrous with age; pinnules approximate, spreading, sessile, oblong-linear, long-acuminate; segments herbaceous, deeply incised, the lobes usually bidentate; costules and veins sparsely hirsute beneath and with a thin covering of minute, closely appressed, septate hairs.

9. *Alsophila bicrenata* (Liebm.) Fourn. Mex. Pl. Crypt. 134. 1872.

Cyathea bicrenata Liebm. Dansk. Vid. Selsk. Skrivt. V. 1: 289. 1849.

Mountains of Veracruz, Puebla, Oaxaca, and Chiapas, at 1,200 to 2,100 meters elevation, the type from Puebla.

Caudex 5 to 10 meters high, up to 15 cm. thick; stipe short, yellowish brown, short-aculeate; blades 2 to 4 meters long, elongate-lanceolate, the primary rachis sparingly hirsute with gland-tipped, laxly unciform, septate hairs, scabrous from their persistent inflated bases; pinnae oblong-lanceolate, acuminate, 45 to 60 cm. long, 14 to 20 cm. broad; pinnules 25 to 30 pairs, linear, attenuate, 10 to 15 mm. broad, sessile; segments narrowly oblong, subfalcate, herbaceous, deeply crenate-serrate, the teeth bidentate.

4. *DICKSONIA* L'Hér. Sert. Angl. 30. 1788.

REFERENCE: Maxon, The North American tree ferns of the genus *Dicksonia*, Contr. U. S. Nat. Herb. 17: 153-156. 1913.

Caudex erect, 1 to 10 meters high or more, stout, often with a thick growth of adventitious roots toward the base, greatly thickened above by the long-persistent stipe bases of old fronds; fronds numerous, rigidly ascending in a terminal crown, the short stout stipes and the summit of the caudex with a copious covering of bright brown to ferruginous silky capillary scales, these straight or matted, several cm. long, one cell broad; lamina ovate to oblanceolate, 2 to 3-pinnate; pinnae mostly equilateral, the pinnules elongate; segments coriaceous or rigidly herbaceous, dimorphous or (in our species) uniform; veins simple or several times forked; sori terminal; indusium bivalvate, the outer lip consisting of a deeply concave, rounded, greenish, scarcely modified lobule of the leaf margin, the inner lip dark or yellowish brown, deeply concave, usually coriaceous and equaling the outer lip.

1. *Dicksonia ghiesbreghtii* Maxon, Contr. U. S. Nat. Herb. 17: 155. 1913.

Temperate mountain region of Chiapas, the type collected by Ghiesbreght.

Caudex 4 to 5 meters high; blades essentially tripinnate; primary pinnae linear-oblong, acuminate, 60 to 70 cm. long, about 20 cm. broad, the rachis slightly rough from the abrasion of the articulate, turgid, dirty yellow, capillary scales; pinnules numerous, contiguous, alternate, sessile, linear-oblong, long-acuminate, the costa with a few capillary scales beneath; segments 20 pairs or more, linear-oblong, straight or subfalcate, 10 to 15 mm. long, the sterile ones serrate to obliquely incised, the fertile ones pinnatifid two-thirds the distance to the elevated costule; veins 7 or 8 pairs, those of the fertile segments usually once forked; sori mostly 4 or 5 pairs, 1 mm. broad.

5. **CIBOTIUM** Kaulf. Berlin, Jahrb. Pharm. 21: 53. 1820.

REFERENCE: Maxon, The American species of Cibotium, Contr. U. S. Nat. Herb. 16: 54-58. pl. 30-32. 1912.

Caudex stout, 1 to 8 meters high, sometimes from its covering of adventitious roots and old stipe bases attaining a diameter of nearly one meter; fronds erect-arching, the stout stipes and upper caudex clothed with capillary scales as in *Dicksonia*; blades ample, of an ovate-deltoid type, bipinnate to tripinnate-pinnatifid, the rachises smooth or nearly so, glabrescent; pinnae mostly inequilateral, the distal pinnules much longer than the proximal ones; pinnules similarly inequilateral, deltoid-oblong to linear, asymmetrical; under surfaces pruinose to ceraceo-papillate, glabrous, hairy, or rarely subfurfuraceous; veins oblique, the fertile ones usually simple; sori terminal, essentially marginal; indusium deeply bivalvate, the outer lip consisting of a highly differentiated saccate portion of the leaf margin, the inner of an orbicular to linguiform cartilaginous operculum affixed at its base, somewhat reflexed at maturity.

Larger pinnae 40 to 50 cm. long; sori mostly distant, usually extending outward in the plane of the segment, the inner lip of the indusium as large as the outer one; leaf tissue chartaceous-membranous-----1. **C. schiedei**.

Larger pinnae 60 to 80 cm. long; sori contiguous, erect, or the narrower and slightly longer inner lip strongly reflexed at maturity and overlying the costule; leaf tissue rigidly herbaceous-----2. **C. regale**.

1. **Cibotium schiedei** Schlecht. & Cham. Linnaea 5: 616. 1830.

Dicksonia schiedei Baker in Hook. & Baker, Syn. Fil. 50. 1868.

Humid mountain forests of Oaxaca and Veracruz, at 600 to 1,200 meters altitude, the type from Hacienda de la Laguna, Veracruz.

Caudex 1 meter high or less or (according to Galeotti) attaining a height of 4.5 meters; fronds 1.2 to 1.8 meters long, the blade at least 80 cm. broad, pinnae ascending, deltoid-oblong to deltoid-lanceolate, abruptly acuminate; pinnules 28 to 30 pairs, pinnatifid nearly to the costa, the larger distal ones 11 to 16 cm. long; segments 25 to 30 pairs, conspicuously pruinose and ceraceo-papillate beneath.

2. **Cibotium regale** Versch. & Lem. Ill. Hort. 15: under pl. 548. 1868.

Dicksonia regalis Baker in Hook. & Baker, Syn. Fil. ed. 2. 461. 1874.

Mountains of Chiapas, whence it was introduced into cultivation by Ghiesbreght.

Caudex erect, up to 10 meters high, 40 to 50 cm. in diameter, fronds 10 to 12, widely recurved-spreading, up to 4 meters long; blades about 3 meters long, up to 1.5 meters broad; pinnae mostly spreading, deltoid-lanceolate acuminate; pinnules about 35 pairs, pinnatifid nearly to the costa; segments 30 to 35 pairs, conspicuously ceraceo-pruinose beneath.

3. **CYCADACEAE. Cycad Family.**

REFERENCE: A. De Candolle in DC. Prodr. 16²: 522-547. 1864.

Palmlike plants, the leaves pinnate, basal or clustered at the end of a trunk; flowers dioecious, in large thick cones; seeds nutlike.

Many of the species are important as food plants because of their edible fruits or of the starch obtained from the stems. They are often grown for ornament.

Cone scales imbricate in alternate series. Trunk covered by the persistent petioles-----1. **DIOON**.

Cone scales in vertical series.

Cone scales with 2 transverse appendages at the apex; caudex covered with persistent petioles-----2. **CERATOZAMIA**.

Cone scales naked; caudex naked-----3. **ZAMIA**.

1. **DIOON** Lindl. Bot. Reg. 1843: Misc. 59. 1843.

Pinnae entire-----1. **D. edule**.

Pinnae spinulose-denticulate.

Pinnae with numerous teeth on both margins; trunk 2 to 15 meters high.

2. **D. spinulosum**.

Pinnae entire on the lower margin, with few teeth on the upper margin; trunk short-----3. **D. purpusii**.

1. **Dioon edule** Lindl. Bot. Reg. 1843: Misc. 59. 1843.

Zamia maeleni Miquel, Linnaea 18: 97. 1844.

Platyzamia rigida Zucc. Abh. Wiss. Akad. München 4: 23. 1845.

Dioon imbricatum Miquel, Wiss. Tijdschr. 1: 36. 1848.

Dioon angustifolium Miquel, Wiss. Tijdschr. 1: 37. 1848.

Dioon aculeatum Lem. Ill. Hort. Lem. 2: Misc. 91. 1855.

Dioon edule latipinna Dyer in Hemsl. Biol. Centr. Amer. Bot. 3: 191. 1883.

Nuevo León, Tamaulipas, San Luis Potosí, and Veracruz; described from cultivated plants.

Plants with a trunk 1 to 2 meters high; leaves 1 to 1.5 meters long, woolly when young, with about 200 pinnae, these linear-lanceolate, sharp-pointed; staminate cones cylindric, 20 to 30 cm. long; pistillate cones ovoid, 20 to 30 cm. long. "Chamal" (Nuevo León, Tamaulipas, San Luis Potosí); "sotol" (Tamaulipas); "palma de la virgen" (Sinaloa; in market); "palma de macetas" (Durango; cultivated).

The large chestnut-like seeds contain much starch, and are roasted or boiled and eaten. They are a favorite food of bears, peccaries, and domestic swine. A decoction of the seeds is said to be used for neuralgia. The staminate inflorescences are claimed to be poisonous to cattle, causing emaciation and partial paralysis. The plant is often seen in cultivation.

2. **Dioon spinulosum** Dyer; Eichl. Gart. Zeit. 1883: 411. 1883.

Reported from Veracruz and Yucatán.

Said to attain a height of 15 meters, although often much lower; leaves numerous, spreading, 1 to 2 meters long, with very numerous pinnae.

3. **Dioon purpusii**¹ Rose, Contr. U. S. Nat. Herb. 12: 260. 1909.

In shaded canyons, Puebla and Oaxaca; type from Tomellín Canyon, Oaxaca.

Trunk short; leaves numerous, a meter long or larger, stiff, ascending; pinnae 5 to 9 cm. long; staminate cones 15 to 20 cm. long; fertile cones about 45 cm. long and 20 cm. thick. "Chamal" (Oaxaca).

A plant with similar leaves, probably of the same species, has been collected in Tepic. Another similar plant, with glaucous leaves, is in cultivation in Sonora.

¹ Named for C. A. Purpus, who has made extensive collections in Mexico in recent years, especially in Baja California, San Luis Potosí, Veracruz, Puebla, and Chiapas. His collections have included many plants previously unknown, most of which have been described by Brandegee. Sets of his collections are in the U. S. National Herbarium.

2. CERATUZAMIA Brongn. Ann. Sci. Nat. III. 5: 7. 1846.

The plants of this genus are very imperfectly known and are rarely collected. Some of them are seen occasionally in cultivation.

Petioles unarmed; pinnae about 1.3 cm. wide.....1. *C. kusteriana*.

Petioles aculeate; pinnae 1.8 to 7.5 cm. wide.

Pinnae few (about 5 pairs), semiobovate.....2. *C. miqueliana*.

Pinnae numerous (15 to 20 pairs), narrowly lanceolate.

Pinnae 10 to 12.5 cm. long, 1.8 to 3.5 cm. wide.....3. *C. latifolia*.

Pinnae 30 to 32 cm. long, about 2.5 cm. wide.....4. *C. mexicana*.

1. *Ceratozamia kusteriana* Regel, Bull. Soc. Nat. Moscou 1857: 187. 1857.

Introduced into cultivation from Mexico, the locality not stated.

Trunk short; leaves about 1.5 meters long, tomentose at first, with about 40 pinnae; staminate cones about 8 cm. long, short-pedunculate.

2. *Ceratozamia miqueliana* Wendl. Ind. Palm. 68. 1854.

Mexico, the locality not stated.

Leaves about a meter long, glaucous when young; pinnae 20 to 22.5 cm. long, about 7 cm. wide.

3. *Ceratozamia latifolia* Miquel, Wiss. Tijdschr. 1: 206. 1848.

Described from Mirador, Veracruz.

4. *Ceratozamia mexicana* Brongn. Ann. Sci. Nat. III. 5: 7. 1846.

?*Zamia galeottii* Vriese, Tijdschr. Nat. Gesch. 1845: 23. 1845.

Ceratozamia longifolia Miquel, Wiss. Tijdschr. 1: 40. 1848.

Ceratozamia intermedia Miquel, Wiss. Tijdschr. 1: 40. 1848.

Ceratozamia robusta Miquel, Wiss. Tijdschr. 1: 42. 1848.

Veracruz.

Trunk short, ovoid; leaves about a meter long; staminate cones about 10 cm. long and 4 cm. thick. "Palma" (*Ramírez*).

3. ZAMIA L. Sp. Pl. 165. 1753.

Several other species besides those listed here have been reported from Mexico, but their status is altogether doubtful. The species of the genus are known very imperfectly. The Indians of Florida used the starch extracted from the stems of the species of that region as a food known as coontie.

Pinnae oblanceolate or obovate-oblong.....1. *Z. furfuracea*.

Pinnae linear to lanceolate.

Nerves of the pinnae few (7 to 10).....2. *Z. spartea*.

Nerves of the pinnae numerous (18 to 30 or more).

Pinnae few (about 16), usually entire.....3. *Z. cycadifolia*.

Pinnae numerous (28 to 50 or more), more or less serrulate.

Pinnae obtuse or truncate at the apex.....4. *Z. leiboldii*.

Pinnae acute or attenuate.

Pinnae about 0.8 cm. wide.....5. *Z. lawsoniana*.

Pinnae 1.5 to 3 cm. wide.....6. *Z. loddigesii*.

1. *Zamia furfuracea* L. f.; Ait. Hort. Kew. 3: 477. 1789.

Veracruz; introduced into cultivation in England as early as 1691.

Trunk 30 to 60 cm. long or obsolete; pinnae 20 to 26; pistillate cones 5 to 10 cm. long, yellow.

2. *Zamia spartea* A. DC. in DC. Prodr. 16³: 539. 1864.

Type from Acayucan, Veracruz. Guatemala.

Leaves about 30 cm. long, the petioles aculeolate; pinnae about 40, 25 to 30 cm. long, 4 to 5 mm. wide.

Reported (A. DC., loc. cit.) to be used as a remedy for snake bites.

3. *Zamia cycadifolia* Dyer in Hemsl. Biol. Centr. Amer. Bot. 3: 195. 1883.

Described from Mexico, probably from Veracruz.

Leaves bright green; pinnae linear, 12.5 to 20 cm. long, 6 to 12 mm. wide.

4. *Zamia leiboldii* Miquel, Linnaea 19: 427. 1845.

Described from Colipa, Veracruz.

Trunk very short; petioles 20 to 30 cm. long, the pinnae 28 to 44, 15 to 28 cm. long, 10 to 12 mm. wide; pistillate cone 5.5 cm. long.

5. *Zamia lawsoniana* Dyer in Hemsl. Biol. Centr. Amer. Bot. 3: 195. 1883.

Oaxaca.

Pinnae 50 or more, 22 cm. long or shorter, 8 mm. wide; staminate cone 6.5 cm. long, 2.5 cm. thick.

6. *Zamia loddigesii* Miquel, Tijdsch. Nat. Gesch. 10: 73. 1843.

Zamia mexicana Miquel, Prodr. Cycad. 13. 1861.

Southern Mexico, the locality not indicated. Guatemala.

Pinnae about 19 cm. long.

4. TAXACEAE. Yew Family.

1. TAXUS L. Sp. Pl. 1040. 1753.

1. *Taxus globosa* Schlecht. Linnaea 12: 496. 1838.

Forests of Veracruz, Hidalgo, Mexico, and Oaxaca; type from Real del Monte, Hidalgo.

Tree, 6 meters high or probably larger; leaves linear, cuspidate, 2 to 3.5 cm. long; seed nutlike, seated in a fleshy red cup-shaped disk.

The other North American species of yew have hard strong elastic close-grained reddish wood, with a specific gravity of about 0.64. The leaves and seeds of the various species contain a poisonous alkaloid, taxine; the bark is rich in tannin.

5. PINACEAE. Pine Family.

Trees or shrubs; leaves usually evergreen, alternate, opposite, verticillate, or fasciculate; flowers monoecious or dioecious; fruit a dry or somewhat fleshy cone, composed of few or numerous scales.

Leaves fasciculate (rarely solitary), with a sheath at the base-----1. **PINUS**.

Leaves solitary, without a sheath.

Leaves linear, 1 cm. long or larger.

Cones globose, with few thick scales; leaves deciduous--4. **TAXODIUM**.

Cones elongate, with numerous thin scales; leaves persistent.

Cones pendulous, the scales persistent-----2. **PSEUDOTSUGA**.

Cones erect, the scales deciduous-----3. **ABIES**.

Leaves scalelike, mostly 3 mm. long or shorter.

Fruit baccate, indehiscent-----5. **JUNIPERUS**.

Fruit a dry cone, dehiscent.

Leaves opposite; cone scales peltate-----6. **CUPRESSUS**.

Leaves in whorls of 4; cone scales oblong, not peltate.

7. **LIBOCEDRUS**.

1. PINUS L. Sp. Pl. 1000. 1753.

REFERENCE: G. R. Shaw, The pines of Mexico, pp. 1-29. pl. 1-22. 1909.

The pines are perhaps the most important genus of North American trees. They are certainly the most important group of lumber trees, the wood, varying

in quality in different species, being used for almost every purpose for which wood is commonly employed. In the mountains of Mexico large quantities of pine lumber are sawed and much is exported.

The resinous juice is of great economic importance, being the source of turpentine, resin, tar, and other products. When the juice, which is obtained by tapping the trees, is distilled, oil or spirits of turpentine is produced. This has many well-known uses in the arts and in medicine. The residue left from the distillation is the resin of commerce. By crude distillation of the wood, pine tar is obtained, with a residue of charcoal. Tar subjected to distillation yields oil of tar and a thick residue known as naval pitch.

Pine wood is used extensively in Mexico for fuel. Bundles of splinters of pitch pine to be used in starting fires are seen commonly in the markets. Some of the North American Indians in times of famine have used the sapwood and inner bark for food, and they have also employed strips of the inner bark for making baskets. Some tribes still use resin to waterproof baskets and jars of wickerwork.

Pine leaves are sometimes mixed in adobe bricks in place of straw. The leaves are very tough, and the longer ones occasionally serve as a substitute for twine. The branches are employed in some localities for thatching. A volatile oil obtained from the leaves is used in medicine, and pine tar also is employed medicinally. The cones are used in place of combs by some of the Indian tribes.

The pines are often planted for ornamental purposes, and some of the Mexican species have been cultivated in Europe, although few of them thrive there. *Pinus halepensis* Mill. and *P. pinea* L., European species, are said to be cultivated in Mexican parks.

In Mexico pines are most generally known under the names "pino" (Spanish) and "ocote," the latter a corruption of the Nahuatl "ocotl." Besides the vernacular names listed under the various species, the following names are applied to Mexican pines, although it is uncertain to which species they belong: "Pino barbón" (Durango); "pino triste" (Durango); "pino de azúcar" (Durango; "perhaps *P. ayacahuite*"); "pino prieto" (Durango, Sinaloa); "guiri-biche" (Oaxaca, Zapotec, *Reko*).

In 1857 there was published in the City of Mexico a "Catalogue de Graines de Conifères Méxicains" by B. Roezl & Cia. In this 82 new species of Mexican pines were described, nearly all from the Valley of Mexico. The most competent students of the genus have concluded that all these new names are properly referable to earlier published species. It does not seem necessary to list the numerous names in synonymy here, but those who wish to refer to them will find them tabulated in Shaw's monograph referred to above.

Leaves 1 or 2 in a fascicle.

Leaves solitary.....1. *P. monophylla*.

Leaves 2 in a fascicle.

Leaf sheaths deciduous; leaves 2 to 4 cm. long.....2. *P. edulis*.

Leaf sheaths persistent; leaves 3 to 8 cm. long.....26. *P. contorta*.

Leaves 3 or more in a fascicle.

Leaves 4 to 5 cm. long or shorter.

Leaves 3 in a fascicle.....3. *P. cembroides*.

Leaves 4 in a fascicle.....4. *P. quadrifolia*.

Leaves 6 cm. long or longer.

Leaves 15 to 40 cm. long.

Sheaths of the leaves deciduous.

Leaves in fascicles of 5; cones 20 to 45 cm. long.....7. *P. ayacahuite*.

Leaves in fascicles 3; cones 5 to 7 cm. long.....13. *P. lumholtzii*.

Sheaths of the leaves persistent.

Cones usually deciduous, dull or sublustrous.

Cones 4 to 5 cm. long.

Leaves bright green-----14. *P. teocote*.

Leaves glaucous-----15. *P. lawsoni*.

Cones mostly 8 to 30 cm. long.

Leaves in fascicles of 3 or 4; cones 6 to 12 cm. long.

Sheaths deciduous-----12. *P. chihuahuana*.

Sheaths persistent.

Cones deciduous, dull.

Cones 7 cm. long or shorter-----14. *P. teocote*.

Cones 6 to 12 cm. long-----18. *P. hartwegii*.

Cones persistent, sublustrous.

Leaves 8 to 13 cm. long; cones 4 to 8 cm. long; resin ducts uniting hypoderm and endoderm of the leaves.

23. *P. oocarpa*.

Leaves 7 to 10 cm. long; cones 6 to 12 cm. long; resin ducts medial-----24. *P. greggii*.

Leaves in fascicles of 5.

Cones 4 to 12 cm. long.

Sheaths deciduous-----11. *P. leiophylla*.

Sheaths persistent.

Leaves 18 to 28 cm. long. Cones persistent, lustrous.

23. *P. oocarpa*.

Leaves 7 to 18 cm. long.

Cones deciduous, dull-----18. *P. hartwegii*.

Cones persistent, lustrous-----20. *P. arizonica*.

Cones 10 to 45 cm. long.

Leaves 10 to 20 cm. long-----7. *P. ayacahuite*.

Leaves less than 10 cm. long.

Leaves entire. Seed wings rudimentary-----8. *P. flexilis*.

Leaves serrulate.

Prickles of the cone scales weak and deciduous.

Bark of young trees smooth-----16. *P. pseudostrobus*.

Bark of young trees rough-----17. *P. montezumae*.

Prickles of the cone scales stout and persistent.

19. *P. ponderosa*.

Cones persistent, very lustrous.

Resin ducts of the leaves uniting the hypoderm and endoderm.

23. *P. oocarpa*.

Resin ducts of the leaves internal or medial.

Resin ducts of the leaves internal.

Cone scales without upcurved spines-----21. *P. pringlei*.

Cone scales with strongly upcurved spines-----22. *P. coalteri*.

Resin ducts medial-----25. *P. patula*.

Leaves up to 15 cm. long, usually shorter.

Seeds not winged. Leaves in fascicles of 3.

Sheaths of the leaves deciduous; leaves entire-----5. *P. pinceana*.

Sheaths persistent; leaves serrulate-----6. *P. nelsoni*.

Seeds winged.

Seed wing well developed; cones 25 to 45 cm. long.

9. *P. lambertiana*.

Seed wing rudimentary; cones 10 to 25 cm. long-----10. *P. reflexa*.

1. *Pinus monophylla* Torr. in Frém. Rep. Exped. Rocky Mount. 319. pl. 4. 1845.

Pinus cembroides monophylla Voss, Mitt. Deutsch. Dendr. Ges. 16: 95. 1907.

Mountains of Northern Baja California. Southern California (type locality) to Utah.

Tree, usually 7 meters high or less, but sometimes attaining a height of 15 meters and a trunk diameter of 30 cm.; trunk short, often branched near the base, the bark deeply and irregularly fissured, dark reddish brown; leaves about 4 cm. long, pale green; cones 4 to 6.5 cm. long, light reddish brown, shining, the scales few, thick; seeds about 1.5 cm. long; wood soft, brittle, weak, close-grained, yellow to light brown, its specific gravity about 0.56. "Piñón" (California, Arizona).

The wood is used for fuel and for charcoal for smelters. The seeds are edible, either raw or roasted, and they are sometimes ground into meal.

2. *Pinus edulis* Engelm. in Wislitz. Mem. North. Mex. 88. 1848.

Pinus cembroides edulis Voss, Mitt. Deutsch. Dendr. Ges. 16: 95. 1907.

Dry mountain sides, Baja California, at an altitude of about 1,800 meters; perhaps also in northern Chihuahua. Western Texas to Arizona and Wyoming; type from New Mexico.

Sometimes reaching a height of 12 meters and a trunk diameter of 75 cm., but usually smaller; trunk short, often divided to the base, the bark brown, irregular fissured; leaves 1.8 to 4 cm. long, green; cones about 4 cm. long, the few scales very thick; seeds brown, about 1.2 cm. long; wood soft, weak, brittle, close-grained, pale brown, the specific gravity about 0.64. "Piñón" (New Mexico, Arizona, etc.).

In the United States the wood is used for fencing, fuel, and charcoal, and is sometimes sawed into boards, although it is only rarely suitable for lumber. Pinyon seeds are an important article of food in New Mexico and Arizona, largely taking the place filled by peanuts in other parts of the United States. They were a staple food, also, of the Indians. In New Mexico they are sometimes gathered in such large quantities as to be used for horse feed. The nuts are sometimes exported to other regions, and have been used in making confectionery.

3. *Pinus cembroides* Zucc. Abh. Akad. Wiss. Muenchen 1: 392. 1832.

Pinus llaveana Schiede, Linnaea 12: 488. 1838.

Pinus osteosperma Engelm. in Wislitz. Mem. North. Mex. 89. 1848.

Low mountains, Chihuahua to Baja California, southward to Hidalgo. Southern Arizona and New Mexico.

Bushy tree, usually about 6 meters high, with a trunk diameter of 30 cm., but sometimes much larger; bark reddish brown, irregularly fissured; leaves 2.5 to 5 cm. long, dark green; cones 3 to 5 cm. in diameter, reddish brown; seeds 8 to 10 mm. long; wood soft, close-grained, yellow, its specific gravity about 0.65. Known generally as "piñón" or "pino piñón," the seeds as "piñones."

The seeds are eaten in all regions where the nut pine grows, and are highly esteemed. They are very palatable raw, but are improved by roasting, after which they possess a flavor unexcelled, perhaps, by that of any kind of nut. The seeds are placed in the mouth and the thin shells are cracked with the teeth and ejected without being touched by the fingers, an operation in which one may become very proficient by a little practice. The nuts are often added to candies.

4. *Pinus quadrifolia* Parry; Parl. in DC. Prodr. 16³: 402. 1868.

Pinus parryana Engelm. Amer. Journ. Sci. II. 34: 332. 1862. Not *P. parryana* Gord. 1858.

Mountains of Baja California, at low elevations. Southern California; type from mountains east of San Diego.

Tree, sometimes 12 meters high, with a trunk 45 cm. in diameter, the lower branches often touching the ground; bark dark reddish brown, shallowly fissured; leaves 3.5 to 4.5 cm. long, pale green; cones 4 to 6 cm. long, brown and shining; seeds about 1.5 cm. long; wood soft, close-grained, yellow or pale brown, its specific gravity about 0.57. "Piñón" (California).

The seeds are eaten like those of the other nut pines.

5. *Pinus pinceana* Gord.; Gord. & Glend. Pinet. 204. 1858.

Pinus latisquama Engelm. Gard. Chron II. 18: 712. 1882.

Coahuila to Hidalgo; type said to have come from Cuernavaca, but if so it was probably taken from a cultivated tree.

Low tree with short trunk, the branchlets long, slender, pendent; leaves 12 to 16 cm. long, grayish green; cones 6 to 9 cm. long, pendent, early deciduous.

In the original description the tree is said to reach a height of 18 meters, but it is usually much lower.

6. *Pinus nelsoni*¹ Shaw, Gard. Chron. III. 36: 122. f. 49. 1904.

Nuevo León, on lower slopes of the mountains; type from Miquihuana.

Low tree, 8 to 10 meters high, with long slender branches, these clothing the trunk to the ground; leaves 6 to 9 cm. long, grayish green.

Shaw reports that the nuts are eaten greedily by macaws, and are sometimes found in the markets for human food.

7. *Pinus ayacahuite* K. Ehrenb. Linnaea 12: 492. 1838.

Pinus strobiformis Engelm. in Wislitz. Mem. North. Mex. 102. 1848.

Pinus veitchii Roetzl, Cat. Conif. Mex. 32. 1857.

Pinus bonapartei Roetzl, Gard. Chron. 1858: 358. 1858.

Pinus loudoniana Gord.; Gord. & Glend. Pinet. 230. 1858.

Chihuahua to Mexico, Guerrero, and Chiapas; type from Omitlán, Hidalgo. Guatemala.

Large tree; leaves 10 to 20 cm. long; cones 20 to 45 cm. long, pendent, pale yellowish or reddish brown, usually dull; seeds with a large wing, or this rarely almost obsolete. "Acanita" (Coahuila); "acalocahuite" (Veracruz, Ramírez); "ayacahuite" (Valley of Mexico, Oaxaca, etc.); "ocote blanco" (Oaxaca); "ayacahuite colorado" (Hidalgo, Mexico, Ramírez); "sacalacahuite" (various localities, Ramírez); "pino real" (Oaxaca, Reko); "pino acahuite" or "pino cahuite" (Durango, Patoni).

8. *Pinus flexilis* James in Long, Exped. 2: 34. 1823.

Mountains of Coahuila. Northward along the Rocky Mountains to Alberta; type from the Rocky Mountains.

Tree, sometimes 15 meters high, with a trunk 1.5 meters thick, the crown conic or in age rounded; bark dark brown or nearly black, deeply fissured into broad ridges and scaly plates; leaves about 5 cm. long (rarely 9 cm.); cones 7.5 to 25 cm. long, light brown, with thin scales; seeds 8 to 12 mm. long, winged; wood soft, close-grained, pale yellow or reddish, its specific gravity about 0.43.

The wood of the limber pine is used to some extent in the United States for construction purposes. The seeds are edible.

¹ Named for E. W. Nelson (1855-), Chief of the Bureau of Biological Survey, U. S. Department of Agriculture. Mr. Nelson has traveled very extensively in Mexico, while engaged in investigations of the biological features of the country. He has obtained a very large series of botanical specimens, which are in the U. S. National Herbarium.

9. *Pinus lambertiana* Dougl. Trans. Linn. Soc. Bot. 15: 500. 1827.

San Pedro Mártir Mountains of Baja California, at elevations of 2,250 meters or more. Northward to Oregon; type from the Umpqua River.

The largest of North American pines (probably of all pines), in the northern part of its range sometimes attaining a height of 70 meters and a trunk diameter of 4 meters, trees of still larger dimensions having been reported; bark brown or red-brown, fissured into long plates, on young trees smooth; cones pendulous; seeds broadly winged; wood light brown, soft, its specific gravity about 0.37.

In the United States (where the tree is known as sugar pine) the wood is used for shingles, barrels, general construction, etc.

10. *Pinus reflexa* Engelm. Bot. Gaz. 7: 4. 1882.

Pinus flexilis reflexa Engelm.; Rothr. in Wheeler, Rep. U. S. Surv. 100th Merid. 6: 258. 1878.

Mountains of northern Chihuahua. Arizona (type from Santa Rita Mountains) and New Mexico.

Tree, sometimes 30 meters high and with a trunk diameter of 60 cm., the branches slender and somewhat drooping; bark brown or reddish brown, deeply fissured; leaves light green; wood hard, strong, reddish white, its specific gravity about 0.49.

11. *Pinus leiophylla* Schlecht. & Cham. Linnaea 6: 354. 1831.

Zacatecas to Veracruz and Oaxaca; type from Michoacán.

Tree, 15 to 27 meters high; bark thin, at first, red, soon becoming very coarse and rough; leaves 10 to 14 cm. long, grayish green; cones maturing the third year, 7 cm. long or shorter, persistent. The names "ocote blanco" and "ocote chino" are said to be applied to this species.

12. *Pinus chihuahuana* Engelm. in Wislitz. Mem. North. Mex. 103. 1848.

Chihuahua to Zacatecas and Tepic; type from mountains of Chihuahua. Southern Arizona and New Mexico.

Tree, sometimes 20 meters high, with a trunk 90 cm. in diameter; bark thick, dark reddish or nearly black, deeply fissured into broad flat ridges; leaves 6 to 10 cm. long, pale green; cones 4 to 6 cm. long, ripening the third year, brown and shining; wood soft and brittle but durable, close-grained, orange, its specific gravity about 0.54.

13. *Pinus lumholtzii*¹ Robins. & Fern. Proc. Amer. Acad. 30: 122. 1894.

In the mountains, Chihuahua to Zacatecas and Tepic; type from Coloradas, Chihuahua.

Tree with broad rounded crown and slender, somewhat pendent branches; bark at first thin, separating into deciduous scales, in age coarse and thick; leaves 20 to 30 cm. long, bright green, pendent; cones pendent, dull pale brown. "Pino triste."

A decoction of the leaves is employed by the Indians for stomach troubles. The wood is used for musical instruments, and for other purposes.

14. *Pinus teocote* Schlecht. & Cham. Linnaea 5: 76. 1830.

Pinus teocote macrocarpa Shaw, Pines Mex. 17. 1909.

Nuevo León to Tepic and Chiapas; type from Mount Orizaba.

Tree, 20 to 35 meters high; bark at first thin, red, deciduous, in age thick and rough; leaves 10 to 20 cm. long; cones spreading or reflexed, brown or

¹ Named for Carl Lumholtz (1851-), a native of Norway, who has conducted extensive investigations of the ethnological features of Mexico, especially in the northern ranges of the Sierra Madre. Upon some of his expeditions botanical collections were obtained.

sublustrous. The following names are said to be applied to the tree in various localities: "Jalocote," "xalócotl" (Nahuatl), "ocote," "ocotl," "pino real."

The tree produces turpentine ("ocotzol," "trementina de pino," "trementina de ocote") which is used in medicine as a balsamic stimulant, and for other purposes for which turpentine is generally employed. The tar ("brea") remaining after the distillation of turpentine is used for making torches, in soap, etc.

15. *Pinus lawsoni* Roetzl; Gord. & Glend. Pinet. App. 64. 1862.

Pinus altamirani Shaw; Sarg. Trees & Shrubs 1: 209. 1905.

Michoacán and Morelos to Oaxaca, growing at subtropical levels.

Tree, 20 to 25 meters high, the branchlets with a white bloom; leaves 24 cm. long or shorter, glaucous; cones usually 5 to 6 cm. long, reflexed, deciduous, dull yellowish brown. "Ocote" (Oaxaca).

16. *Pinus pseudostrobus* Lindl. Bot. Reg. 25: Misc. 63. 1839.

Pinus apulcensis Lindl. Bot. Reg. 25: Misc. 63. 1839.

Pinus tenuifolia Benth. Pl. Hartw. 92. 1842.

Pinus orizabae Gord. Journ. Hort. Soc. Lond. 1: 237. 1846.

Durango and Sinaloa to Veracruz and Chiapas, chiefly at subtropical levels; type from Orizaba. Guatemala and Nicaragua.

Large tree, the trunk sometimes nearly 2 meters in diameter; bark smooth at first, becoming very rough in old age, the branches slender, verticillate; leaves 15 to 30 cm. long, pendent; cones 7 to 14 cm. long, early deciduous. "Pino real" (Durango, *Patoni*).

17. *Pinus montezumae* Lambert, Descr. Pinus ed. 3. 1: 39. 1839.

Pinus devoniana Lindl. Bot. Reg. 25: Misc. 62. 1839.

Pinus russelliana Lindl. Bot. Reg. 25: Misc. 63. 1839.

Pinus macrophylla Lindl. Bot. Reg. 25: Misc. 63. 1839.

Pinus filifolia Lindl. Bot. Reg. 26: Misc. 61. 1840.

Pinus grenvilleae Gord. Journ. Hort. Soc. Lond. 2: 77. 1847.

Pinus gordoniana Hartw. Journ. Hort. Soc. Lond. 2: 79. 1847.

Pinus wincesteriana Gord. Journ. Hort. Soc. Lond. 2: 158. 1847.

Pinus lindleyana Gord.; Gord. & Glend. Pinet. 229. 1858.

In the mountains, Durango and Zacatecas to Chiapas. Guatemala.

Tree, 15 to 20 or even 30 meters high; leaves 10 to 45 cm. long; cones subcylindric, 6 to 25 cm. long, deciduous, brown or nearly black, dull. Reko states that the following names are applied in Oaxaca: "Ocote blanco," "pino de Montezuma," "yutnusatnu" (Mixtec). The following names are said to be applied in various regions: "Ocote," "ocotl," "pino real," "pino blanco," "ocote hembro," "ocote macho."

18. *Pinus hartwegii*¹ Lindl. Bot. Reg. 25: Misc. 62. 1839.

Pinus rudis Endl. Syn. Conif. 151. 1847.

Pinus ehrenbergii Endl. Syn. Conif. 151. 1847.

¹Karl Theodor Hartweg (1812-1871) was born at Karlsruhe, Germany. In 1836 he was sent by the Horticultural Society of London to Mexico to collect living plants and seeds for introduction into England. He reached Veracruz in December, 1836, and made collections about Santa Fé and Zacuapan. Later he visited Guanajuato, Aguascalientes, Jalisco, Hidalgo, and San Luis Potosí. In 1838 he spent two months at Morelia, and in 1839 he botanized in Oaxaca. Later he visited California, Guatemala, and the Andes of South America. His collections, which included many new species, were described by Bentham in a work entitled "Plantae Hartwegianae" (1839-42).

Durango to Nuevo León and Chiapas, growing on the mountains up to timber line; type from mountains of Campanario, at 2,700 meters.

Tree, 13 to 45 meters high; leaves 7 to 15 cm. long, glaucous; young cones blue or sooty black, the mature ones 6 to 12 cm. long, brown or nearly black, dull or lustrous. "Ocote" (Chiapas).

19. *Pinus ponderosa* Dougl.; P. Laws. Agr. Man. 354. 1836.

Pinus macrophylla Engelm. in Wislitz, Mem. North. Mex. 103. 1848.

Pinus jeffreyi Murray, Bot. Exped. Oreg. 2. pl. 1. 1853.

Pinus engelmanni Carr. Rev. Hort. 227. 1854.

In the mountains at middle elevations, Chihuahua to Durango and Baja California. Widely distributed in the western United States and Canada; type from Washington.

Large tree, sometimes 70 meters high, with a trunk diameter of 2.4 meters, but usually smaller, the trunk tall and naked, the bark pale reddish brown, broken into large plates; leaves 7.5 to 40 cm. long, yellowish green; cones 6 to 19 cm. long, early deciduous, reddish brown, lustrous; wood hard and strong but brittle, close-grained, pale and reddish brown or yellow, very resinous, its specific gravity 0.48 to 0.52. "Pino real" (Durango); "pinabete" (New Mexico).

The western yellow pine is an important source of lumber in northern Mexico and the southern Rocky Mountains. The wood is used for railroad ties, fencing, and all kinds of construction purposes.

20. *Pinus arizonica* Engelm.; Rothr. in Wheeler, Rep. U. S. Surv. 100th Merid. 6: 260. 1878.

Mountains of Chihuahua and Nuevo León. Southern Arizona (type from the Santa Rita Mountains) and New Mexico.

Tree, sometimes 30 meters high, with a trunk 1.2 meters in diameter; branches stout, spreading; bark reddish brown, broken into large irregular plates; leaves dark green; wood soft, weak, rather brittle, close-grained, light red or yellowish, very resinous, its specific gravity about 0.50.

An important source of lumber in the mountains of northern Mexico.

21. *Pinus pringlei* Shaw; Sarg. Trees & Shrubs 1: 211. 1905.

Michoacán, Guerrero, and Morelos, at subtropical levels; type from Uruapan, Michoacán.

Large tree with long sinuous branches; leaves 15 to 25 cm. long, bright green; cones 5 to 10 cm. long, pendent or spreading, ocher-yellow, lustrous.

22. *Pinus coulteri*¹ Lambert; Don, Trans. Linn. Soc. Bot. 17: 440. 1837.

On mountain tops, Baja California. California; type from Santa Lucia Mountains.

Tree, sometimes 21 meters high, with a trunk 1.2 meters in diameter; bark dark brown or nearly black, deeply fissured; leaves 15 to 35 cm. long, dark bluish green; cones 25 to 35 cm. long, 10 to 13 cm. thick, pendent, light yellowish brown; wood soft, weak, brittle, coarse-grained, light red, resinous, its specific gravity about 0.41.

¹ Thomas Coulter (1793-1843) came to Mexico in 1825 as physician for a mining company in Hidalgo. He remained there for a number of years and made collections of plants. From 1831 to 1833 he explored Alta California (now chiefly included in the State of California) and later Sonora, being the first collector who forwarded to Europe collections from the latter region. His collections were sent to Trinity College, Dublin, from which institution they were distributed to various herbaria. A few of his plants are in the U. S. National Herbarium.

23. *Pinus oocarpa* Schiede, Linnaea 12: 491. 1838.

Sinaloa to Zacatecas and Chiapas; type collected between Ario and Volcán de Jorullo, Michoacán. Guatemala.

Tree, 12 to 15 meters high, with round compact head and stout branches; leaves 18 to 28 cm. long, bright green; cones 4 to 8 or sometimes 10 cm. long, persistent, pendent or spreading, ocher-yellow, often tinged with gray or green. "Ocote" (Oaxaca); "pino real" (Tepic); said to be known also as "ocote macho."

Pinus oocarpa microphylla Shaw¹ is a form from Sinaloa and Tepec with leaves only 8 to 13 cm. long.

24. *Pinus greggii*² Engelm.; Parl. in DC. Prodr. 16²: 396. 1868.

Mountains of Coahuila; type collected near Saltillo.

Tree, 10 to 15 meters high, with smooth gray bark when young; leaves bright green, erect; cones reflexed, ocher-yellow, lustrous.

25. *Pinus patula* Schlecht. & Cham. Linnaea 6: 354. 1831.

Querétaro to Veracruz and Puebla; type collected between Lerma and Toluca, Mexico.

Tree, 12 to 25 meters high, with long slender branches, the upper part of the trunk red; leaves 15 to 30 cm. long, slender, drooping; cones 6 to 9 cm. long, reflexed, persistent, dark brown.

26. *Pinus contorta* Dougl.; Loud. Arb. Frut. 4: 2292. 1830.

San Pedro Mártir Mountains of Baja California, at an altitude of about 2,400 meters. Northward to Alaska.

In the Mexican locality 22 to 30 meters high or larger, with straight trunk and narrow tapering crown; bark very thin, smooth, orange-brown; leaves 3 to 8 cm. long, stiff, yellowish green; cones 5 to 6 cm. long, ocher-brown, lustrous; wood soft, weak, close-grained, light yellow or whitish, with little resin, its specific gravity about 0.41.

2. PSEUDOTSUGA Carr. Trait. Conif. ed. 2. 256. 1867.

REFERENCES: Britton, N. Amer. Trees 69-73. f. 55, 56. 1908; Sudworth, For. Trees Pacif. Slope 99-106. f. 36, 37. 1908.

Trees with linear leaves 2 to 3 cm. long; cones ovoid-oblong, drooping, the bracts lobed, exserted beyond the rounded cone scales.

Cones 5 to 10 cm. long; bracts of the cones much exserted----1. *P. mucronata*.

Cones 10 to 17 cm. long; bracts only slightly exserted-----2. *P. macrocarpa*.

1. *Pseudotsuga mucronata* (Raf.) Sudw. Contr. U. S. Nat. Herb. 3: 266. 1895.

Abies mucronata Raf. Atl. Journ. 120. 1832.

Abies douglasii Lindl. Penny Cycl. 1: 32. 1833.

Pseudotsuga douglasii Carr. Trait. Conif. ed. 2. 256. 1867.

Mountains, at high altitudes, Chihuahua and Sonora to Hidalgo. Northward to southern Canada; type from the mouth of the Columbia River.

¹ Pines Mex. 27. 1909.

² Little is known concerning Josiah Gregg, who was a trader under the patronage of Thomas G. Rockhill, a Philadelphia merchant. He published in 1844 "The Commerce of the Prairies," in which he tells of his travels in the West, and of his residence of nearly nine years in northern Mexico. He made botanical collections in Mexico, and his specimens are chiefly in the herbarium of the Missouri Botanical Garden. He is believed to have died in California in 1850. The genus *Greggia*, of the family Brassicaceae, was named in his honor by Gray.

Tree, in Oregon and Washington sometimes reaching a height of 90 meters, with a trunk diameter of 4.5 meters, but usually smaller; bark thick, deeply fissured; cones purplish at first, yellowish brown when mature; wood hard, light red and coarse-grained or yellowish brown and fine-grained, the specific gravity about 0.51. "Hallarín" (Coahuila); "abeto," "pino de corcho" (Hidalgo); "pinabete," "cahuite," or "acahuite" (Durango); "pino real" (New Mexico).

This tree (known in the United States as Douglas fir) is of the greatest commercial importance in the United States, especially on the Pacific coast, as well as in those portions of Mexico where it is abundant. It furnishes the largest saw timber of any of the North American trees, if not of any trees in the world. The wood is used for all kinds of construction purposes, especially those which require large timbers, such as shipbuilding. It is used also for railroad ties. Large quantities of the lumber are exported from the United States. The bark is sometimes employed for tanning leather. The smaller roots are very uniform in diameter for a length of 2 to 3 meters and have been a favorite material of the California Indians for the manufacture of baskets. It is said that in the same State a decoction of the green leaves has been used by both Indians and white people as a beverage in place of coffee; and a decoction of the spring buds has been employed as a remedy for venereal diseases.

2. *Pseudotsuga macrocarpa* (Torr.) Mayr, Wald. Nordam. 278. 1890.

Abies douglasii macrocarpa Torr. in Ives, Rep. Colo. Riv. 28. 1861.

San Pedro Mártir Mountains, Baja California, at altitudes of 1,500 to 2,100 meters. Southern California, the type from San Diego County.

Similar to preceding species except for the larger cones; tree, sometimes 30 meters high, with a trunk diameter of 1.2 meters; wood hard, strong, close-grained, brown, durable, the specific gravity about 0.45.

3. *ABIES* Hill, Brit. Herb. 509. 1756.

Large conical trees with linear sessile leaves 2 to 6 cm. long; flowers monocious; cones cylindric or ovoid, the thin scales falling away from the axis at maturity.

Leaves green and sulcate on the upper surface, slender-----1. *A. religiosa*.

Leaves glaucous and carinate on the upper surface, stout-----2. *A. concolor*.

1. *Abies religiosa* (H. B. K.) Schlecht. & Cham. Linnaea 5: 77. 1830.

Pinus religiosa H. B. K. Nov. Gen. & Sp. 2: 5. 1817.

Abies hirtella Lindl. Penny Cycl. 1: 31. 1833.

In the mountains, up to 3,600 meters, San Luis Potosí to Jalisco and southward; type collected between Mazatlán and Chilpancingo, Guerrero. Guatemala.

Large tree, sometimes 45 meters high (on Orizaba said to be as much as 60 meters high and 6 meters in circumference), occurring mostly at altitudes of 1,200 to 3,450 meters; branchlets hirtellous or glabrate; leaves mostly 2 to 3 cm. long; cones 6 to 15 cm. long. "Abeto" (Valley of Mexico, Oaxaca); "acxoyatl" (Valley of Mexico, Nahuatl); "bansú" (Otomí); "jalocote" (Valley of Mexico); "oyamel" or "oyametl" (Valley of Mexico, Durango, Oaxaca, Nahuatl); "huallame" (Coahuila); "pinabete" (Durango and elsewhere); "guayame" (Nuevo León, González); "cipreso" (Guatemala); known also in various localities as "pino," "pino oyamel," or "xalócotl" (Nahuatl).

This fir tree furnishes considerable lumber which is used for various construction purposes, as well as for making paper. The trees are tapped in winter

for the oleoresin which they yield abundantly. This, known as "aceite de palo" or "aceite de abeto," is used in medicine for its balsamic properties, and as an ingredient of paints. The specific name "*religiosa*" was applied to the tree because of the fact that its branches are often used as decorations in churches.

2. *Abies concolor* Lindl. Journ. Hort. Soc. Lond. 5: 210. 1850.

San Pedro Mártir Mountains of Baja California, at altitudes of 2,250 meters or more. New Mexico (type locality) to California and Oregon.

Large tree, sometimes attaining a height of 75 meters and a trunk diameter of 2 meters, but usually smaller; bark very thick, reddish brown or light gray, deeply furrowed; leaves 3 to 6 cm. long; cones 7 to 15 cm. long, green or purplish; wood very soft, of medium strength, coarse-grained, inodorous, its specific gravity about 0.36.

The balsam fir is valuable for lumber when it occurs in sufficient abundance.

4. *TAXODIUM* L. Rich. Ann. Mus. Hist. Nat. 16: 298. 1810.

Only 2 other species are known, natives of the southeastern United States.

1. *Taxodium mucronatum* Ten. Ann. Sci. Nat. III. 19: 355. 1853.

Taxodium montezumae Decalsne, Bull. Soc. Bot. France 1: 71. 1854.

Taxodium mexicanum Carr. Trait. Conif. 147. 1855.

Sinaloa to Coahuila and southward, chiefly in wet soil; often planted as a shade tree. Guatemala.

Large tree, 20 to 30 meters high; trunk straight, enlarged near the base, covered with brownish red, rather smooth but shredded bark; roots of trees growing in water often sending up conical projections or "knees;" leaves (and many of the young branches) deciduous, 6 to 12 mm. long; staminate flowers in long slender spikes; cones subglobose, 1.5 to 2.5 cm. in diameter. The Nahuatl name is "ahuehuatl," in modern Mexican "ahuehuete"; the Tarascan name is "pentamu" or "pentamón;" "ciprés" (Tamaulipas); "cipreso" (Chiapas); "sabino" (Durango, San Luis Potosí, Oaxaca, and in other states); "ciprés de Montezuma" (Oaxaca, Valley of Mexico); "tnuyucu" or "yucu-ndatura" (Oaxaca, Mixtec, *Reko*); "yaga-chichicino" or "yaga-guichi xiña" (Oaxaca, Zapotec, *Reko*).

This bald cypress is one of the best-known trees of Mexico, being noted especially for its size. The largest individual reported is the famous tree at Santa María del Tule, Oaxaca, near the city of Oaxaca, which has a height of 38.6 meters and a trunk circumference of 51.8 meters;¹ the greatest diameter of its trunk is 12 meters, and the spread of its branches about 42 meters. The Cypress of Montezuma, in the gardens of Chapultepec, has a height of 51 meters and a trunk circumference of 15 meters. It was a noted tree four centuries ago, and has been estimated to be about 700 years old. Other trees have been estimated to have attained a much greater age. A third famous tree is the "Árbol de la Noche Triste," in the village of Popatela, near the City of Mexico, which is noted for its association with Cortés.

The wood is soft and rather weak, light or dark brown or yellowish, and is often obtained in very large planks. It is susceptible of a good polish and is used in Mexico for fine furniture, as well as for general construction. The tree furnishes an acrid resin which was used in pre-Conquest times for the cure of wounds, ulcers, cutaneous diseases, toothache, gout, etc., and which is still used extensively in popular practice. The bark is employed as an emmena-

¹M. O. Reyes. El gigante de la flora Mexicana ó sea el sabino de Santa María del Tule del Estado de Oaxaca. Naturaleza 6: 110-114. pl. 6. 1884.

gogue and diuretic, and the leaves are applied as a resolutive and as a cure for itch. Chips of the wood are placed in an excavation in the ground, covered with earth, and fired, and as a result there is obtained a kind of pitch which is used commonly as a cure for bronchitis and other chest affections.¹

5. JUNIPERUS L. Sp. Pl. 1038. 1753.

Trees or shrubs with small scalelike leaves, these opposite or verticillate; fruit a small globose cone, often berry-like.

Cedar wood is of much economic importance, being useful for many purposes, one of the most common of which is the manufacture of lead pencils. The bark is rich in tannin and is used for tanning leather. The volatile oil obtained from the fruit of some species is aromatic, stimulant, and diuretic. Spirits distilled with the berries of common juniper (*J. communis* L., of North America, Europe, and Asia) constitutes the gin of commerce. The leaves, or their decoction, of *J. sabina* L. (of Europe) and *J. virginiana* L. (of the United States) have been used as a teniafuge and abortifacient, although their use is dangerous. The trees are very commonly planted for ornamental purposes.

Reko gives the Mixtec name (in Oaxaca) as "yutnu-itne."

Leaves of the branchlets ternate, obtuse. Fruit 1.2 to 1.8 cm. in diameter,
1 or 2-seeded-----1. *J. californica*.

Leaves of the branchlets opposite.

Bark checkered. Leaves obtuse; fruit dry, usually 4-seeded.

2. *J. pachyphloea*.

Bark shredded.

Fruit brownish, dry, fibrous, with 4 or more seeds; leaves very acute.

3. *J. flaccida*.

Fruit blue, fleshy, resinous, with 1 or sometimes 2 seeds; leaves obtuse.

4. *J. mexicana*.

1. *Juniperus californica* Carr. Rev. Hort. 1854: 352. 1854.

Juniperus cerrosianus Kellogg, Proc. Calif. Acad. 2: 37. 1863.

Baja California, at altitudes of 150 to 1,000 meters. California (type locality).

Usually a shrub but sometimes a tree 12 meters high, with a trunk diameter of 60 cm.; bark thin, peeling off in long gray shreds, the inner bark reddish brown; fruit reddish brown, maturing the second year; wood soft, close-grained, light reddish brown, its specific gravity about 0.63. "Cedro" (Baja California).

The wood is very durable and is used for fencing and for fuel. The Indians employed the fruit, either fresh or dried, ground and made into cakes, for food.

2. *Juniperus pachyphloea* Torr. U. S. Rep. Expl. Miss. Pacif. 4: 142. 1857.

Low dry hillsides, Chihuahua and Sonora to Zacatecas and Puebla. Arizona to western Texas; type from New Mexico.

Shrub or tree, sometimes 18 meters high, with a trunk diameter of 1.8 meters; trunk usually short, covered with thick, reddish brown bark, this divided into coarse 4-sided plates; fruit about 1.2 cm. in diameter, with dry sweet flesh; wood soft, weak, brittle, close-grained, light red, with a specific gravity of about 0.58. "Tascate" (Chihuahua, Durango).

The bark is very different from that of any other species. The fruit is often used as food. Palmer reports that in Chihuahua the plant (presumably the leaves) is used as a remedy for rheumatism and neuralgia. Because of its

¹ Tomás Noriega. El Ahuehete. Naturaleza 4: 35-40. 1877.

rough checkered bark, this species is known in the United States as alligator juniper.

3. *Juniperus flaccida* Schlecht. Linnaea 12: 495. 1838.

Chihuahua and Sonora, southward; type from Atotonilco El Chico. Guatemala; western Texas.

Shrub or tree, sometimes 12 meters high, with slender, spreading or drooping branches; fruit subglobose, reddish brown, 1.2 to 1.6 cm. in diameter, with dry flesh. "Cedro colorado" (Veracruz); "cedro" (Durango).

4. *Juniperus mexicana* Spreng. Syst. Veg. 3: 909. 1826.

Cupressus sabinooides H. B. K. Nov. Gen. & Sp. 2: 3. 1817. Not *Juniperus sabinooides* Griseb. 1844.

Juniperus tetragona Schlecht. Linnaea 12: 495. 1838.

Juniperus deppeana Steud. Nom. Bot. ed. 2. 835. 1840.

Nearly throughout Mexico, except along the northern part of the Pacific coast. Guatemala; western Texas.

Shrub or tree, sometimes 30 meters high, with a trunk diameter of a meter or more; in Mexico sometimes ascending to an altitude of 4,500 meters, and then a low shrub; trunk short or tall, the thin bark separating into fibrous, reddish brown scales; twigs 4-sided; fruit 6 to 8 mm. in diameter, dark blue, glaucous, with thin sweet resinous flesh; wood hard, weak, close-grained, brown, its specific gravity about 0.59. "Sabino" (Chihuahua, Hidalgo, Mexico, etc.); "enebro" (Oaxaca, *Reko*); "tascate" or "taxate" (Durango, Chihuahua).

The wood is used for general construction, fence posts, telegraph poles, railroad ties, etc., and for fuel. Palmer states that the ashes of the bark are used in the preparation of corn for tortillas.

Some of the specimens placed here may be referable to *J. monosperma* (Engelm.) Sarg., but in the herbarium material examined it is impossible to distinguish more than a single species.

6. CUPRESSUS L. Sp. Pl. 1002. 1753.

Tree or shrubs, closely resembling the species of *Juniperus*, but with larger cones, these opening when ripe and shedding the seeds; leaves opposite, small and scalelike.

The species of cypress are often cultivated for ornament. *C. sempervirens* L., of the Old World, is said to be cultivated in Mexico.

Seeds not winged, 2 or 3 to each scale; leaves not appressed. Cones about 2.5 cm. in diameter.....1. *C. thurifera*.

Seeds narrowly winged, 5 to 8 to each scale; leaves appressed.

Cones 2.5 to 3.5 cm. in diameter.....2. *C. guadalupensis*.

Cones 1.2 to 2.5 cm. in diameter.

Branchlets stout, stiff; leaves glaucous.....3. *C. arizonica*.

Branchlets slender; leaves green.....4. *C. benthamii*.

1. *Cupressus thurifera* H. B. K. Nov. Gen. & Sp. 2: 3. 1817.

Veracruz and Oaxaca; type from Tasco and Tehuillotepec, at 1,750 meters.

Shrub or large tree. "Cedro" (Veracruz); "cedro de la sierra" (Durango, Veracruz, etc.); "ciprés" (Veracruz); "cedro amarillo," "gretado amarillo" (Oaxaca, *Reko*); "tlatzcán" (*Herrera*).

2. *Cupressus guadalupensis* S. Wats. Proc. Amer. Acad. 14: 300. 1879.

Guadalupe Island, Baja California.

Widely spreading tree, averaging about 12 meters in height, but sometimes larger and with a trunk 7.5 meters in circumference; bark brown, curling into thin plates; wood whitish.

One tree measured by Palmer had a trunk 2 meters in circumference, with 236 annual rings.

3. *Cupressus arizonica* Greene, Bull. Torrey Club 9: 64. 1882.

Coahuila to San Luis Potosí, Zacatecas, and Baja California. Arizona (type locality) and New Mexico.

Shrub or tree, sometimes 21 meters high, with a trunk diameter of 1.2 meters; old bark thin, dark red or brown, separating into long shreds; cones reddish brown, glaucous; wood soft, close-grained, grayish, streaked with yellow, its specific gravity about 0.48. "Cedro," "cedro de la sierra," "pinabete" (Durango).

The wood is used for fuel and for general construction purposes.

4. *Cupressus benthamii*¹ Endl. Syn. Conif. 59. 1847.

? *Cupressus coulteri* J. Forbes, Pinet. Woburn. 190. 1839.

Cupressus lindleyi Klotzsch; Endl. Syn. Conif. 59. 1847.

Cupressus ehrenbergii Kunze, Linnaea 20: 16. 1847.

Cupressus karwinskiana Regel, Gartenflora 1857: 346. 1857.

Cupressus knightiana Perry; Gord. & Glend. Pinet. 61. 1858.

Tepic to Veracruz and southward; ascending to 3,000 meters; type from Banco. Guatemala to Costa Rica.

Tree, often 18 to 30 meters high. "Cedro blanco" (Oaxaca, etc.); "ciprés" (Veracruz); "cedro" (Jalisco); "ciprés de México" (Veracruz, etc.); "gre-tado galán" (Oaxaca, *Reko*); "tlascal," "tlascale" (Veracruz Michoacán, Mexico, etc.); "tlazzcán" (Guerrero, Hidalgo, Veracruz); "teatlale" (various localities, *Ramírez*).

The wood is undoubtedly of importance for lumber, although no details concerning it are available. The bark is said to be used in medicine as an astringent.

7. **LIBOCEDRUS** Endl. Syn. Conif. 42. 1847.

1. *Libocedrus decurrens* Torr. in Frém. Rep. Exped. Rocky Mount. 7. pl. 3. 1854.

Mountains of Baja California, at altitudes of 2,100 to 2,400 meters. California and Oregon; type from the Sacramento River.

Tree, sometimes 45 meters high, with irregularly furrowed, reddish brown bark; leaves in whorls of 4, scalelike, decurrent; cones oblong, 1.8 to 2.5 cm. long, reddish brown; wood soft, weak, close-grained, light reddish brown, the specific gravity about 0.40.

Known in the United States as incense cedar, a name applied because of the fact that all parts of the tree contain a volatile oil with a characteristic incense-like odor. The wood is very durable and is used for general construction, laths, shingles, interior finish, etc. The bark is rich in tannin.

6. **GNETACEAE.** Joint-fir Family.

1. **EPHEDRA** L. Sp. Pl. 1040. 1753.

Shrubs, erect or rarely subscandent or trailing over other shrubs; stems slender, jointed; leaves reduced to opposite or verticillate scales; flowers dioecious, the staminate in short aments, the fertile inflorescence conelike; fruit nutlike, angled, sometimes fleshy.

¹ Named in honor of George Bentham (1800–1884), one of the most noted of British botanists. He was the author of many important botanical works, one of which was a report upon the Mexican collections obtained by Hartweg.

In their general appearance these leafless plants are very unlike any others found in North America. The stems have an astringent taste and contain tannin, but they are much eaten by stock. A decoction of the stems is used widely as a cure for venereal and renal diseases. *E. distachya* L., of the Mediterranean Region, contains an alkaloid, ephedrine, which produces paralysis of the heart.

Leaf scales ternate.

Leaf scales 8 to 10 mm. long, the apex aristate.....1. *E. trifurca*.

Leaf scales 5 mm. long or shorter, acute.....2. *E. californica*.

Leaf scales opposite.

Stems very scabrous3. *E. aspera*.

Stems smooth.

Fruit not fleshy; stems yellowish green, stiff, erect...4. *E. antisiphilitica*.

Fruit fleshy; stems glaucous or glaucescent.

Stems erect, with short stiff branches; fruit sessile or nearly so.

5. *E. compacta*.

Stems reclining, slender, flexuous; fruit conspicuously pedunculate.

6. *E. pedunculata*.

1. *Ephedra trifurca* Torr. in Emory, Mil. Recon. 152. 1848.

Dry mesas and hillsides, Chihuahua, Sonora, and Baja California. Western Texas to Utah; type from New Mexico.

About a meter high, with numerous erect branches. "Popotillo" (Chihuahua, Texas, New Mexico); "tepopote" (Chihuahua, Texas).

2. *Ephedra californica* S. Wats. Proc. Amer. Acad. 14: 300. 1879.

Dry plains and low mountain slopes, Baja California. Southern California; type from San Diego County.

Erect shrub.

3. *Ephedra aspera* Engelm.; S. Wats. Proc. Amer. Acad. 18: 157. 1883.

Dry plains and hillsides, Chihuahua to Zacatecas and Baja California; type from mountains near Saltillo, Coahuila.

Erect shrub, 0.3 to 1 meter high. "Pitamoreal" (Coahuila); "tepopote," "cañatilla," "popotillo" (Durango); "itamo real" (Coahuila); "hintimoreal" (Coahuila, Palmer).

Used for the same purposes as the other species. Palmer states, also, that the plant is sometimes sold in the markets as a remedy for pneumonia.

4. *Ephedra antisiphilitica* Meyer, Monogr. Ephedra 101. 1846.

In dry soil at low altitudes, Coahuila (type locality); doubtless also in Chihuahua. Western Texas to Colorado.

Shrub, a meter high or lower. "Cañatilla" (Chihuahua, Texas, New Mexico); "tepopote" (Chihuahua, Texas); "popotillo" (New Mexico).

5. *Ephedra compacta* Rose, Contr. U. S. Nat. Herb. 12: 261. 1909.

Dry plains and hillsides, Puebla and Oaxaca; type from Tehuacán, Puebla.

Shrub, 30 to 50 cm. high, very densely branched, pale green; fruit red and fleshy.

6. *Ephedra pedunculata* Engelm.; S. Wats. Proc. Amer. Acad. 18: 157. 1883.

Dry plains and hillsides, Chihuahua to San Luis Potosí and Zacatecas. Western Texas, the type from Uvalde.

Slender shrub with long reclining stems; fruit fleshy, red or salmon-colored. "Cañatilla," "tepopote," "popotillo" (Durango); "itamo real" (Zacatecas, San Luis Potosí); "retama real" (Durango, Palmer); "sanguinaria" (the stems, San Luis Potosí, Safford).

Besides its other uses, Palmer states that in Zacatecas the plant is esteemed as a remedy for pleurisy and pneumonia.

7. POACEAE. Grass Family.

(Contributed by Prof. A. S. Hitchcock.)

REFERENCE: Hitchcock, Mexican grasses in the U. S. National Herbarium, Contr. U. S. Nat. Herb. 17: 181-389. 1913.

Herbs or rarely shrubs or trees; leaves usually long and narrow, but in the woody species usually lanceolate or elliptic, often petiolate; flowers small, greenish, or purplish, arranged in small spikelets, the spikelets in narrow or open panicles; fruit a caryopsis or grain.

Most of the woody grasses belong to the tribe Bamboseae, usually known in English-speaking countries as bamboos. In tropical America there are few grasses, aside from bamboos, that have woody stems, and nearly all of these belong to the genus *Lasiacis* of the tribe Paniceae.

It is impracticable to draw a sharp distinction between woody and herbaceous grasses. In the following account only those species have been included which possess culms that persist from year to year. Some excluded species have woody crowns or have the base of the culms woody; others, such as the sugar cane and reed (*Phragmites communis* Trin.), have large firm culms that appear woody during the season of growth, but do not persist.

Leaves many times longer than broad; panicle a large terminal plume; spikelets 2 to several-flowered, more or less silky.

Spikelets unisexual, the pistillate long-silky, the staminate glabrous; plants dioecious.....1. **GYNERIUM**.

Spikelets perfect, the lemmas silky.....2. **ARUNDO**.

Leaves lanceolate or elliptic, usually not more than 20 cm. long; panicles narrow or open but scarcely a large plume; spikelets 1 to several-flowered.

Spikelets unisexual; pistillate spikelets borne on the upper branches and on the ends of the lower branches of a loose terminal panicle, the smaller staminate spikelets pedicellate along the lower branches; leaves asymmetrically lanceolate-oblong, the larger 20 cm. long and 5 cm. wide.

3. **OLYRA**.

Spikelets perfect (often with sterile florets above or below); leaves usually less than 5 cm. wide.

Spikelets globose or ovoid, obtuse, with one perfect terminal floret and a sterile floret below; blades sessile.....4. **LASIACIS**.

Spikelets 1 to several-flowered, the florets acute or acuminate; blades usually contracted into a short petiole and jointed with the sheath. (BAMBOOS.)

Stamens 6. Spikelets several-flowered.....5. **BAMBOS**.
Stamens 3.

Spikelets 1-flowered.....6. **CHUSQUEA**.
Spikelets 2 to many-flowered.

Glumes 1 or 2; sterile lemmas none; spikelets loose, many-flowered, elongate, paniculate or racemose.....7. **ARUNDINARIA**.

Glumes 2; sterile lemmas 1 or 2; spikelets in racemes or 1-sided spikes, these arranged in tufts at the culm nodes.

8. **ARTHROSTYLIDIUM**.

1. **GYNERIUM** Humb. & Bonpl. Pl. Aequin. 2: 112. pl. 115. 1809.

1. **Gynerium sagittatum** (Aubl.) Beauv. Ess. Agrost. 138. pl. 24. f. 6. 1812.

Saccharum sagittatum Aubl. Pl. Guian. 1: 50. 1775.

Gynerium saccharoides Humb. & Bonpl. Pl. Aequin. 2: 112. pl. 115. 1809.

River banks and low ground, forming dense colonies, Veracruz and Oaxaca. West Indies to South America, the type from French Guiana.

Stout reed, often 10 meters tall, with culms clothed below with old sheaths (the blades having fallen), sharply serrulate blades, commonly 2 meters long and 4 to 6 cm. wide (forming a great fan-shaped summit to the sterile culms), and pale, plummy, densely flowered panicles 1 meter long or more, the main axis erect, the branches drooping. "Caña brava" (Tabasco, *Rovirosa*); "caña de casa" (Guatemala); "caña boba," "suza" (Colombia); "caña de Castilla" (El Salvador, Cuba).

2. ARUNDO L. Sp. Pl. 81. 1753.

1. *Arundo donax* L. Sp. Pl. 81. 1753.

Along rivers and ditches throughout Mexico. Warmer parts of the Old World; cultivated in America for ornament and occurring from Texas to California and southward to South America as an escape.

A tall reed with strong, sparingly branching culms, elongate scabrous-margined flat blades, and densely flowered, slightly drooping panicles 30 to 60 cm. long, the spikelets about 1 cm. long. "Carrizo" (Durango, etc.); "caña hueca," "cañaveral" (*Ramírez*); "carricillo" (Tamaulipas); "güfn" (Cuba).

Tender stems eaten by animals; canes used for fishing rods, arrows, and flutes.

3. OLYRA L. Syst. Nat. ed. 10. 2: 1261. 1759.

1. *Olyra latifolia* L. Syst. Nat. ed. 10. 2: 1261. 1759.

Copses and shady banks, San Luis Potosí to Michoacán and southward. Mexico and West Indies to South America, the type from Jamaica.

Glabrous perennial, bamboo-like in aspect, commonly 5 meters tall, the strong hollow culms sometimes 1 cm. thick, erect and unsupported, the summit only arching (or weaker culms leaning among brush), the lower half to two-thirds simple and naked, the short sheaths bladeless or nearly so, the elongate internodes blotched with dull purple, branching from the upper nodes, the branches commonly fascicled, divaricate, often 1 meter long, sometimes again branching; blades convolute in the bud, spreading, flat, firm, asymmetrically lanceolate-oblong, abruptly acuminate, commonly 20 cm. long and 5 cm. wide, those of the ultimate branches smaller, the lowermost on both primary culm and branches rudimentary; panicles 10 to 15 cm. long, about two-thirds as wide, those of the secondary branches reduced, the branches stiffly ascending or spreading, each bearing a single large long-acuminate pistillate spikelet at the thickened summit and several small slender-pedicelled staminate spikelets along the rachis. "Tibisí" (Cuba).

4. LASIACIS (Griseb.) Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910.

The clambering species are known in Cuba as "tibisí."

Main stem prostrate, the fertile shoots prostrate, ascending, or erect.

Blades lanceolate, mostly less than 5 cm. long; fertile shoots strongly dorsiventral, mostly prostrate.....1. *L. rugelii*.

Blades linear-lanceolate, about 10 to 12 cm. long; fertile shoots ascending or erect from a decumbent base, not dorsiventral.....2. *L. grisebachii*.

Main stem clambering, or much branched and forming a tangled mass.

Ligule noticeable, brownish, about 2 mm. long. Blades scabrous on both surfaces, elongate, more than 10 times as long as wide; plants not forming a strong central clambering cane.....3. *L. oaxacensis*.

Ligule inconspicuous, hidden within the mouth of the sheath, rarely as much as 1 mm. long.

Culms not high-climbing, decumbent and rooting at base, forming a tangled mass, with no strong central cane; spikelets clustered toward the ends of the branches-----4. *L. rhizophora*.

Culms high-climbing, forming a strong central cane; spikelets not clustered toward the ends of the branches.

Blades glabrous on both surfaces, often more or less scabrous (see *L. ruscifolia*, rarely with glabrous ovate-lanceolate blades).

Panicle few-flowered, 5 to 10 cm. long; branches strongly zigzag, the branchlets strongly divaricate or reflexed; blades narrowly lanceolate, firm, mostly less than 1 cm. wide (sometimes wider on vigorous shoots) -----5. *L. divaricata*.

Panicle many-flowered, usually 15 to 25 cm. long or more on the primary branches; branches straight or arcuate, not zigzag; blades mostly over 1.5 cm. wide.

Spikelets globose, about 3 mm. long-----6. *L. globosa*.

Spikelets lanceolate-ellipsoidal, 3.5 to 5 mm. long-----7. *L. sloanei*.

Blades pubescent on one or both surfaces (sometimes glabrous in *L. ruscifolia*).

Blades narrowly lanceolate, averaging 8 to 10 times as long as wide; panicle large and open; spikelets 4 to 5 mm. long.

8. *L. sorghoidea*.

Blades ovate-lanceolate or elliptic, sometimes lanceolate, often more or less cordate-clasping; panicle often compact or at least the branches commonly compactly flowered; spikelets 3 to 4 mm. long.

9. *L. ruscifolia*.

1. *Lasiacis rugelii* (Griseb.) Hitchc. Bot. Gaz. 51: 302. 1911.

Panicum rugelii Griseb. Cat. Pl. Cub. 233. 1866.

Rich woods, San Luis Potosí and Yucatán. Cuba (the type locality).

Prostrate, the main canes slender; branches commonly fascicled, very leafy, the pubescent sheaths overlapping, the small, lanceolate, firm, puberulent, somewhat cinereous blades oblique at base; panicles short-exserted, few-flowered.

2. *Lasiacis grisebachii*¹ (Nash) Hitchc. Bot. Gaz. 51: 302. 1911.

Panicum grisebachii Nash, Bull. Torrey Club 35: 301. 1908.

Rich woods and shady banks, carpeting the floor of dark thickets, Veracruz. Honduras; Cuba (type locality).

Stems more slender, freely producing rootlets, the long narrow blades not crowded; panicle branches ascending.

3. *Lasiacis oaxacensis* (Steud.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Panicum oaxacense Steud. Syn. Pl. Glum. 1: 73. 1854.

Edges of woods, Veracruz, Michoacán, and Oaxaca (type locality). Guatemala and Jamaica to South America.

Slender, straggling, decumbent and geniculate at base, with numerous aerial rootlets, the long branches ascending and arcuate, with narrow scabrous blades commonly 20 cm. long, and large open few-flowered panicles, the spikelets borne at the ends of the branchlets.

¹ Heinrich Rudolph August Grisebach (1814-1879), a native of Hanover, published in 1864 a "Flora of the British West Indies," one of the most important works upon the plants of tropical North America. He is known, too, for his "Vegetation der Erde," published in 1872, a classic work upon plant geography, and for numerous other botanical publications.

4. *Lasiacis rhizophora* (Fourn.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Panicum rhizophorum Fourn. Mex. Pl. 2: 31. 1886.

Copses and edges of woods, Veracruz, the type from Orizaba. Guatemala to Costa Rica.

Culms branching and straggling, not forming a strong central cane, decumbent at base and rooting at the lower nodes, the fertile culms ascending, 30 to 100 cm. long; blades 7 to 14 cm. long, 1.5 to 3 cm. wide; panicles 8 to 15 cm. long.

5. *Lasiacis divaricata* (L.) Hitchc. Contr. U. S. Nat. Herb. 15: 16. 1910.

Panicum divaricatum L. Syst. Nat. ed. 10. 2: 871. 1759.

Copses and edges of woods, chiefly at low altitudes and especially in the vicinity of the seacoast, Baja California to Veracruz and southward. Southern Florida and the West Indies to South America, the type from Jamaica.

Shrubby, with strong central canes, clambering to a height of 3 or 4 meters, the main branches often fascicled, the vigorous secondary foliage shoots mostly strongly divaricate or zigzag, usually glabrous throughout except on the margin of the sheaths; blades commonly less than 1 cm. wide, only on vigorous shoots as much as 1.5 cm. wide; panicles usually less than 10 cm. long, the branches deflexed at maturity. "Pito de bejuco" (Cuba).

6. *Lasiacis globosa* Hitchc. Contr. U. S. Nat. Herb. 17: 251. 1913.

Copses near the sea, Guerrero; type from Acapulco. Panama.

Blades smooth, elliptic-lanceolate; panicle loosely flowered, 8 to 12 cm. long, the spikelets globose, 3 mm. long.

7. *Lasiacis sloanei* (Griseb.) Hitchc. Bot. Gaz. 57: 302. 1911.

Panicum sloanei Griseb. Fl. Brit. W. Ind. 551. 1864.

Climbing among bushes and small trees, San Luis Potosí and Veracruz. West Indies and Mexico, south to Colombia, the type from Jamaica.

Climbing to the height of 3 to 4 meters, forming a strong central cane; branches solitary or 2 or 3 together, elongate; blades parchment-like in texture at maturity, commonly 12 to 15 cm. long and 2 to 3 cm. wide, narrowed into a very short pubescent petiole; panicles commonly as much as 20 cm. long, nearly as wide, the branches rather rigid.

The spikelets are larger in this species than in any other of the genus in the region.

8. *Lasiacis sorghoidea* (Desv.) Hitchc. & Chase, Contr. U. S. Nat. Herb. 18: 338. 1917.

Panicum lanatum Swartz, Prodr. Veg. Ind. Occ. 24. 1788. Not *P. lanatum* Rottb. 1776.

Panicum sorghoideum Desv.; Hamilt. Prodr. Pl. Ind. Occ. 10. 1825.

Ravines, wood borders, and hedges, San Luis Potosí and Jalisco, southward. West Indies and Mexico to Argentina, the type from Hispaniola.

Erect or clambering to a height of 5 to 7 meters, with a strong central cane as much as 1 cm. thick, the main branches 1 meter long or more, arcuate, bearing slender branchlets toward the pendent ends; sheaths and both surfaces of the blades velvety, or the sheaths glabrescent, the blades of the main branches commonly 20 cm. long and 2.5 cm. wide, those of the branchlets much smaller, often less velvety; panicles usually about 10 to 20 cm. long, at maturity as wide or wider, the spikelets more or less clustered on the long distant branches.

9. *Lasiacis ruscifolia* (H. B. K.) Hitchc. Proc. Biol. Soc. Washington 24: 145. 1911.

Panicum ruscifolium H. B. K. Nov. Gen. & Sp. 1: 101. 1816.

Panicum compactum Swartz, Adnot. Bot. 14. 1829. Not *P. compactum* Kit. 1814.

Panicum liebmannianum Fourn. Mex. Pl. 2: 33. 1886.

Climbing over bushes, Sonora to Veracruz and southward; type from the Volcán Jorullo. Mexico and the West Indies to Venezuela.

More robust than any other species, freely branching, with numerous leafy dorsiventral shoots with broad blades, these velvety or glabrous beneath, glabrous or scabrous above, the sheaths glabrous or nearly so, the scarcely exerted, oblong or club-shaped panicles usually compactly flowered.

5. **BAMBOS** Retz. Obs. Bot. 5: 24. 1789.

Robust arboreous grasses with culms several centimeters in diameter and rising to the height of 10 to 20 meters.

Branches spiny-----1. *B. aculeata*.

Branches unarmed-----2. *B. vulgaris*.

1. *Bambos aculeata* (Rupr.) Hitchc. Contr. U. S. Nat. Herb. 17: 387. 1913.
Guadua aculeata Rupr.; Fourn. Mex. Pl. 2: 130. 1886.

Veracruz, the type from Colipa.

2. *Bambos vulgaris* Schrad.; Wendl. Coll. Pl. 2: 26. pl. 47. 1810.

Commonly cultivated in tropical America; native of the Old World.

Arborescent, freely branching; flowering branches fascicled, elongate, leafless, the sessile spikelets radiate in clusters. "Caña brava" (Cuba).

The common bamboo of cultivation.

6. **CHUSQUEA** Kunth, Syn. Pl. Aequin. 1: 254. 1822.

Branchlets pubescent; base of sheath tumid-----1. *C. nelsoni*.

Branchlets glabrous; base of sheath not tumid-----2. *C. bilimeki*.

1. *Chusquea nelsoni* Scribn. & Smith, U. S. Dept. Agr. Div. Agrost. Bull. 4: 16. 1897.

Only known from the type, which was collected between Chilapa and Tuxtla, Guerrero.

2. *Chusquea bilimeki*¹ Fourn. Mex. Pl. 2: 132. 1886.

Only known from the type locality, in the Valley of Mexico.

Described as having a culm a centimeter in diameter.

7. **ARUNDINARIA** Michx. Fl. Bor. Amer. 1: 73. 1803.

Blades 2 mm. wide; lemmas 1 to 1.5 mm. wide-----1. *A. acuminata*.

Blades 5 to 8 mm. wide; lemmas 2 mm. wide-----2. *A. longifolia*.

1. *Arundinaria acuminata* Munro, Trans. Linn. Soc. Bot. 26: 25. 1868.

Veracruz, the type locality.

Panicles diffuse, the spikelets narrow, acuminate, the lemmas awned.

2. *Arundinaria longifolia* Fourn. Mex. Pl. 2: 131. 1886.

Durango, Tepic, San Luis Potosí, Veracruz, and Oaxaca; type from Jicaltepec, Veracruz.

Panicles less diffuse than in the preceding, the spikelets wider; blades long and narrow, 15 to 20 cm. long, 5 to 8 mm. wide; culms as much as 4 cm. thick.

¹ Named for Bilimek, who was chief gardener of the Emperor Maximilian. He made a small collection of plants, some of which are in the U. S. National Herbarium.

8. **ARTHROSTYLIDIUM** Rupr. Mém. Acad. St. Pétersb. VI. Sci. Nat. 3¹: 117. 1839.

1. *Arthrostylidium racemiflorum* Steud. Syn. Pl. Glum. 1: 336. 1854.

Veracruz; the type from Mexico, but the definite locality unknown. Costa Rica.

Several other species of bamboos have been described from Mexico, but their validity and identity are uncertain.

8. **PHOENICACEAE.** Palm Family.

REFERENCE: Oersted, Nat. For. Kjöbenhavn Vid. Medd. 1858: 1-54. 1859.

The palms are one of the most interesting and important groups of Mexican plants. Although the number of species represented is not nearly as large as in Central America, or farther southward in South America, those which are found in Mexico are of great economic importance. The plants attract attention because of their curious and beautiful forms, and they are favorite ornamental plants in Mexican parks and gardens. Besides the native species, some exotic ones are cultivated. The species are widely distributed in Mexico and often form extensive forests.

The trunks are used for making the walls and roofs of houses, and the leaves are the usual material employed for thatch. The juice of the stems usually contains sugar, and may be fermented to obtain intoxicating drinks. The tough leaves are made into hats, mats, raincoats, and other articles, and their fiber furnishes cordage. The fruits of many of the species are edible, and the seeds contain large quantities of oil.

The writer is under special obligations to Mr. O. F. Cook for assistance in the preparation of the account of this family.

Leaves flabellate.

Calyx and corolla united and forming a 6-dentate cup; ovary of a single 1-ovulate carpel. Petioles unarmed.....1. **THRINAX.**

Calyx and corolla distinct; ovary of 3 distinct or more or less united carpels. Style or stigma basilar in fruit. Petioles unarmed.....2. **INODES.**

Style or stigma terminal in fruit.

Trunk armed with long spines.....4. **ACANTHORRIZA.**

Trunk unarmed.

Petioles smooth. Fruit globose, about 12 mm. in diameter.

5. **CRYOSOPHILA.**

Petioles with dentate or denticulate margins.

Branches of the inflorescence, at least the primary ones, subtended by spathes.

Leaf sheaths split at base.....3. **WASHINGTONIA.**

Leaf sheaths not split at base.....6. **ERYTHEA.**

Branches of the inflorescence not subtended by spathes.

7. **BRAHEA.**

Leaves pinnate or pinnatifid, or sometimes simple and bifid at the apex.

Ovary of 3 distinct carpels, only one normally developed.....8. **PHOENIX.**

Ovary of united carpels.

Fruit baccate, without a bony endocarp.

Flowers sunk in the fleshy rachis of the inflorescence.

Style lateral, beside the one fertile cell of the ovary....9. **GEONOMA.**

Style rising from between the 3 fertile cells of the ovary.

10. **CALYPTROGYNE.**

Flowers not sunk in the rachis of the inflorescence.

Spathes 2 11. **REINHARDTIA**.

Spathes 3 or more 12. **CHAMAEDOREA**.

Fruit nutlike, with a bony endocarp.

Trunk and leaf bases unarmed.

Stamens 6; fruit 1-seeded 13. **COCOS**.

Stamens 10 to 24; fruit 2 to 6-seeded 14. **ATTALEA**.

Trunk or leaf bases armed with spines, these sometimes black and needle-like.

Petals of the pistillate flowers connate only at the base.

15. **ACROCOMIA**.

Petals of the pistillate flowers united.

Staminate flowers immersed in the rachis of the inflorescence; fruit spiny 16. **ASTROCARYUM**.

Staminate flowers not immersed in the rachis; fruit not spiny.

Trunk erect; seeds with large subapical foramina.

17. **BACTRIS**.

Trunk trailing or scandent; seeds with small peripheral foramina.

18. **DESMONCUS**.

1. **THRINAX** L. f.; Swartz, Prodr. Veg. Ind. Occ. 57. 1788.

1. **Thrinax wendlandiana** Becc. Webbia 2: 265. 1907.

Yucatán. Cuba (type locality); Honduras.

Leaves flabellate, about a meter long, green above, slightly paler beneath; spadix paniculate-branched; fruit globose, 5 mm. or more in diameter. Known in Cuba as "miraguano de lana," "guano de lana," or "guano de costa."

2. **INODES** Cook, Bull. Torrey Club 28: 529. 1901.

REFERENCE: Beccari, Webbia 2: 10-86. 1907 (as *Sabal*).

Plants with tall trunks; leaves flabelliform, the margins of the segments with numerous long threads; fruit small, globose, usually black.

Seeds small, 5 to 8 mm. broad. Branches of the inflorescence slender.

Fruit globose, not at all asymmetric 1. **I. mexicana**.

Fruit more or less asymmetric at the base 2. **I. japa**.

Seeds large, 10 to 13 mm. broad.

Branches of the pistillate inflorescence strongly thickened, fusiform. Embryo lateral 3. **I. uresana**.

Branches of the pistillate inflorescence slender.

Embryo lateral 4. **I. rosei**.

Embryo subdorsal 5. **I. texana**.

1. **Inodes mexicana** (Mart.) Standl.

Sabal mexicana Mart. Hist. Nat. Palm. 3: 246. pl. S, f. 1-7, pl. V, f. 4. 1836-50.

Tepic to Zacatecas and Oaxaca (type locality), and perhaps farther eastward. Guatemala.

Trunk 10 to 20 meters high, when young clothed with the persistent petioles, but in age naked; leaf blades somewhat recurved; inflorescence short and dense, recurved; fruit depressed-globose, about 8 mm. in diameter. "Palma real" (Oaxaca); "palma redonda" (Michoacán, Guerrero).

2. **Inodes japa** (Wright) Standl.

Sabal japa Wright; Sauv. Anal. Acad. Ci. Habana 7: 562. 1870.

Yucatán. Cuba (type locality).

Trunk tall, sometimes 24 meters high; leaves large, the blades about 1.2 to 1.3 meters long; inflorescence 30 to 70 cm. long, composed of several short panicles; fruit globose, 8 to 10 mm. in diameter. "Huano," "xaan" (Yucatán). Known in Cuba as "palma de guano," "cana," "japa," or "miraguano."

3. *Inodes uresana* (Trel.) Cook, Bull. Torrey Club 28: 534. 1901.

Sabal uresana Trel. Rep. Mo. Bot. Gard. 12: 79. pl. 35-37. 1901.

Vicinity of Ures, Sonora.

Trunk 5 to 10 meters high, about 30 cm. in diameter, naked; leaves very glaucous, on long unarmed petioles, the blades about 1 meter long; fruit depressed-globose, 15 to 20 mm. in diameter, green or dirty brown and somewhat lustrous.

4. *Inodes rosei*¹ Cook, Bull. Torrey Club 28: 534. 1901.

Sabal rosei Becc. Webbia 2: 83. 1907.

In the coastal plain, Tepic and southern Sinaloa; type from Acaponeta, Tepic.

Six to 12 or even 18 meters high, the trunk slender, naked, 15 to 20 cm. thick; leaves numerous, the blades pale green, 80 cm. wide or larger; inflorescence 60 cm. long or longer; fruit globose, about 1.8 cm. in diameter, blackish or dark blue.

5. *Inodes texana* Cook, Bull. Torrey Club 28: 534. 1901.

Sabal texana Becc. Webbia 2: 78. 1907.

Tamaulipas. Southwestern Texas (type locality).

Trunk tall, naked; spadices about 75 cm. long, copiously branched; flowers white, with a honey-like odor; fruit globose, 1.5 to 2 cm. in diameter. "Palma real," "palma de micheros" (Tamaulipas).

The leaves are used for thatching and for chair seats. The flowers are much frequented by bees. The fruits, known as "micheros," are said to be edible.

3. *WASHINGTONIA* Wendl. Bot. Zeit. 37: 68. 1879.

REFERENCES: Parish, Bot. Gaz. 44: 408-434. f. 1-12. 1907; Goldman, Contr. U. S. Nat. Herb. 16: 316. 1916; Parish, Bot. Gaz. 46: 144-147. f. 1-5. 1908; Parish, Bot. Gaz. 48: 462-463. 1909.

Plants usually with tall trunks; leaves flabelliform, deeply divided, the margins of the leaves usually separating into drooping fibers; fruit drupaceous.

Petiole obtuse at the junction with the blade.....1. *W. sonorae*.

Petiole acuminate prolonged into the blade.

Leaf blades nearly or quite without filaments.....2. *W. gracilis*.

Leaf blades copiously filiferous.....3. *W. filifera*.

1. *Washingtonia sonorae* S. Wats. Proc. Amer. Acad. 24: 79. 1889.

Dry plains and canyons, Sonora and southern Baja California; type from canyons near Guaymas, Sonora.

Trunk reaching a height of 7.5 meters or more; leaves about a meter broad, somewhat glaucous, copiously filiferous; petioles armed with stout curved spines; inflorescence 1.5 to 1.8 meters long; fruit about 6 mm. in diameter, said to be used for food. In Baja California three distinct forms, known as "palma blanca," "palma colorada," and "palma negra," are recognized by the natives.

¹ Named for Dr. J. N. Rose (1862-), Associate Curator of the U. S. National Herbarium. Dr. Rose has collected extensively in nearly all parts of Mexico, and has obtained a very large series of specimens, which are in the National Herbarium. He has published many papers dealing with Mexican plants.

2. *Washingtonia gracilis* Parish, Bot. Gaz. 44: 420. f. 8-10. 1907.

Described from trees cultivated in southern California; believed to be a native of Baja California.

Trunk slender, at least 20 meters high; blades 80 to 100 cm. broad; petioles armed throughout with short curved yellow spines; fruit 6 to 7 mm. in diameter.

3. *Washingtonia filifera* (Linden) Wendl. Bot. Zeit. 37: 68. 1879.

Pritchardia filifera Linden, Ill. Hort. Lem. 24. 1877.

Neowashingtonia filamentosa Sudw. U. S. Dept. Agr. Div. For. Bull. 14: 105. 1897.

Neowashingtonia filifera Sudw. For. Trees Pac. Slope 199. 1908.

Dry plains, Baja California. Southern California.

Trunk up to 27 meters high, often a meter in diameter; leaves a meter broad or larger; inflorescence 2.5 to 3 meters long; fruit about 8 mm. long, black, with thin sweet flesh. In the typical form the petioles are unarmed near the blade; in *W. filifera robusta* (Wendl.) Parish¹ they are armed throughout; in *W. filifera microsperma* Becc.² they are armed only near the base.

This species is one of the commonest palms cultivated in hothouses. It is grown in parks in Sonora, where it is known as "palma de Castilla." The desert Indians of southern California utilized the leaves for building huts and strands from the leaves for tying and in basketry. The fruit was eaten fresh or dried, the seeds were ground into meal, and the terminal bud or "cabbage" was roasted and eaten.

4. *ACANTHORRHIZA* Wendl. in Kerchove, Palmiers 230. 1878.

REFERENCE: Beccari, Webbia 2: 230-243. 1907.

1. *Acanthorrhiza mocinni* (H. B. K.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 3: 411. 1885.

Chamaerops mocinni H. B. K. Nov. Gen. & Sp. 1: 300. 1815.

Trithrinax aculeata Liebm.; Mart. Hist. Nat. Palm. 3: 320. 1836-50.

Acanthorrhiza aculeata Wendl. in Kerchove, Palmiers 230. 1878.

Sinaloa to Oaxaca and Campeche; type from Acapulco, Guerrero. Guatemala.

Trunk of medium height, tapering upward, covered above with long spines; leaves flabelliform, green, slightly paler beneath, the petioles smooth; inflorescence short, recurved; fruit whitish, about 1.2 cm. in diameter. "Palma de escoba" (Campeche); "zoyamiche," "zoyaviche" (Oaxaca); "soyamiche" (Michoacán, Guerrero).

5. *CRYOSOPHILA* Blume, Rumphia 2: 53. 1836.**1. *Cryosophila nana* (H. B. K.) Blume, Rumphia 2: 53. 1836.**

Corypha nana H. B. K. Nov. Gen. & Sp. 1: 299. 1815.

Copernicia nana Liebm.; Hemsl. Biol. Centr. Amer. Bot. 3: 411. 1885.

Known only from the type locality, summit of Cuesta de los Pozuelos, between Acapulco and Mazatlán, Guerrero.

Trunk 2 to 4 meters high, slender, unarmed; leaves flabellate, green above, whitish beneath; flowers densely spicate; fruit globose, about 12 mm. in diameter, green. "Palmillo."

¹ Bot. Gaz. 44: 420. 1907. *Washingtonia robusta* Wendl. Gart. Zeit. 2: 198. 1883.

² Parish, Bot. Gaz. 44: 420. 1907.

6. **ERYTHEA** S. Wats. Bot. Calif. 2: 211. 1880.

REFERENCE: Beccari, Webbia 2: 118-140. 1907.

Plants with tall trunks; leaves flabelliform, deeply divided, the divisions lacerate at the apex; flowers perfect; fruit baccate.

Fruit obpyriform, distinctly attenuate to the base; petioles unarmed.

1. *E. elegans*.

Fruit globose, rounded at the base; petioles usually armed with spinelike teeth.

Leaves glaucous ----- 2. *E. armata*.

Leaves green.

Fruit 1.5 to 2 cm. in diameter; trunk sometimes 30 meters high.

3. *E. brandegeei*.

Fruit 2.5 to 3 cm. in diameter; trunk usually 6 to 9 meters high.

Petioles armed with short hooked spines ----- 4. *E. aculeata*.Petioles unarmed or nearly so ----- 5. *E. edulis*.1. *Erythea elegans* Franceschi; Becc. Webbia 2: 138. 1907.

Sonora, in the region about Hermosillo.

Leaves glaucescent; fruit 18 to 20 mm. long, 15 to 17 mm. thick.

2. *Erythea armata* S. Wats. Bot. Calif. 2: 212. 1880.*Brahea armata* S. Wats. Proc. Amer. Acad. 11: 146. 1876.*Glaucothea armata* Cook, Journ. Washington Acad. Sci. 5: 237. 1915.

Along canyons and arroyos, northern Baja California; type from Tantillas Mountains.

Trunk sometimes 12 meters high and a meter in diameter, but usually about 6 meters high; leaves very numerous, the blades glaucous, the petioles armed with curved teeth; inflorescence slender, exceeding the leaves, the flowers dull purplish. "Palma blanca" (Sonora).

This species is cultivated in southern California and in Sonora. It has been made the type of a new genus, *Glaucothea*, by Cook. While this genus is apparently well founded, it seems impracticable to recognize it in the present work, since the position of some of the other species, especially *E. elegans*, is doubtful.3. *Erythea brandegeei*¹ Purpus, Gartenflora 1903: 12. f. 1, 2. 1903.

Mountains of the Cape Region of Baja California.

Trunk 30 meters high or higher, about 60 cm. in diameter or less, smooth; leaves 10 to 12, the blades subtomentose, sparsely filiferous, green above, pale beneath, about 1 meter long; petioles glabrous, 1 to 1.5 meters long, spine-toothed; inflorescence tomentose; fruit 10 to 15 mm. in diameter. "Palmilla," "palma negra," "palma de Tlaco."

The tender buds are eaten.

4. *Erythea aculeata* T. S. Brandeg. Zoe 5: 196. 1905.

Sinaloa; type from Cofradía.

Trunk 6 to 7 meters high; leaf blades 40 to 60 cm. long, with about 40 segments, slightly filiferous; petioles slender, 50 cm. long or longer, the margins armed with short teeth; fruit globose, 2.5 cm. in diameter.

¹ Named for T. S. Brandeg (1843-) who has made large collections of Mexican plants, chiefly in Baja California, but also in Sinaloa. He has published several papers upon the plants of Baja California, which are our most important sources of information upon the botanical features of that region. He has published, also, papers dealing with plants from other parts of Mexico, especially the recent collections obtained by C. A. Purpus. The Brandeg Herbarium is at the University of California, but large numbers of the plants of Mr. Brandeg's collections are in the U. S. National Herbarium.

5. *Erythea edulis* (Wendl.) S. Wats. Bot. Calif. 2: 212. 1880.*Brahea edulis* Wendl.; S. Wats. Proc. Amer. Acad. 11: 146. 1876.

Known only from Guadalupe Island, Baja California. Cultivated in southern California.

Trunk sometimes 9 meters high and 37 cm. in diameter, covered with thick corky cracked bark; petioles stout, unarmed; leaf blades about a meter long, with 70 to 80 folds, tomentose at first; inflorescence 1.2 meters long, tomentose; fruit about 2.5 cm. in diameter, with thick pulp.

The fruit clusters are said to weigh 40 to 50 pounds. The pulp of the fruit is sweet and edible. The buds also are eaten.

7. **BRAHEA** Mart. Hist. Nat. Palm. 3: 243. 1836-50.

REFERENCE: Beccari, Webbia 2: 92-107. 1907.

Plants with tall unarmed trunks; leaves flabelliform, cleft into numerous segments; fruit of 1 to 3 1-seeded carpels.

Flowers glomerate-ternate-----1. *B. pimo*.
Flowers solitary.

Branches of the inflorescence terete, stout, densely tomentose-velutinous, the flowers partly immersed; leaves filiferous-----2. *B. calcarea*.

Branches of the inflorescence filiform, puberulent, the flowers sessile; leaves not filiferous-----3. *B. dulcis*.

1. *Brahea pimo* Becc. Webbia 2: 103. 1907.

Type from Monte de la Ventana, Michoacán or Guerrero.

Trunk 3 to 4 meters high; spadices about 40 cm. long, thrice branched. "Pimo."

2. *Brahea calcarea* Liebm.; Mart. Hist. Nat. Palm. 3: 319. 1836-50.

Described from mountains near Jalcomulco, Veracruz, altitude about 600 meters.

Trunk about 6 meters high, naked; petioles smooth; inflorescence about 25 cm. long, the branches flexuous, pendulous.

3. *Brahea dulcis* (H. B. K.) Mart. Nat. Hist. Palm. 3: 244. *pl. 137, 162*. 1836-50.*Corypha dulcis* H. B. K. Nov. Gen. & Sp. 1: 300. 1815.

Nuevo León to Sinaloa and Oaxaca; type from "La Moxonera et Alto de las Caxas."

Trunk 2.5 to 6 meters high, or sometimes nearly obsolete, 15 to 20 cm. thick, unarmed; leaves green or pale green, sparsely filiferous, the margins of the petioles coarsely spine-toothed; inflorescence 1.5 to 2.5 meters long, pendulous, the branchlets very thick, tomentose; fruit globose, yellow, succulent; seed white, ovate, very hard. "Palmito" (Durango, Nuevo León); "cocaiste" (Michoacán, Guerrero); "palma apache" (Hidalgo, Puebla, *Urbina*); "palma dulce" (Puebla, Guerrero, *Ramírez*); "palma de sombrero," "palma soyal" (Guerrero, Hidalgo); "soyale" (various localities, *Ramírez*); "zoyate," "soyate" (Hidalgo, Jalisco, Oaxaca); "palma de abanico" (Oaxaca); "yagaxiña" (Oaxaca, Zapotec, *Reko*); "yucu-teyeye," "yutnu-ñun" (Oaxaca, Mixtec, *Reko*).

Wood very hard and heavy, used for frames of houses. Leaves used for thatching. The fruit (known in Durango as "michire" or "miche") is sweet and edible.

8. **PHOENIX** L. Sp. Pl. 1188. 1753.1. **Phoenix dactylifera** L. Sp. Pl. 1188. 1753.

Widely cultivated in Mexico and in some places, as in Baja California, growing without cultivation, perhaps on the sites of abandoned ranches. Native of the Old World.

Trunk often 15 meters high or taller; leaves large, pinnate; fruit borne in large panicles. Commonly known as "datil;" the name "zoyacapulfn" is said to be applied also.

One of the best-known palms, grown for its fruit in most tropical regions. The date palm was introduced into Mexico at an early period and is now cultivated in many localities, chiefly in the more arid regions. Dates were exported from Baja California in the early part of the nineteenth century, but the amount now produced in Mexico is not very large. They could doubtless be grown on a large scale in Sonora and Sinaloa, for the trees thrive in that part of Mexico.

9. **GEONOMA** Willd. Mém. Acad. Sci. Berlin 1804: 37. 1807.

Trunk very short, covered by the sheaths of the petioles-----1. **G. mexicana**.
Trunk 4 to 8 meters high, naked-----2. **G. magnifica**.

1. **Geonoma mexicana** Liebm.; Mart. Hist. Nat. Palm. 3: 316. 1836-50.

Oaxaca, at about 900 meters; material from Veracruz perhaps belongs here.

Trunk very short; leaves interrupted-pinnatifid, bifid at the apex, the pinnae subopposite, broadly lanceolate, long-acuminate; spadix pubescent, with cernuous branches; fruit oblique-ellipsoid.

2. **Geonoma magnifica** Lind. & Wendl. Linnaea 28: 335. 1856.

Described from material collected between San Carlos and Macuspana, Tabasco.

Trunk 4 to 8 meters high and 5 to 6 cm. thick, annulate; leaves pinnatisect, the blade 2.5 meters long, 70 to 80 cm. wide, with 7 or 8 pairs of pinnae, these broadly lanceolate, long-acuminate. "Pujal."

Hemsley reports¹ a third species from Oaxaca as *Geonoma galeottiana* Wendl., but this name is unpublished.

10. **CALYPTROGYNE** Wendl. Bot. Zeit. 17: 72. 1859.1. **Calyptrogyne ghiesbreghtiana**² (Lind. & Wendl.) Wendl. Bot. Zeit. 17: 72. 1859.

Geonoma ghiesbreghtiana Lind. & Wendl. Linnaea 28: 343. 1856.

Chiapas.

¹ Biol. Centr. Amer. Bot. 3: 408. 1885.

² August Ghiesbreght was born in Brussels in 1810. In 1836 he and Linden were appointed by Leopold I to explore Brazil. In 1837, together with Linden and Funck, he started for Mexico and reached Veracruz in January, 1838. He accompanied Galeotti in his ascent of Orizaba, and also collected elsewhere. He went to Europe in 1839, but returned to Mexico in the same year, and with Linden visited Tabasco. In March, 1840, he accompanied his collections to Europe, but returned soon after, and botanized in various states, ascending the volcanoes of Colima, Jorullo, and Zempoaltepec. He took up his residence in Tabasco, and explored that State as well as Chiapas. In 1857 he again accompanied his collections to Europe, to return once more, however, and establish himself in the city of Chiapas. His collections are found in many of the herbaria of Europe and America.

Trunk short or almost none; rachis of the leaf 80 to 85 cm. long, with 6 pairs of pinnae, these 50 to 65 cm. long; inflorescence 1.2 to 1.5 meters long. "Guanito talis."

Leaves used for covering huts.

11. REINHARDTIA Liebm.; Mart. Hist. Nat. Palm. 3: 311. 1836-50.

1. Reinhardtia elegans Liebm.; Mart. Hist. Nat. Palm. 3: 311. 1836-50.

Oaxaca; type collected between Chuapan and Tiutalcingo.

Trunk slender, 6 meters high; leaves 1.5 to 1.8 meters long, horizontal, the pinnae 30 to 45 cm. long, 1.2 cm. wide; inflorescence erect, a meter long, branched; fruit oval, about 1.5 cm. long.

12. CHAMAEDOREA Willd. Sp. Pl. 4¹: 638. 1806.

Plants unarmed, erect or procumbent, with stout or very slender stems; leaves pinnatisect, or simple and bifid at the apex; fruit small, of 1 to 3 carpels, dry or fleshy.

The Mexican species of this genus, as of most others of the family, are very imperfectly known. Some of them were described from cultivated plants, and all are poorly represented in herbaria. The following key, consequently, is very imperfect.

The unopened flower spathes of various species are often cooked and eaten. The following vernacular names are reported for some of the species: "Tepejilote" or "tepexilotl (Nahuatl; Oaxaca, Morelos, Guerrero); "hom cabalsáh" (Oaxaca, Veracruz, *Ramírez*); "guaya de bajo," "guaya de cerro," "guayita" (Tabasco).

Interior perianth of the staminate flowers usually not stipitate; anthers obliquely incumbent.

Caudex repent, short, dichotomous; pinnae linear-----1. *C. martiana*.

Caudex erect, elongate, simple; pinnae lanceolate.

Pinnae few, about 8 on each side-----2. *C. alternans*.

Pinnae numerous, 18 or more on each side.

Segments of the inner perianth acutish; branches of the staminate inflorescence few -----3. *C. tepejilote*.

Segments of the inner perianth very obtuse; branches of the staminate inflorescence numerous -----4. *C. wendlandiana*.

Interior perianth of the staminate flowers connate at the base with the filaments and rudimentary ovary to form a short stipe; anthers erect.

Perianth segments of both staminate and pistillate flowers valvate.

Interior perianth of the pistillate flowers of 3 distinct segments.

Leaves simple, bilobate or irregularly pinnatifid; pistillate spadix simple.

5. *C. ernesti-augusti*.

Leaves pinnate; pistillate spadix branched-----6. *C. sartorii*.

Interior perianth of both staminate and pistillate flowers gamophyllous, tridentate.

Leaves simple, bifid-----7. *C. stolonifera*.

Leaves pinnate.

Caudex very short or obsolete-----8. *C. humilis*.

Caudex 2 to 3.5 meters high.

Pinnae 1 to 1.5 cm. wide, about 15 cm. long-----9. *C. elegans*.

Pinnae about 2.5 cm. wide and 30 cm. long-----10. *C. liebmanni*.

Perianth segments of the staminate flowers valvate, those of the pistillate flowers imbricate.

Fruit 3-celled. Pistillate spadices simple.

Caudex procumbent; leaves about 40 cm. long----11. *C. pygmaea*.

Caudex erect; leaves more than 40 cm. long.

Pinnae 12.5 to 17 cm. long, 6 to 8 mm. wide.

12. *C. cataractarum*.

Pinnae 30 cm. long, 2.5 to 3.3 cm. wide-----13. *C. oreophila*.

Fruit 1-celled.

Leaves simple, bifid; spadices simple-----14. *C. tenella*.

Leaves pinnate; spadices usually branched.

Caudex very long, flexuous, subcandent.

Pinnae partly hooked at the apex, some of them opposite.

15. *C. elatior*.

Pinnae not hooked at the apex, all alternate----16. *C. affinis*.

Caudex erect.

Pinnae few (5 to 12 on each side), trapezoid or oblong.

Staminate flowers oblong; segments of the inner perianth free at the apex-----17. *C. lunata*.

Staminate flowers subglobose; segments of the inner perianth adnate at the apex.

Pinnae about 5 on each side-----18. *C. lindéniana*.

Pinnae 10 to 12 on each side-----19. *C. schiedeana*.

Pinnae numerous, elongate-lanceolate or linear-lanceolate.

Pinnae approximate in clusters along the rachis.

20. *C. klotzschiana*.

Pinnae evenly distributed along the rachis.

Leaf blades short, 45 to 60 cm. long-----21. *C. radicalis*.

Leaf blades large, 1 to 2 meters long.

Pinnae 45 to 50 cm. long, about 2.5 cm. wide; caudex very short-----22. *C. montana*.

Pinnae about 30 cm. long, 2 to 3.5 cm. wide; caudex elongate.

Pinnae 3 to 3.7 wide-----23. *C. karwinskiana*.

Pinnae 0.8 to 2 cm. wide.

Pinnae about 2 cm. wide-----24. *C. pochutlensis*.

Pinnae about 1 cm. wide-----25. *C. graminifolia*.

1. *Chamaedorea martiana* Wendl. Allg. Gartenz. 21: 137. 1853.

Native of Mexico, the locality not known.

Caudex short, repent, dichotomous; leaves long-petiolate, pinnate, the pinnae numerous, small, linear; spadices short-pedunculate, simply branched.

2. *Chamaedorea alternans* Wendl. Gartenflora 29: 104. 1880.

Chiapas.

Caudex up to 3 meters high, 3 cm. thick, the nodes 4 to 8 cm. apart; leaves 4 or 5, 1.75 meters long, the petiole 35 cm. long, the blades pinnate, the pinnae about 8 on each side, elliptic-lanceolate, acuminate, the middle ones 40 to 50 cm. long, 11 to 14 cm. wide; pistillate spadix 40 to 50 cm. long, with 9 to 13 branches.

3. *Chamaedorea tepejilote* Liebm.; Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Described from "Matlaluca, S. Maria, Orizaba."

Caudex 1.2 to 1.8 meters high, thick, closely annulate; leaf blades 1.2 meters long, the pinnae 32 to 37 cm. long, 3.5 cm. wide, numerous, alternate, narrowly lanceolate, subfalcate, acute; spadices simply branched, borne among the younger leaves; fruit oblong-ovoid, 16 mm. long, 6 mm. thick, black. "Tepejilote."

The unopened spathes are cooked and eaten like asparagus.

4. *Chamaedorea wendlandiana* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 3: 407. 1885.

Stephanostachys wendlandiana Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1858: 28. 1859.

Oaxaca.

Leaves 1.2 meters long, the petiole 30 cm. long, the pinnae 18 to 20 on each side, narrowly lanceolate, slightly falcate, long-acuminate, the middle ones 50 cm. long, 3.7 cm. wide or more; staminate spadix 45 cm. long, the peduncle 30 cm. long, the spathes 7, chartaceous, greenish, the branches numerous, 15 cm. long; pistillate spadix 25 cm. long, the few branches erect or ascending, 7.5 cm. long.

5. *Chamaedorea ernesti-augusti* Wendl. Allg. Gartenz. 20: 73. 1852.

Eleutheropetalum ernesti-augusti Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1858: 7. 1859.

Tabasco (type locality). Guatemala and Honduras.

Caudex elongate, erect, remotely annulate; leaves simple, ovate-oblong, bifid or irregularly pinnatifid, coarsely serrate; pistillate spadix simple, strict, equaling or longer than the leaves, the rachis thick and fleshy.

6. *Chamaedorea sartorii*¹ Liebm.; Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Veracruz; type from Barranca de San Francisco, near Mirador, altitude 600 to 750 meters.

Caudex 2.5 to 4.2 meters high, annulate, covered above by the petiole bases; leaf blades 90 to 105 cm. long, the pinnae 30 cm. long, 4 to 5 cm. wide, alternate, elongate-lanceolate, acuminate, falcate; spathes soon deciduous; spadices borne between and below the fronds, simply branched, the branches of the staminate inflorescence very long and pendulous; fruit oval, black, 12 mm. long, 8 mm. thick.

7. *Chamaedorea stolonifera* Wendl.; Hook. f. in Curtis's Bot. Mag. 118: pl. 7265. 1892.

Described from southern Mexico, the locality not known.

Caudices very slender, a meter high, very stoloniferous, forming dense tufts, closely annulate; leaves terminal, 25 cm. long, short-petiolate, the blades cleft to below the middle into 2 oblong acute segments; spadices borne below the leaves, the staminate with 5 or 6 spreading flexuous branches, these 7.5 to 12.5 cm. long.

8. *Chamaedorea humilis* (Liebm.) Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Collinia humilis Liebm. Overs. Dansk. Vid. Selsk. Forh. 1846: 8. 1846.

Veracruz and Oaxaca; type from Colipa, Veracruz.

Dwarf, the caudex very short or obsolete, covered by the petiole sheaths; leaves about 45 cm. long, the pinnae 15 cm. long, 1 cm. wide, linear-lanceolate; spadices 20 to 30 cm. long, borne between and below the leaves simply branched; fruit globose, black.

9. *Chamaedorea elegans* Mart. Linnaea 5: 204. 1830.

Veracruz and Oaxaca; type from Barranca de Tioselo.

Caudex erect, 1.8 meters high, with numerous nodes; pinnae narrowly lanceolate, acuminate, straight; spadix paniculate-branched; fruit globose.

¹ Carl Sartorius, a native of Darmstadt, Germany, was obliged by political conditions to leave his native country in 1826, and in 1830 he took refuge in Mexico. He purchased land at Mirador, at the base of Mount Orizaba, and engaged in agricultural pursuits. He made large collections of plants which are deposited in various herbaria of Europe and the United States. His death occurred in 1872.

10. *Chamaedorea liebmanni*¹ Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Type from Chinantla, Oaxaca.

Caudex 3 to 3.5 meters high, erect, annulate; leaf blades 1 to 1.2 meters long, the petioles 22 cm. long, the pinnae elongate-lanceolate, 30 cm. long, 2.5 cm. wide, acuminate; spadices 45 cm. long, twice-branched; fruit globose, minute, black.

11. *Chamaedorea pygmaea* Wendl. Allg. Gartenz. 20: 217. 1852.

Chiapas.

Caudex very short, procumbent; leaves short-petiolate, 40 to 42.5 cm. long, the pinnae 9 to 12 on each side, elongate-lanceolate; pistillate spadices 25 to 30 cm. long.

12. *Chamaedorea cataractarum* (Liebm.) Mart. Hist. Nat. Palm. 3: 309. 1836-50.

Stachyphorbe cataractarum Liebm. Overs. Dansk. Vid. Selsk. Forh. 1846: 8. 1846.

Oaxaca; type from Chinantla.

Thirty to 60 cm. high, the caudex very short, included in the sheaths; terminal leaves erect, the pinnae linear-lanceolate, acute, straight, alternate, 12.5 to 17 cm. long, 6 to 8 mm. wide; spadices basal, shorter than the leaves; fruit oval, black, the size of a pea.

13. *Chamaedorea oreophila* Mart. Hist. Nat. Palm. 3: 309. 1836-50.

Type from mountains of Tepitonga, Oaxaca.

Caudex 7.5 to 10 cm. long, densely annulate; leaves erect-patent, 75 cm. long, the pinnae 30 cm. long, 2.5 to 3.3 cm. wide, alternate, elongate-lanceolate, acute, straight; spadix 8 cm. long, erect, borne among the leaves; fruit olive-like, orange.

14. *Chamaedorea tenella* Wendl. Gartenflora 29: 102. 1880.

Nunnezharia tenella Hook. f. in Curtis's Bot. Mag. 107: pl. 6584. 1881.

Described from cultivated plants of Mexican origin.

Plants very small, flowering when 17 to 23 cm. high but sometimes 1 meter high, the caudex slender, rooting from the lower nodes; leaves short-petiolate, 10 to 20 cm. long, 6 to 10 cm. wide, obovate-oblong, bifid for a third their length, the lobes acute; spadices about as long as the whole plant, slender, drooping, simple; fruit globose, 8 mm. in diameter, dark green or bluish black.

Hooker (loc. cit.) remarks that this is perhaps the smallest palm known.

15. *Chamaedorea elatior* Mart. Linnaea 5: 205. 1830.

Chamaedorea scandens Liebm.; Mart. Hist. Nat. Palm. 3: 308. 1836-50.

San Luis Potosí, Veracruz, and Oaxaca; type from Barranca de Tioselo.

Stem sometimes 3.5 meters high, 2.5 cm. thick, flexuous and subscandent, covered with petiole sheaths; basal leaves 2, persistent, flabellate-bifid, the

¹ Frederick Michael Liebmann (1813-1856), a Dane, was sent by the Danish Government to Mexico in 1840, in company with a gardener, Rath sack, to make scientific collections, especially of living plants and seeds for the botanical garden of Copenhagen. He landed at Veracruz in February, and with Karwinsky he explored that State, making his headquarters at Mirador. Later he visited Puebla and Oaxaca, and in 1843 he returned to Copenhagen with his collections, which consisted of 40,000 botanical specimens. He was appointed professor of botany at Copenhagen in 1845 and director of the botanical garden in 1849. He published numerous papers based upon his collections, and after his death Oersted also published descriptions of some of the new species discovered. His plants were distributed to many of the herbaria of Europe and the United States.

cauline ones remote, 1.8 to 2.5 meters long, the pinnae numerous, 45 cm. long, 2.5 cm. wide, alternate, elongate-lanceolate, long-acuminate; spadices lateral, subappressed, pedunculate, simply branched; fruit globose, black.

16. *Chamaedorea affinis* Liebm.; Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Oaxaca; type from Chinantla.

Pinnae all alternate, the uppermost confluent; spathes 4, persistent.

17. *Chamaedorea lunata* Liebm.; Mart. Hist. Nat. Palm. 3: 307. 1836-50.

Type from Jicaltepec, Veracruz. Guatemala.

Caudex erect, 1.8 to 3.5 meters high, annulate, covered above with the leaf sheaths; leaves 75 to 100 cm. long, the pinnae 30 cm. long and 7.5 cm. wide or smaller, alternate, remote, broadly lanceolate, falcate, acuminate; spadices simply branched, borne below the leaves, the branches very long, flexuous; fruit elongate, curved, attenuate at each end, 12 to 14 mm. long.

18. *Chamaedorea lindeniana* Wendl. Allg. Gartenz. 21: 139. 1853.

Native of Mexico, the locality not known; specimens from Veracruz are perhaps referable here.

Pinnae 5 on each side, oblong-trapezoid, the middle ones 25 to 28 cm. long, 10 to 11.5 cm. wide, the lowest ones approximate, reflexed-patent, the upper confluent; peduncle of the pistillate inflorescence 35 to 38 cm. long, the rachis 7.5 to 10 cm. long, the branches slender, subflexuous.

19. *Chamaedorea schiedeana*¹ Mart. Linnaea 5: 204. 1830.

Veracruz; type from Jalapa. Guatemala.

Caudex about 1.8 meters high; petioles half as long as the blades, the pinnae broadly lanceolate, falcate-cuspidate; spadices simply branched; fruit globose, bluish black.

20. *Chamaedorea klotzschiana* Wendl. Ind. Palm. 63. 1854.

Native of Mexico, the locality not known.

Pinnae 15 to 18 on each side, elongate-lanceolate, acuminate, the middle ones 30 cm. long, 3.7 cm. wide.

21. *Chamaedorea radicalis* Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Type from the Sierra Madre, lat. 21° to 22° (Tepic or Jalisco).

Plant small, the caudex short, stoloniferous, covered with the petiole sheaths; petioles shorter than the pinnae, the blades 45 to 60 cm. long, the pinnae thickish, linear-acuminate; spathes 6; spadices subbasal, erect, few-branched; fruit globose, black, the size of a pea.

22. *Chamaedorea montana* Liebm.; Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Type from Trapiche de la Concepción, Oaxaca.

Caudex 30 cm. high or less, erect, closely annulate; petioles 45 to 60 cm. long, the blades 1.5 to 2 meters long, the pinnae 45 to 50 cm. long, 2.5 cm. wide or

¹ Christian Julius Wilhelm Schiede (1798-1836), a German, studied natural science, especially botany, at Berlin and Göttingen, and, as a means of assistance in his proposed botanical explorations, medicine. Accompanied by another botanist, Deppe, he reached Mexico in 1828. The two spent about a year in exploring the State of Veracruz, and obtained large collections of plants and other objects. Schiede then took up the practice of medicine, which gave him means to explore other regions of Mexico. His collections were studied chiefly by Schlechtendal and Chamisso, who published numerous papers dealing with them in Linnaea. Schiede himself published descriptions of some of the new plants he discovered, as well as letters dealing with the general aspects of Mexican vegetation. He died in the City of Mexico in 1836. His plants were widely distributed, the most complete series being at Berlin; a few are in the U. S. National Herbarium.

more, numerous, alternate or subopposite, rigid, narrowly lanceolate, acute, cuspidate; spadices simply branched, erect, borne among the leaves, the branches flexuous; fruit globose, small, thin-fleshed, black.

23. *Chamaedorea karwinskiana* Wendl. Allg. Gartenz. 21: 179. 1853.

Native of Mexico, the locality not known.

Caudex 50 cm. high or more, stoloniferous; leaves pinnate, the pinnae 27 to 33 on each side, linear-lanceolate, 30 cm. long, 3 to 3.7 cm. wide; staminate spadix 35 to 50 cm. long, the branches pendulous, the pistillate spadix 40 to 50 cm. long, branched; fruit oblong, black.

24. *Chamaedorea pochutlensis* Liebm.; Mart. Hist. Nat. Palm. 3: 308. 1836-50.

Type from Pochutla, Oaxaca.

Caudex 3 to 3.5 meters high, slender, closely annulate; fronds 1 to 1.2 meters long, the pinnae 20 to 28 cm. long, scarcely 2.5 cm. wide, elongate-lanceolate, straight, acute, spadices 45 cm. long, erect between the leaves, simply branched, the branches very long, slender, pendulous.

25. *Chamaedorea graminifolia* Wendl. Ind. Palm. 62. 1854.

Specimens from Yucatán are referred here with doubt. Guatemala.

Pinnae 36 to 42 on each side, linear, about 25 to 30 cm. long and 1 cm. wide, straight; staminate spadix 30 cm. long or more, the branches very long, flexuous, pendulous. "Xiat" (Yucatán).

. 13. *COCOS* L. Sp. Pl. 1188. 1753.

REFERENCES: Cook, The origin and distribution of the cocoa palm, Contr. U. S. Nat. Herb. 7: 257-293. 1901; Cook, History of the coconut palm in America, Contr. U. S. Nat. Herb. 14: 271-342. 1910; Beccari, The origin and dispersal of *Cocos nucifera*, Philippine Journ. Sci. Bot. 12: 27-43. 1911.

1. *Cocos nucifera* L. Sp. Pl. 1188. 1753.

Common along both coasts of Mexico, often cultivated. Widely distributed in tropical regions.

Trunk slender, sometimes 30 meters high with a diameter of 60 to 70 cm., usually enlarged at the base, normally erect but often bent over by wind; leaves pinnate, 3 to 6 meters long; flowers white, borne in large panicles. Known commonly in Mexico as "coco," "cocotero," "palma de coco," and "coco de agua;" also as "coco de castillo."

The best known and most important of all palms, of frequent occurrence along the coasts of Mexico, growing normally in the immediate vicinity of salt water. The trunks are used for building dwellings and for rafts and the leaves for thatching. The meat of the nut is a favorite article of food and large amounts are used for making "dulces" or sweetmeats. The milk of the fresh fruits is a refreshing drink and is said to have diuretic properties. The fruit has the reputation, in Cuba and Yucatán, of expelling intestinal parasites.

On the west coast of Mexico, particularly in Colima, an intoxicating drink called "tuba" is made from the sap obtained from the trunk or from the inflorescences. This is sometimes flavored with pineapple, lemon, onion, chile, or cinnamon, when it is known as "tuba compostura." The "tuba" is distilled to obtain alcohol, and also furnishes vinegar.

The shells of the nuts are made into cups and other articles. Oil is expressed from the meat, and small quantities of it have been exported from Mexico.

In other regions of the world the different parts of the coco palm are employed for an infinite variety of purposes which it seems unnecessary to enumerate here.¹

¹ See Safford, Contr. U. S. Nat. Herb. 9: 233-243. 1905.

14. **ATTALEA** H. B. K. Nov. Gen. & Sp. 1: 309. 1815.1. *Attalea cohune* Mart. Hist. Nat. Palm. 3: 300. *pl.* 167. 1836-50.

Jalisco to Oaxaca and Yucatán, chiefly in the littoral regions. Central America; type from Honduras.

Trunk often 50 to 60 meters high, when short usually covered with persistent leaf bases; leaves very large, sometimes 7.5 meters long (said to be even 18 meters long and 2.5 meters wide), gracefully recurved, pinnate, with very numerous segments; inflorescence 1.5 to 2 meters long; fruit resembling a small coconut, about 7 cm. long, mamillate at the apex, subtended by the accrescent perianth; seeds large, very oily. "Corozo" (Yucatán, Oaxaca, Guatemala, Costa Rica); "palma de coquito de aceite," "coquino," "coco de aceite," "coquito" (Colima); "palma real," "corozo gallinazo" (Panama); "cohune" (Honduras, Guatemala); "monaco," "manaca" (Guatemala); "coco de Guadalajara" (Chihuahua, in market).

The tallest and most showy of Mexican palms and one of the most important ones economically. The trunks are used for building purposes and the leaves for thatching. From the trunk a liquor similar to that of the coco palm is obtained. The flowers have a heavy, unpleasant odor, and attract bees and wasps. The young bud or "cabbage" is cooked and eaten, and in Costa Rica, at least, the young leaves are used for making hats. The fruits, however, are the most important part of the plant. They are much eaten by cattle, and the seeds are used for human food, especially for the preparation of sweetmeats. The seeds contain about 50 per cent of oil, which is extracted by pressure, and is used chiefly for making soap, but also for candles, machine oil, etc. One soap factory at Guaymas is said to have used 100,000 pounds of the oil a year.

Two species of *Cocos* described from Mexico by Liebm. probably belong to this genus. They may be synonyms of *Attalea cohune*, or they may represent distinct species, for there is reason to believe that more than one species of *Attalea* occurs in Mexico. *Cocos regia* Liebm. (Mart. Hist. Nat. Palm. 3: 323. 1836-50) was based upon material from the mountains of eastern Mexico. *C. guacuyule* Liebm. (Mart. loc. cit.) was collected near Guatulco, at an altitude of 360 meters. The latter name has been much used in Mexican literature for the plant here listed as *Attalea cohune*. The following vernacular names have been reported: "Coyol," "coyole," "guacoyul," "huiscoyul," "quacoyul."

15. **ACROCOMIA** Mart. Hist. Nat. Palm. 2: 66. 1823 (?).1. *Acrocomia mexicana* Karw.; Mart. Hist. Nat. Palm. 3: 285. *pl.* 138. 1836-50.

Sinaloa and southward along the Pacific coast; Yucatán; type from Teoxmulco. Guatemala.

Trunk of medium height, very spiny; leaves pinnate, with numerous thin narrow segments, these pale and more or less hispid beneath; rachis and petiole of the leaf armed with very numerous long compressed blackish lustrous spines; fruit globose, about 4 cm. in diameter: "Coyol" (Guerrero); "cocoyol" (Yucatán); "cocoyul" (Sinaloa, Guerrero); "guacoyul" (Oaxaca; from the Nahuatl, "cuau-coyotli"); "coquito baboso" (Oaxaca).

The fruit is edible and is often found in the markets. It is said that an intoxicating liquor is made from it.

16. **ASTROCARYUM** Meyer, Prim. Fl. Esseq. 265. 1818.1. *Astrocaryum mexicanum* Liebm.; Mart. Hist. Nat. Palm. 3: 323. 1836-50. Veracruz and Oaxaca (type locality).

Trunk 1.2 to 1.8 meters high, densely covered with black spines; petiole and rachis densely spiny, the blades pinnate, the pinnae broadly linear; spathes densely spiny; inflorescence spicate; fruit fusiform, beaked, densely spiny. "Chocón" (Veracruz).

17. BACTRIS Jacq. Stirp. Amer. 271. 1763.

Plants usually low, the stems unarmed or often covered with long spines; leaves pinnatisect, the petioles usually spiny; flowers monoecious; fruit 1-celled, 1-seeded, the pericarp fleshy.

Petiole and rachis of the leaf unarmed.....1. *B. acuminata*.

Petiole and rachis armed with long spines.

Fruit globose, unarmed.....2. *B. baculifera*.

Fruit obovoid, ovoid, or turbinate.

Fruit densely prickly.....3. *B. cohune*.

Fruit unarmed.....4. *B. mexicana*.

1. Bactris acuminata Liebm.; Mart. Hist. Nat. Palm. 3: 321. 1836-50.

Described from Chinantla, Oaxaca.

Petiole and rachis unarmed, the pinnae elongate-lanceolate or the upper ones elongate-obovate, linear-acuminate, black-aculeate beneath.

2. Bactris baculifera Karw.; Mart. Hist. Nat. Palm. 3: 322. 1836-50.

Type from Jicaltepec, Veracruz.

Cespitose; trunk 2.5 to 2.7 meters high, the internodes about 20 cm. long, armed with numerous compressed spines 7 to 13 cm. long; petiole and rachis spiny; fruit globose, unarmed.

Wood very hard; said to be used for canes, etc.

3. Bactris cohune S. Wats. Proc. Amer. Acad. 21: 467. 1886.

Material from Tabasco probably belongs to this species. Originally described from Guatemala.

Trunk 1.8 to 4.5 meters high, straight, slender, densely spiny, covered with the persistent sheaths of old leaves; leaves pale beneath, the petiole and rachis very spiny, the pinnae linear, often a meter long, aculeolate on the margin; spathes tomentose and spiny; fruit obovoid, nearly 5 cm. long, prickly. "Cocoyol de jauacte" (Tabasco).

Fruit edible.

4. Bactris mexicana Mart. Palm. Orbign. 65. 1847.

Veracruz and Oaxaca; type from Jicaltepec, Veracruz.

Trunk of medium height, very spiny; petiole and rachis armed with numerous long slender black spines, the pinnae lance-linear, aculeate-ciliate, paler beneath; spathe very prickly; fruit shaped like an acorn, about 2.5 cm. long, surrounded at the base by the cuplike perianth. "Palma de garroche" (Oaxaca); the "quauhcoyolli" of Hernández, according to Martius.

18. DESMONCUS Mart. Hist. Nat. Palm. 2: 84. 1824(?).

1. Desmoncus chinantlensis Mart. Hist. Nat. Palm. 3: 321. 1836-50.

Forests of Chinantla, Oaxaca.

Trunk stout, flexuous, subscandent, very densely setose-aculeate; leaves remote, the petioles sheathing, spiny, the blades pinnate, with elliptic pinnae; peduncles densely retrose-spiny; fruit obovoid-globose.

Plants of this genus are said to be known in Tabasco as "ballí" and "matambilla," but perhaps these names apply rather to species of *Bactris*.

9. ARACEAE. Arum Family.

REFERENCES: Engler in DC. Monogr. Phan. 2. 1879; Engler, Pflanzenreich IV. 23. 1905-1913.

Plants glabrous; leaves alternate, distichous, or spirally arranged, entire or lobate; flowers small, perfect or monoecious, crowded on a simple spadix, this usually surrounded by a spathe, the whole inflorescence resembling a single flower; fruit baccate.

A large family, with numerous species in Mexico. Most of the plants, however, are wholly herbaceous, and often acaulescent. The species taken up here scarcely deserve to rank as shrubs, but they have long, coarse, epiphytic, scandent stems, which give them the general appearance, at least, of shrubs. The leaves in this family usually contain crystals of calcium oxalate, which penetrate the tongue when a piece is chewed, causing pain and swelling.

Flowers all fertile, or a few at the base of the spike unisexual; leaves often perforated or pinnatifid-----1. **MONSTERA**.

Flowers monoecious, the upper ones staminate, the lower pistillate; leaves not perforated.

Ovaries distinct, 2 to 10-celled; seeds with endosperm--2. **PHILODENDRON**.

Ovaries coherent, 1 or 2-celled; seeds without endosperm--3. **SYNGONIUM**.

1. **MONSTERA** Adans. Fam. Pl. 2: 470. 1763.

Scandent branched shrubs, the branches rooting; leaves distichous, entire or pinnatifid, often with large perforations; flowers perfect.

Leaf blades regularly pinnatifid-----1. **M. deliciosa**.

Leaf blades never regularly pinnatifid, with large openings.

Openings biseriate or triseriate along the costa-----2. **M. punctulata**.

Openings irregularly scattered or uniseriate.

Spadix oblong, about half as long as the spathe---3. **M. pertusa jacquinii**.

Spadix broadly ovoid, only slightly shorter than the spathe.

4. **M. karwinskyi**.

1. **Monstera deliciosa** Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1849: 19. 1849.
Monstera lennae C. Koch, Bot. Zeit. 1852: 277. 1852.

Forests of Oaxaca (type locality) and Veracruz. Guatemala.

Stems terete, 6 meters long and 6 cm. thick or larger, sending out long roots from the nodes; leaf blades 40 to 60 cm. broad, with numerous narrow lobes; spadix 17 to 20 cm. long; berries pale yellow, spotted with violet. "Piñanona" (Oaxaca).

The fruiting spadices are edible.

2. **Monstera punctulata** Schott; Engl. in DC. Monogr. Phan. 2: 259. 1879.

Anadendron punctulatum Schott, Prodr. Syst. Aroid. 393. 1860.

Reported from Mexico, the locality not stated. Type locality uncertain but probably somewhere in Central America.

Leaf blades ovate, 60 to 70 cm. long, with numerous perforations.

3. **Monstera pertusa jacquinii** (Schott) Engl. in Mart. Fl. Bras. 3^a: 113. 1878.

Monstera jacquinii Schott, Oesterr. Bot. Wochenbl. 1854: 66. 1854.

Forests of Veracruz. West Indies, Central America, and northern South America.

Stems high-climbing, 1 to 3 cm. thick; leaf blades ovate, 30 to 40 cm. long, with few large perforations.

4. *Monstera karwinskyi* Schott, Oesterr. Bot. Zeitschr. 9: 99. 1859.

Monstera egregia Schott; Engl. in DC. Monogr. Phan. 2: 260. 1879.

Forests of Veracruz; type collected between Colipa and Papantla.

Stems high-climbing, 2 to 3 cm. thick; leaf blades obliquely oblong, 40 to 50 cm. long.

2. **PHILODENDRON** Schott; Schott & Endl. Melet. Bot. 1: 19. 1832.

Plants scandent, the leafy stems rooting at the nodes; leaves entire or lobate, thick, with persistent sheaths; flowers monoecious.

Leaves acute at the base, entire.

Leaf sheath arising slightly below the blade, long-produced---1. *P. seguine*.

Leaf sheath arising far below the blade-----2. *P. inaequilaterum*.

Leaves either sagittate or cordate or lobate.

Leaves parted or lobed.

Leaves 3-parted.

Ovules several in each cell-----9. *P. anisotomum*.

Ovules solitary-----10. *P. fenzlii*.

Leaves incised or pinnatifid.

Leaves ovate in outline-----11. *P. radiatum*.

Leaves rounded-----12. *P. polytomum*.

Leaves neither parted nor lobed.

Ovules solitary.

Petiole terete-----7. *P. subovatum*.

Petiole flattened above-----8. *P. advena*.

Ovules 2 to 5 in each cell.

Leaves thin, usually pellucid-striolate-----6. *P. mexicanum*.

Leaves subcoriaceous, not pellucid-striolate.

Petioles terete-----5. *P. sanguineum*.

Petioles flattened or sulcate on the anterior side.

Petioles flattened on the anterior side-----3. *P. sagittifolium*.

Petioles sulcate on the anterior side-----4. *P. daemonum*.

1. *Philodendron seguine* Schott, Bonplandia 1859: 164. 1859.

Forests of Oaxaca.

Branches 6 to 8 mm. thick; leaf blades narrowly oblong, 15 to 20 cm. long, 4 to 4.5 cm. wide.

2. *Philodendron inaequilaterum* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 16. 1850.

Pital, Veracruz, the type locality.

Leaf blades oblong-ovate, 20 to 32 cm. long, 10 to 13 cm. wide.

3. *Philodendron sagittifolium* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 17. 1850.

Philodendron tanyphyllum Schott, Prodr. Syst. Aroid. 273. 1860.

Veracruz to Morelos.

Stems high-climbing, 2.5 to 3 cm. thick; leaf blades sagittate, 30 to 50 cm. long; spathe green outside, purplish within; berries dull yellow.

4. *Philodendron daemonum* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 17. 1850.

Veracruz, the type from Colipa.

Leaf blades cordate-hastate, 28 to 35 cm. long.

5. *Philodendron sanguineum* Regel, Gartenflora 1869: 197. pl. 621. 1869.

Forests of Veracruz, the type from the Valley of Córdoba.

Leaf blades elongate-sagittate, 20 to 30 cm. long; spathes green, 13 to 15 cm. long.

6. *Philodendron mexicanum* Engl. in Mart. Fl. Bras. 3²: 143. 1878.
Valley of Córdoba, Veracruz.
Leaf blades elongate-hastate, 30 to 36 cm. long.
7. *Philodendron subovatum* Schott, Oesterr. Bot. Wochenbl. 1855: 289. 1855.
Southern Mexico, the locality not indicated.
Stems scandent; leaf blades cordate-ovate, 25 to 35 cm. long, 24 to 30 cm. wide.
8. *Philodendron advena* Schott, Oesterr. Bot. Wochenbl. 1855: 289. 1855.
Southern Mexico, the locality not indicated.
Stems scandent; leaf blades broadly cordate-ovate, 35 cm. long, 20 to 26 cm. wide; spathes green outside, purple within; berries stramineous.
9. *Philodendron anisotomum* Schott, Oesterr. Bot. Zeitschr. 1858: 179. 1858.
Philodendron affine Hemsl. Diag. Pl. Mex. 37. 1878.
Morelos to Chiapas. Guatemala.
Stems repent or scandent, rooting at the nodes; leaf blades 3-parted.
10. *Philodendron fenzlii* Engl. in Mart. Fl. Bras. 3²: 144. 1878.
Morelos and probably elsewhere in Mexico.
Caudex scandent, 1 to 1.2 cm. thick; leaves 3-parted.
11. *Philodendron radiatum* Schott, Oesterr. Bot. Wochenbl. 3: 378. 1853.
Forests of Veracruz and Oaxaca. Guatemala.
Stems stout, scandent; leaf blades deeply pinnatifid; spathes green or purplish outside, pale purple within.
12. *Philodendron polytomum* Schott, Bonplandia 7: 164. 1859.
Forests of Veracruz; type from Colipa.
Leaf blades deeply pinnatifid, 60 to 70 cm. long, 60 to 65 cm. wide.

3. SYNGONIUM Schott, Wien. Zeitschr. 3: 780. 1829.

Scandent shrubs, the stems rooting at the nodes; leaves petiolate, the primary ones sagittate, the adult ones 3 to 9-lobate, the petiole elongate, with an accrescent persistent sheath; flowers monoecious, the peduncles short, solitary or fasciculate, the spadix much shorter than the spathe.

Tube of the spathe narrowly cylindric; lateral nerves of the leaves ascending at an angle of about 60° ----- 1. *S. auritum*.

Tube of the spathe oblong-ovoid; lateral nerves ascending at an angle of 30 to 45° ----- 2. *S. podophyllum*.

1. *Syngonium auritum* (L.) Schott; Schott & Endl. Melet. Bot. 1: 19. 1832.

Arum auritum L. Sp. Pl. ed. 2. 1371. 1763.

Syngonium neglectum Schott, Bonplandia 1859: 163. 1859.

Veracruz to Morelos. Jamaica.

2. *Syngonium podophyllum* Schott, Prodr. Syst. Aroid. 68. 1856.

Veracruz. El Salvador.

10. LILIACEAE. Lily Family.¹

The Mexican species treated here are trees or shrubs, sometimes acaulescent but often with thick, simple or branched trunks; the leaves are either linear or dagger-shaped, usually stiff and rigid, sometimes with spiny margins; the flowers are either small or large and showy.

¹The writer is under obligations to Dr. William Trelease for generous assistance in the preparation of the account of this family.

Ovules numerous in each cell; flowers large, perfect.

Flowers scarcely 1.5 cm. wide, greenish; anthers oblong—1. **HESPERALOE**.

Flowers 5 to 10 cm. wide, white or yellow; anthers short-sagittate.

Style filiform; stigma papillate-----2. **HESPEROYUCCA**.

Style stout; stigma not papillate.

Perianth gamophyllous, tubular below, the stamens inserted in the throat.

3. **SAMUELA**.

Perianth polyphyllous or nearly so, campanulate, the stamens inserted at the base-----4. **YUCCA**.

Ovules 2 or 3 in each cell; flowers small, unisexual.

Ovary 3-celled; fruit exalate.

Fruit deeply 3-lobate, often inflated-----5. **NOLINA**.

Fruit not lobed or inflated-----6. **CALIBANUS**.

Ovary 1-celled; fruit 3-winged.

Perianth segments entire; leaves somewhat ribbed, the margins not prickly.

7. **BEAUCARNEA**.

Perianth segments denticulate; leaves not ribbed, the margins usually prickly-----8. **DASYLIRION**.

1. **HESPERALOE** Engelm.; S. Wats. in King. Geol. Expl. 40th Par. 5: 497. 1871.

REFERENCE: Trelease, Rep. Mo. Bot. Gard. 13: 29-38. pl. 1-4. 1902.

Plants acaulescent or nearly so; leaves linear, with filiferous margins; inflorescence paniculate, with few branches.

Flowers green, tinged with purple-----1. **H. funifera**.

Flowers rosy red or salmon-colored-----2. **H. parviflora**.

1. **Hesperaloe funifera** (Koch) Trel. Rep. Mo. Bot. Gard. 14: 36. 1902.

Yucca funifera Koch, Belg. Hort. 12: 132. 1862.

Hesperaloe davyi Baker, Kew Bull. 1898: 226. 1898.

Coahuila, Nuevo León, and San Luis Potosí; described from cultivated plants.

Leaves sometimes nearly 2 meters long and 4 cm. wide; inflorescence 2 to 2.5 meters high, the flowers campanulate, about 2.5 cm. long; capsule 2.5 to 5 cm. long, with large flat black seeds. "Samandoque."

The plant is said to be planted in Nuevo León for the fiber obtained from the leaves. The fiber is long and of excellent quality. It is exported as "ixtli" or "Tampico fiber."

2. **Hesperaloe parviflora** (Torr.) Coulter, Contr. U. S. Nat. Herb. 2: 436. 1894.

Yucca parviflora Torr. U. S. & Mex. Bound. Bot. 221. 1859.

Aloe yuccaefolia A. Gray, Proc. Amer. Acad. 7: 390. 1867.

Hesperaloe yuccaefolia Engelm.; S. Wats. in King, Geol. Expl. 40th Par. 5: 497. 1871.

Southwestern Texas, the type collected between the mouth of the Pecos and the Nueces. There is little doubt that the species occurs also on the Mexican side of the Rio Grande, in Coahuila.

Leaves 1 to 1.25 meters long, about 2.5 cm. wide; inflorescence 1 to 1.25 meters high; flowers about 3.5 cm. long; capsule 2.5 cm. long or larger.

2. **HESPEROYUCCA** (Engelm.) Baker, Kew Bull. 1892: 8. 1892.

REFERENCE: Trelease, Rep. Mo. Bot. Gard. 13: 38-41. pl. 4, 5. 1902.

1. **Hesperoyucca whipplei** (Torr.) Baker, Kew Bull. 1892: 8. 1892.

Yucca whipplei Torr. U. S. & Mex. Bound. Bot. 222. 1859.

Mountain slopes, Baja California. California; type from Pasqual.

Plants acaulescent or nearly so; leaves linear, stiff, 0.3 to 1 meter long, 1.5 cm. wide, sharp-pointed, glaucous; inflorescence 2 to 5 meters high, dense, the flowers white, pendent, fragrant; capsule about 5 cm. long.

The leaves are said to give a fine, strong fiber. The flowers were eaten formerly by the California Indians, and Palmer states that the seeds, also, were ground and eaten, either raw or in the form of porridge.

3. SAMUELA Trel. Rep. Mo. Bot. Gard. 13: 116. 1902.

Trees with thick, simple or branched trunks; leaves dagger-shaped, sharp-pointed, coarsely filiferous; flowers white, in large dense panicles.

Perianth tube conic, less than 1 cm. long-----1. *S. faxoniana*.

Perianth tube cylindric, 1.2 to 1.5 cm. long-----2. *S. carnerosana*.

1. Samuela faxoniana Trel. Rep. Mo. Bot. Gard. 13: 117. 1902.

Western Texas (type from Sierra Blanca), and doubtless extending into Chihuahua.

Trunk 1.5 to 5 meters high, 30 to 60 cm. thick, simple or with a few branches at the top; leaves 1 to 1.25 meters long, 5 to 7.5 cm. wide; fruit baccate, 2.5 to 7.5 cm. long.

2. Samuela carnerosana Trel. Rep. Mo. Bot. Gard. 13: 118. 1902.

Dry plains and mountain sides, Coahuila, Nuevo León, San Luis Potosí, and Zacatecas; type from Carneros Pass.

Trunk 1.5 to 6 meters high, simple or rarely branched, 70 cm. or less in diameter; fruit 5 to 7.5 cm. long, 4 cm. thick. "Palma samandoca" (Coahuila, Zacatecas).

The large trunks are used for fences or for the walls of houses, and sometimes they are split open so that the soft interior may be eaten by stock. The large flower panicles are eaten greedily by cattle and are sometimes gathered for this purpose. The immature inflorescences are used also for human food, boiled or roasted. The leaves yield a fiber (known in Zacatecas as "palma ixtle" fiber) useful for cordage. The pulpy, sweet but somewhat bitter fruits are eaten by people as well as by wild and domestic animals.

4. YUCCA L. Sp. Pl. 319. 1753.

REFERENCES: Trelease, Rep. Mo. Bot. Gard. 13: 27-133. *pl.* 1-99. 1902; *op. cit.* 18: 225-230. *pl.* 12-17. 1907.

The plants of this genus are distributed nearly throughout Mexico, but are most abundant in the more arid regions east of the western Sierra Madre, where they are often the dominant feature of the landscape. Yuccas are of importance from an economic standpoint, although much less so than the genus *Agave*.

The most important product is the fiber obtained from the leaves, which, however, is usually coarse and shorter than is desirable in commercial fiber. It is extracted usually in a crude fashion, and is an article of export. It may be that in time its extraction will be of considerable importance commercially. During the war-shortage of raw materials this fiber has acquired considerable value in the southwestern United States, especially that of *Yucca elata*. The fiber is much used locally for cordage, and it has been woven into mats and cloth by the Indians of Mexico and the United States. It is said that the cloth ("ayate") bearing the famous likeness of Our Lady of Guadalupe is made of *Yucca* fiber, but this may be incorrect.

The trunks of the arborescent species are often used for stockades and for walls of houses, and the leaves are used for thatching. Paper can be made from the fiber of the trunks and leaves.

The plants possess the saponifying properties of the genus *Agave*. The roots (under the name "amole") are used widely for washing clothing, the hair, etc., and they have been used in the United States in the manufacture of fine

toilet soap. An extract of the roots has been employed to produce foam in beverages.

The plants are of some importance as forage, chiefly in times of severe drought, when cattle often eat the stiff leaves. The flower panicles are much eaten by cattle. The flowers, either in bud or just after they have opened, have long been an article of human food in Mexico and they are frequently found in the markets at the present time. They are eaten raw as a salad, or are cooked in various ways, and are sometimes made into a conserve. They are slightly bitter and are reputed to have tonic properties.

The fruits of those species with baccate fruit, usually known as "datiles," are eaten by birds and mammals and by man. They contain much sugar but are more or less bitter. They are eaten either raw or cooked, and some of the Indians, of the United States at least, dried them for use in winter. The fruits are also fermented and sometimes distilled to produce an alcoholic beverage.

Various statements are made concerning the seeds. Palmer reports that the Indians used them for food. Others state that they are purgative, while Cervantes says that they are useful for the treatment of dysentery.

Many of the species of *Yucca* are used as ornamental plants, especially in arid regions. They are admirably suited for this purpose because of their showy flowers and striking palmlike appearance.

Fruit dehiscent, erect.

Leaves filiferous along the white margins. Plants with a tall trunk.

1. *Y. elata*.

Leaves minutely denticulate on the margins, not filiferous.

Capsule beaked, the valves rounded on the back.

Leaves about 60 cm. long; trunk about 3 meters tall.....4. *Y. rostrata*.

Leaves 20 to rarely 35 cm. long; trunk 1 meter high or less.

5. *Y. thompsoniana*.

Capsule mucronate, the valves flat on the back.

Plants with a tall trunk.....2. *Y. rigida*.

Plants acaulescent.....3. *Y. rupicola*.

Fruit indehiscent, baccate, pendent.

Fruit without a core, the pulp purple; ovary stalked. Leaves sharply denticulate but not filiferous.....6. *Y. aloifolia*.

Fruit with a papery core, the pulp greenish or whitish; ovary sessile.

Leaves not filiferous.....7. *Y. elephantipes*.

Leaves filiferous.

Margins of the leaves denticulate at first. Leaves thick and firm, often rough.....8. *Y. treculeana*.

Margins of the leaves not denticulate.

Leaves thin, flexible, smooth, the filaments slender.

Leaves 2 to 4 cm. wide; trunk nearly simple.....9. *Y. schottii*.

Leaves 7.5 cm. wide; trunk much branched.....10. *Y. jaliscensis*.

Leaves thick, rigid, the filaments usually coarse.

Leaves usually less than 2.5 cm. wide, smooth; trunk usually less than 2 meters high.....11. *Y. treleasei*.

Leaves 2.5 cm. wide or wider, often rough; trunk usually more than 2 meters high.

Leaves usually 2 to 4 cm. wide, smooth.

Plants acaulescent.....12. *Y. endlichiana*.

Plants with an elongate trunk.

Panicles narrow, pendent.....13. *Y. australis*.

Panicles broad, not pendent.

Leaves 15 to 23 cm. long-----14. *Y. valida*.

Leaves 30 to 60 cm. long.

Panicles glabrous or the pedicels puberulent.

15. *Y. decipiens*.

Panicles tomentose-----16. *Y. periculosa*.

Leaves 4 to 5 cm. wide, rough.

Style elongate-----17. *Y. macrocarpa*.

Style very short -----18. *Y. mohavensis*.

1. *Yucca elata* Engelm. Bot. Gaz. 7: 17. 1882.

Yucca angustifolia radiosa Engelm. in King, Geol. Expl. 40th Par. 5: 496. 1871.

Yucca radiosa Trel. Rep. Mo. Bot. Gard. 3: 163. 1892.

Dry plains, Chihuahua. Western Texas to Arizona.

Trunk simple or branched, sometimes 7 meters high; leaves very numerous, usually 3 to 10 mm. wide, long and very slender, with white margins; inflorescence glabrous; flowers white, campanulate. "Palmilla" (New Mexico).

2. *Yucca rigida* (Engelm.) Trel. Rep. Mo. Bot. Gard. 13: 65. 1902.

Yucca rupicola rigida Engelm. Trans. Acad. St. Louis 3: 49. 1873.

Chihuahua, Durango, and Zacatecas; perhaps also in Coahuila; type from between Mapimi and Guajuquilla.

Trunk simple or branched, sometimes 5 meters high; leaves thin, flat, glaucous, 30 to 60 cm. long, 2 to 3 cm. wide, rather stiff, sharp-pointed, with yellow margins; inflorescence glabrous; capsule about 5 cm. long. "Palma San José (Zacatecas); "palmita" (Durango); "palmilla."

A form with smooth, entire-margined leaves is var. *inermis* Trel. (Rep. Mo. Bot. Gard. 22: 102. 1911).

3. *Yucca rupicola* Scheele, Linnaea 23: 143. 1850.

Western Texas and doubtless in adjacent Mexico.

Plants acaulescent; leaves 30 to 50 cm. long, 2.5 to 3 cm. wide, glaucous, with brown or yellowish margins; inflorescence glabrous; flowers white or greenish.

A form with smooth-edged leaves is var. *edentata* Trel. (Rep. Mo. Bot. Gard. 22: 102. 1911).

4. *Yucca rostrata* Engelm.; Trel. Rep. Mo. Bot. Gard. 13: 68. 1902.

Chihuahua and Coahuila; type from Monclova, Coahuila.

Trunk simple or branched 3 meters high or less, 15 to 20 cm. in diameter, the wood very soft and spongy; leaves about 1 cm. wide, somewhat glaucous, striate, rather stiff, very pungent, with yellow margins; inflorescence glabrous, 0.5 to 1 meter long, the flowers large, pendent, white, rarely tinged with purple; capsule about 5 cm. long. "Soyate" (Coahuila); "palmita."

5. *Yucca thompsoniana* Trel. Rep. Mo. Bot. Gard. 22: 101. pl. 104-107. 1911.

Coahuila; type from Bufatello. Western Texas.

Flowering while stemless, but in age with a trunk a meter high; leaves 35 cm. long and 1 cm. wide or smaller, nearly flat, rigid, bluish or somewhat glaucous, pungent, usually roughened on the back; flowers about 4 cm. long; fruit 4 cm. long.

6. *Yucca aloifolia* L. Sp. Pl. 319. 1753.

Yucca serrulata Haw. Suppl. Pl. Succ. 32. 1819.

Veraacruz, Morelos, and Yucatán; sometimes cultivated for ornament. West Indies; Gulf coast of the United States.

Trunk slender, branched or nearly simple, short; leaves distributed along the stem, flat, rigid, brown-pointed; flowers creamy white, tinged with green or purple near the base; fruit baccate, nearly black, with purplish black pulp. Ramírez gives the common names as "ic Zotli" and "izote."

A form with clustered trunks sometimes 7 meters high, and with tomentose inflorescence, is var. *yucatan* (Engelm.) Trel. (Rep. Mo. Bot. Gard. 13: 93. 1902; *Y. yucatan* Engelm. Trans. Acad. St. Louis 3: 37. 1873). It is known only from Yucatán.

7. *Yucca elephantipes* Regel, Gartenflora 8: 35. 1859.

Yucca guatemalensis Baker, Ref. Bot. 5: pl. 313. 1872.

Veracruz, Morelos, etc., the type apparently from Veracruz. Extensively cultivated in Guatemala.

Often 8 to 10 meters high, compactly branched above, the trunk from a swollen base, the bark rough; leaves 50 to 100 cm. long, 5 to 7 cm. wide, green, lustrous, not at all pungent, with very slightly scabrid margin; flowers white or creamy white. "Palmita," "datiles" (fruits), "palma" (Veracruz); "itabo" (Costa Rica); "izote" (Veracruz, Guatemala, Honduras).

Extensively cultivated, especially in Central America, as a hedge plant. The flowers are prized as an article of food, and are often found in the markets. They are usually fried with eggs.

8. *Yucca treculeana* Carr. Rev. Hort. 1858: 580. 1858.

Yucca aspera Regel, Ind. Sem. Hort. Petrop. 1858: 24. 1858.

Coahuila and Durango to Tamaulipas. Texas.

Trunk usually less than 5 meters high, simple or sparsely branched; leaves 0.9 to 1.25 meters long, 2.5 to 5 cm. wide, bluish green, thick, rough, concave, pungent, brown-margined; flowers white, sometimes tinged with purple. "Palma pita" or "palma de datiles" (Tamaulipas); "palma loca" (Nuevo León and elsewhere).

The leaves yield a coarse fiber which is used extensively. Palmer reports that the seeds are reputed purgative. The broader-leaved, larger-flowered form is var. *canaliculata* Trel. (*Y. canaliculata* Hook. in Curtis's Bot. Mag. III. 16: pl. 5201. 1860).

9. *Yucca schottii*¹ Engelm. Trans. Acad. St. Louis 3: 46. 1873.

Dry plains and hillsides, northern Chihuahua and Sonora. Southern Arizona and Sonora; type from Santa Cruz River, Arizona.

Trunk 2 meters high or rarely larger, simple or nearly so; leaves 2 to 4 cm. wide, bluish green, smooth, thin, concave, pungent, very finely filiferous; inflorescence usually tomentose; fruit sometimes 10 cm. long.

10. *Yucca jaliscensis* Trel., sp. nov.

Yucca schottii jaliscensis Trel. Rep. Mo. Bot. Gard. 13: 99. 1902.

Jalisco; type from Zapotlán.

¹Arthur Carl Victor Schott (1814-1875), a native of Germany, came to the United States in 1850. He was appointed a member of the scientific corps of the commission to establish the boundary between the United States and Mexico, and in the course of his work made large botanical collections. In 1864 he was commissioned by the governor of Yucatán to make a geological survey of that State, and here, also, he secured botanical collections. The most complete representation of his Yucatán plants is in the herbarium of the Field Museum of Natural History, but many of his specimens are in the U. S. National Herbarium.

About 8 meters high, freely branched; leaves about 75 cm. long and 7.5 cm. wide, thin, blue-green. "Isote."

The fiber extracted from the leaves is fine and of good quality.

11. *Yucca treleasei* Macbride, Contr. Gray Herb. n. ser. 56: 15. 1918.

Yucca brevifolia Schott; Torr. U. S. & Mex. Bound. Bot. 221. 1859, as synonym.

Not *Y. brevifolia* Engelm. 1871.

Region of Nogales, Arizona (the type locality), and doubtless in adjacent Sonora.

Trunk 2.5 meters high or less, or often wanting; leaves about 75 cm. long, usually 2 to 3 cm. wide, green, smooth, thick and stiff, falcate, the margins freely filiferous.

12. *Yucca endlichiana* Trel. Rep. Mo. Bot. Gard. 18: 229. 1907.

Coahuila; type from Marte.

Acaulescent; leaves about 50 cm. long and 1.5 cm. wide, erect, fleshy, V-shaped, smooth, pungent, bluish green, finely filiferous; flowers creamy white or purplish, about 1.5 cm. long; fruit pendent, 2.5 to 3 cm. long, with thin flesh. "Pitilla."

The leaves furnish fiber of excellent quality; it is considered superior to that of "lechuguilla."

13. *Yucca australis* (Engelm.) Trel. Rep. Mo. Bot. Gard. 3: 162. 1892.

Yucca baccata australis Engelm. Trans. Acad. St. Louis 3: 44. 1873.

Coahuila (type locality) to Tamaulipas and Querétaro, perhaps extending to the Distrito Federal; often forming forests.

Large, much branched tree, sometimes 10 meters high or more; leaves about 30 cm. long and 2.5 cm. wide, or sometimes larger, green, stiff, coarsely filiferous; inflorescence pendent, glabrous; flowers creamy white. "Palma" (San Luis Potosí and elsewhere); "palma corriente" (Querétaro); "izote" (Valley of Mexico, perhaps only cultivated there). Known also in various localities as "palma de San Pedro" and "palma samandoca" or "palma samondoca."

The hollowed trunks are used sometimes for beehives. The leaves give a fiber useful for cordage, and the fiber is sometimes dipped in pitch to make torches for use in mines. The young stems and leaves have been distilled to obtain alcohol. The spongy interior of the trunk is cut into long strips, beaten flat, washed in running water, and made into mats which are used as pads ("sudaderos") for pack animals. The fiber forms a part of the exported "ixtle" or "Tampico fiber."

14. *Yucca valida* T. S. Brandeg. Proc. Calif. Acad. II. 2: 208. pl. 11. 1889.

Southern Baja California.

Usually 4.5 to 6 meters high, branched, the trunks 20 to 60 cm. or more in diameter; leaves distributed along the stem, 15 to 23 cm. long, 1 to 2 cm. wide, thin, smooth, with whitish threads; panicle somewhat pubescent, not pendent; flowers creamy white.

15. *Yucca decipiens* Trel. Rep. Mo. Bot. Gard. 18: 228. 1907.

Durango to San Luis Potosí; type from Gutiérrez, Zacatecas.

Arborescent, 8 to 10 meters high, much branched above, the trunk sometimes 2 meters thick, covered with very rough bark; leaves 30 to 60 cm. long, 1 to 4 cm. wide, heavily pointed, finely or coarsely filiferous; panicles about 1.5 meters long, not pendent, glabrous or puberulent; flowers creamy white, 3 to 4 cm. long; fruit pendent, 6 to 8 cm. long. "Palma" (Durango); "palma china" (Zacatecas, etc.).

16. *Yucca periculosa* Baker, Gard. Chron. 1870: 1088. 1870.

Yucca circinata Baker, Gard. Chron. 1870: 1088. 1870.

Puebla and probably in Oaxaca and Veracruz; described from cultivated plants, from Tehuacán, Puebla.

Sometimes 6 meters high, with few branches, slender, with rather smooth bark; leaves 35 to 50 cm. long, 2 to 3.5 cm. wide, short-pointed, finely and abundantly filiferous, with brown threads; panicle about a meter long, tomentose, the flowers creamy white.

17. *Yucca macrocarpa* (Torr.) Coville, Contr. U. S. Nat. Herb. 4: 202. 1893.

Yucca baccata macrocarpa Torr. U. S. & Mex. Bound. Bot. 221. 1859.

Dry plains and hillsides, Chihuahua. Western Texas to southern Arizona; type from plains near the Limpio, Texas.

Usually 3 to 5 meters high, but often lower, simple, or with few short branches; leaves 50 to 100 cm. long, 4 to 5 cm. wide, usually rough, pungent, yellowish green, coarsely filiferous; panicle glabrous or somewhat pubescent, the flowers creamy white, 4 cm. long; fruit 7.5 to 10 cm. long. "Palma criolla" (Chihuahua, Texas); "palma" (New Mexico).

The leaves are used extensively by the Indians of southern New Mexico for making baskets.

18. *Yucca mohavensis* Sarg. Gard. & For. 9: 104. 1896.

? *Yucca schidigera* Roezl, Belg. Hort. 1880: 51. 1880.

Dry plains, Baja California. California to Arizona; type from the Mohave Desert.

Sometimes 4.5 meters high but usually lower, simple or with few short branches, the trunk 20 cm. or less in diameter; leaves 45 to 80 cm. long, about 4 cm. wide, smooth; panicles 30 to 45 cm. long, the flowers 2.5 to 4 cm. long, white, often tinged with purple; fruit 7.5 to 10 cm. long, yellowish, becoming purplish or black; wood porous, light brown, the specific gravity about 0.27.

5. **NOLINA** Michx. Fl. Bor. Amer. 1: 208. 1803.

REFERENCE: Trelease, Proc. Amer. Phil. Soc. 50: 412-426. 1911.

Plants acaulescent or with well-developed trunks; leaves linear, often rough on the margins; flowers very small, whitish, paniculate; fruit papery, containing 3 globose seeds.

It is said that the trunks are sometimes roasted and the interior portion eaten. The leaves are very tough and useful for thatching, brooms, baskets, coarse hats, mats, etc. Their fiber is used locally for cordage and enters somewhat into the cordage materials of the United States.

In Durango (and probably elsewhere) the various species are known as "zacate cortador," "zacate de armazón," "zacate de aparejo," and "palmilla." In the United States the name "bear-grass" is applied.

Leaves 15 to 40 mm. wide, usually not brushlike at the tip; bracts usually papery, often showy. Plants treelike.

Pedicels scarcely half as long as the fruit; leaves rather thick.

13. *N. bigelovii*.

Pedicels nearly or quite as long as the fruit; leaves rather thin.

Leaves 3 to 4 cm. wide-----**14. *N. nelsoni*.**

Leaves 1.5 to 3 cm. wide.

Primary divisions of the inflorescence about 50 cm. long; leaves glaucescent-----**15. *N. beldingi*.**

Primary division of the inflorescence 25 to 30 cm. long; leaves green.

Leaves spreading or erect-----**16. *N. parviflora*.**

Leaves drooping-----**17. *N. longifolia*.**

Leaves 2 to 12 mm. wide, frequently brushlike at the tip; bracts not very showy.

Leaves thin and grasslike, usually 3 to 5 mm. wide, rather flat, usually not brushlike at the tip.

Pedicels slender, equaling or exceeding the fruit; bracts not imbricate.

Inflorescence 30 cm. long, the branches short-----1. *N. pumila*.

Inflorescence 25 to 30 cm. long, the branches stout, stiff--2. *N. juncea*.

Pedicels stout, about half as long as the fruit; bracts imbricate.

Leaves 2 to 3 mm. wide; inflorescence 15 cm. long-----3. *N. humilis*.

Leaves 5 mm. wide; inflorescence 25 to 30 cm. long-----4. *N. watsoni*.

Leaves thick, 2 to 12 mm. wide, concave, keeled on one or both surfaces, often brushlike at the tip.

Fruit somewhat inflated, the seed not protruding.

Leaves 4 to 5 mm. wide; lower branches of the panicle much longer than the bracts-----12. *N. rigida*.

Leaves 6 to 12 mm. wide; lower branches of the panicle about as long as the bracts.

Fruit shorter than the pedicels, 6 to 7 mm. wide--10. *N. durangensis*.

Fruit about as long as the pedicels, 7 to 10 mm. wide.

Divisions of the inflorescence 15 to 45 cm. long; leaves 6 to 12 mm. wide-----9. *N. microcarpa*.

Divisions of the inflorescence 10 to 15 cm. long; leaves 12 mm. wide. 11. *N. elegans*.

Fruit not inflated, the seed early protruding.

Inflorescence essentially smooth; pedicels slender-----8. *N. palmeri*.

Inflorescence roughened in lines; pedicels stout in fruit.

Lower panicle divisions as long as the bracts-----6. *N. erumpens*.

Lower panicle divisions shorter than the bracts.

Branchlets of the lower panicle divisions short, stiff, spreading.

7. *N. cespitifera*.

Branchlets of the lower panicle divisions weak, finally ascending.

5. *N. affinis*.

1. *Nolina pumila* Rose, Contr. U. S. Nat. Herb. 10: 92. 1906.

Known only from the type locality, in the Sierra Madre near Santa Teresa, Tepic.

Plants acaulescent; leaves 20 to 30 cm. long, 2 to 4 mm. wide, with serrulate margins; inflorescence about 30 cm. long.

2. *Nolina juncea* (Zucc.) Macbride, Contr. Gray Herb. n. ser. 56: 16. 1918.

Dasyllirion junceum Zucc. Denkschr. Akad. Wiss. Muenchen 19: 19. 1845.

Dasyllirion hartwegianum Zucc. Denkschr. Akad. Wiss. Muenchen 19: 21. 1845, nomen nudum.

Nolina hartwegiana Hemsl. Biol. Centr. Amer. Bot. 3: 371. 1884.

Known only from Zacatecas, the type locality.

Leaves 3 to 4 mm. wide; inflorescence 25 to 50 cm. long.

3. *Nolina humilis* S. Wats. Proc. Amer. Acad. 14: 248. 1879.

Known only from the original collection, from the region of San Luis Potosí.

Acaulescent; leaves 60 cm. long, 2 to 3 mm. wide, with very rough margins; inflorescence 15 cm. long.

4. *Nolina watsoni* (Baker) Hemsl. Biol. Centr. Amer. Bot. 3: 372. 1884.

Beaucarnea watsoni Baker, Journ. Linn. Soc. Bot. 18: 236. 1880.

San Luis Potosí.

Leaves 5 mm. wide, with very rough margins; inflorescence 25 to 30 cm. long.

5. *Nolina affinis* Trel. Proc. Amer. Phil. Soc. 50: 417. 1911.

Nolina caudata Trel. Proc. Amer. Phil. Soc. 50: 417. 1911.

Chihuahua and Sonora, on mesas and stony hills; type from near the city of Chihuahua. Southern Arizona.

Leaves 3 to 4 mm. wide, sometimes with smooth margins. "Palmilla" (Chihuahua).

Leaves used in Chihuahua for making hats. The young leaves are eaten by goats.

6. *Nolina erumpens* (Torr.) S. Wats. Proc. Amer. Acad. 14: 248. 1879.

Dasyllirion erumpens Torr. U. S. & Mex. Bound. Bot. 216. 1859.

Chihuahua. Western Texas (type locality).

Leaves usually 6 to 10 mm. wide, with rough or rarely smooth edges.

7. *Nolina cespitifera* Trel. Proc. Amer. Phil. Soc. 50: 419. 1911.

Coahuila; type from Buena Vista.

Leaves 6 to 10 mm. wide, rough-edged.

8. *Nolina palmeri* S. Wats. Proc. Amer. Acad. 14: 248. 1879.

In canyons, Baja California; type from Tantillas Mountains.

Acaulescent; leaves 8 to 10 mm. wide, rough-edged.

The roots ("amole") are said to be used as a substitute for soap.

Nolina palmeri brandegeei Trel. (Proc. Amer. Phil. Soc. 50: 420. 1911) is a form with the trunk up to 5 meters high.

9. *Nolina microcarpa* S. Wats. Proc. Amer. Acad. 14: 247. 1879.

Dry plains and hillsides, Chihuahua and Sonora. Arizona (type from Rock Canyon) and New Mexico.

Leaves 6 to 12 mm. wide, rough-edged.

10. *Nolina durangensis* Trel. Proc. Amer. Phil. Soc. 50: 421. 1911.

Chihuahua and Durango; type from the city of Durango.

About 2 meters high; leaves 7 to 11 or even 20 mm. wide, rough-margined. "Soyate" (Durango).

11. *Nolina elegans* Rose, Contr. U. S. Nat. Herb. 10: 91. 1906.

Known only from the Sierra Madre of Zacatecas.

Leaves 50 to 60 cm. long, 12 mm. wide, rough-margined.

12. *Nolina rigida* (Brongn.) Trel. Proc. Amer. Phil. Soc. 50: 422. 1906.

Anatis rigida Brongn. Ann. Sci. Nat. II. 14: 320. 1840.

Known only from a drawing of Sessé and Mocino,¹ believed to represent a Mexican plant.

Leaves about 10 cm. long, 4 to 5 mm. wide.

13. *Nolina bigelovii* (Torr.) S. Wats. Proc. Amer. Acad. 14: 247. 1879.

Dasyllirion bigelovii Torr. U. S. Rep. Expl. Miss. Pacif. 4: 151. 1857.

Dry mesas and hillsides, Sonora and Baja California. California and Arizona; type from Bill Williams Fork, Arizona.

Trunk 1 to 2 meters high; leaves 1.5 to 2.5 cm. wide, the margin shredding into brown fibers.

14. *Nolina nelsoni* Rose, Contr. U. S. Nat. Herb. 10: 92. 1906.

Known only from the type locality, mountains near Miquihuana, Tamaulipas.

Trunk 1 to 3 meters high; leaves 50 to 70 cm. long, 3 to 4 cm. wide, rough-margined; inflorescence 2 to 3.5 meters high.

15. *Nolina beldingi* T. S. Brandeg. Zoe 1: 305. 1890.

Baja California; type from mountains of the Cape Region.

Trunk 3 to 7.5 meters high, branched; leaves 1.5 to 2 cm. wide.

Nolina beldingi deserticola Trel. (Proc. Amer. Phil. Soc. 50: 424. 1911) is a nearly acaulescent form.

¹ Proc. Amer. Phil. Soc. 50: pl. 17. 1911.

16. *Nolina parviflora* (H. B. K.) Hemsl. Biol. Centr. Amer. Bot. 3: 372. 1884.
Cordyline parviflora H. B. K. Nov. Gen. & Sp. 1: 268. 1815.
Roulinia humboldtiana Brongn. Ann. Sci. Nat. II. 14: 320. 1840.
Nolina altamiranoa Rose, Proc. U. S. Nat. Mus. 29: 438. 1905.
 Veracruz, Puebla, and Mexico; type from between Hauhtitlán and Tane-
 pantla.

Trunk 2 to 4 meters high; leaves 1.5 to 2.5 cm. wide.

17. *Nolina longifolia* (Schult.) Hemsl. Biol. Centr. Amer. Bot. 3: 372. 1884.
Yucca longifolia Schult. Syst. Veg. 7: 1715. 1830.
Roulinia karwinskiana Brongn. Ann. Sci. Nat. II. 14: 320. 1840.
 Oaxaca and Puebla; type from San José del Oro.
 Trunk 2 to 3 meters high, swollen at the base, sparsely branched at the top;
 leaves very long, recurved over the trunk, 2 to 3 cm. wide.

6. CALIBANUS Rose, Contr. U. S. Nat. Herb. 10: 90. 1906.

1. *Calibanus hookerii* (Lem.) Trel. Proc. Amer. Phil. Soc. 50: 426. 1911.
Dasyllirion hookerii Lem. Ill. Hort. Lem. 6: Misc. 24. 1859.
Dasyllirion caespitosum Scheidw. Wochenschr. Ver. Beförd. Gartenb. 4: 286.
 1861.
Calibanus caespitosus Rose, Contr. U. S. Nat. Herb. 10: 90. 1906.
 Hidalgo and San Luis Potosí; type from Real del Monte, Hidalgo.

A very curious and remarkable plant, the trunk subglobose, 30 to 100 cm. in diameter, resembling a puffball, attached to the soil by small roots, the interior loosely spongy, the exterior covered with dark corky bark like that of some oaks; leaves 30 to 90 cm. long, 2 to 2.5 mm. wide, appearing in clusters here and there over the trunk, pale green, serrulate; flowers dioecious, purplish, very small, arranged in panicles 10 to 20 cm. long and 10 cm. broad.

7. BEAUCARNEA Lem. Ill. Hort. Lem. 8: Misc. 57. 1861.

REFERENCE: Trelease, Proc. Amer. Phil. Soc. 50: 427-431. 1911; Rose, Contr. U. S. Nat. Herb. 10: 87-89. pl. 23. 1906.

Treelike plants, the trunks sometimes 10 meters high, more or less swollen at the base; leaves long, linear; flowers small, whitish, panicked.

The leaves are used for the same purposes as those of *Dasyllirion* and *Nolina*.

Leaves with papillose grooves and rough margins, firm, more or less concave, keeled, pale or glaucous; fruit short-pedicellate.

Leaves 8 to 15 mm. wide; seeds 4 to 5 mm. long-----5. *B. stricta*.

Leaves 4 to 7 mm. wide; seeds 3 mm. long-----6. *B. gracilis*.

Leaves with smooth grooves and nearly smooth margins, thin, nearly flat, green; fruit long-pedicellate.

Leaves 1.5 to 2 meters long-----1. *B. recurvata*.

Leaves 1 meter long or shorter.

Fruit 18 to 20 mm. long-----4. *B. goldmanii*.

Fruit 10 to 15 mm. long.

Perianth segments scarcely 2 mm. long-----2. *B. inermis*.

Perianth segments 3 mm. long-----3. *B. pliabilis*.

1. *Beaucarnea recurvata* Lem. Ill. Hort. Lem. 8: Misc. 61. 1861.

Beaucarnea tuberculata Roezl, Belg. Hort. 33: 138. 1883.

Nolina recurvata Hemsl. Biol. Centr. Amer. Bot. 3: 372. 1884.

Dasyllirion recurvatum Macbride, Contr. Gray Herb. n. ser. 56: 17. 1918.

Veracruz.

Trunk openly branched; leaves 1.5 to 2 meters long, 1.5 to 2 cm. wide.

2. *Beaucarnea inermis* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 10: 88. 1906.
Dasyllirion inerme S. Wats. Proc. Amer. Acad. 26: 157. 1891.

San Luis Potosí and Veracruz; type from Las Palmas, San Luis Potosí.

Tree, openly branched, sometimes 13 meters high, with a trunk 1.5 meters in diameter, this covered with hard scaly black bark; leaves 1.2 to 1.5 cm. wide. "Soyate" or "zoyate" (San Luis Potosí); "palma culona" (San Luis Potosí, Ramírez).

The soft spongy wood is used for corks.

3. *Beaucarnea pliabilis* (Baker) Rose, Contr. U. S. Nat. Herb. 10: 89. 1906.
Dasyllirion pliabile Baker, Journ. Linn. Soc. Bot. 18: 240. 1880.

Yucatán; type from Sisal.

Leaves 1.5 cm. wide.

4. *Beaucarnea goldmanii*¹ Rose, Contr. U. S. Nat. Herb. 12: 261. 1909.

Known only from the type locality, San Vicente, Chiapas.

Tall slender tree with swollen base, the trunk covered with thick, deeply furrowed bark; leaves 80 to 90 cm. long, 1 to 1.5 cm. wide, erect or reflexed; panicles 30 to 50 cm. long.

5. *Beaucarnea stricta* Lem. Ill. Hort. Lem. 8: Misc. 61. 1861.

Beaucarnea glauca Roezl, Belg. Hort. 33: 138. 1883.

Beaucarnea purpusi Rose, Contr. U. S. Nat. Herb. 10: 89. 1906.

Dasyllirion strictum Macbride, Contr. Gray Herb. n. ser. 56: 17. 1918.

Puebla and Oaxaca; described from cultivated plants.

Tree, 6 to 8 meters high, the trunk moderately swollen at the base, covered with the old leaves; leaves about 60 cm. long, 8 to 15 mm. wide, with yellowish margins. "Izote" (Oaxaca).

6. *Beaucarnea gracilis* Lem. Ill. Hort. Lem. 8: Misc. 61. 1861.

Beaucarnea oedipus Rose, Contr. U. S. Nat. Herb. 10: 88. pl. 23. 1906.

Dasyllirion gracile Macbride, Contr. Gray Herb. n. ser. 56: 17. 1918.

Puebla; described from cultivated plants.

Tree, 6 to 12 meters high, with stout branches, the trunk enormously swollen at the base and 2 to 7 meters in circumference; leaves 25 to 50 cm. long, 4 to 7 mm. wide, glaucous.

8. DASYLIRION Zucc. Allg. Gartenz. 6: 258. 1838.

REFERENCE: Trelease, Proc. Amer. Phil. Soc. 50: 431-441. 1911.

Acaulescent or arborescent plants; leaves linear, usually with very spiny margins, the bases much broadened; flowers small, whitish, paniculate.

The plants grow mostly on dry, rocky mesas or hillsides and are often very abundant and conspicuous. The trunks are used frequently for building houses and for fuel. When one of the plants, covered with the dead leaves, is set on fire it will burn for some time, and the burned stumps are a familiar sight in regions where the plants occur. The leaf bases remaining on such burned plants, when removed from the trunk, make very satisfactory beds upon camping expeditions, for they are elastic and not uncomfortably hard. The trunks are often split open to permit cattle to eat the spongy interior, for this, as well as the leaf bases, contains much sugar and has been found to be an excellent

¹ Named for E. A. Goldman (1873-), of the Bureau of Biological Survey, U. S. Department of Agriculture, who has engaged in biological exploration of nearly all parts of Mexico. He has obtained a large collection of botanical material, which is deposited in the U. S. National Herbarium. Mr. Goldman has published a valuable paper dealing with the plants of Baja California (Contr. U. S. Nat. Herb. 16: 309-371. pl. 104-133. 1916).

food for cattle, especially in time of drought. In New Mexico and western Texas the plants have been used on a large scale for this purpose, often after having been transported by railroad. The plants were formerly much used for food by the natives of the arid regions, and are still so used to some extent. The leaves are trimmed off and the remaining head is roasted or boiled and the sweet pith and leaf bases then eaten. The heads are often baked for about 24 hours in pits dug in the ground. The roasted trunks are also allowed to ferment and then distilled to obtain a highly esteemed intoxicating drink known as "sotol," which is a colorless liquor of penetrating odor and peculiar taste. Alcohol has been extracted from sotol plants upon a commercial scale.

The leaves are much used for thatching, baskets, rough hats, mats, etc., and their fiber for rough cordage. The fiber seems to be suitable for the manufacture of paper.

Most of the species are known generally under the name "sotol."

Leaves 4-sided, unarmed-----16. *D. longissimum*.

Leaves 2-edged, flattened or concave, with prickly margins.

Fruit large (8 to 9 mm. wide), the style longer than the wings.

15. *D. berlandieri*.

Fruit small or, if large, the style not exceeding the wings.

Fruit 3 to 5 mm. wide.

Fruit with a very shallow notch at the apex, broadly elliptic, the style equaling or slightly exceeding the wings. Prickles of the leaves antrorse.

Leaves 10 to 15 mm. wide. Inflorescence much branched.

6. *D. texanum*.

Leaves 5 to 10 mm. wide.

Leaves about 1 meter long-----7. *D. simplex*.

Leaves 40 to 50 cm. long-----8. *D. longistylum*.

Fruit with a rather deep notch, narrowly elliptic to obovate, the style not surpassing the wings. Leaves usually 15 to 20 cm. wide.

Prickles of the leaves mostly retrorse-----5. *D. leiophyllum*.

Prickles of the leaves mostly antrorse.

Leaves 25 mm. wide or more-----3. *D. palmeri*.

Leaves 10 to 20 mm. wide.

Leaves about 0.5 meters long, dull; style nearly equaling the wings.

4. *D. parryanum*.

Leaves about 1 meter long; style half as long as the wings.

Leaves dull, glaucous-----1. *D. cedrosanum*.

Leaves lustrous, not glaucous-----2. *D. lucidum*.

Fruit 6 to 8 mm. wide, the style not exceeding the wings. Prickles all or mostly antrorse.

Leaves not with brushy tips, glaucous-----9. *D. glaucophyllum*.

Leaves with more or less brushy tips.

Leaves 1 cm. wide or narrower-----10. *D. acrotriche*.

Leaves mostly 1.5 cm. wide or wider, rarely only 1.2 cm. wide.

Wings of the fruit truncate at the apex, with a very narrow notch; leaves rough-----13. *D. serratifolium*.

Wings of the fruit rounded or obtuse at the apex, with a broad notch; leaves smooth or nearly so.

Leaves about 1.2 cm. wide-----11. *D. graminifolium*.

Leaves 1.5 to 2 cm. wide.

Style scarcely half as long as the wings-----12. *D. durangense*.

Style about as long as the wings-----14. *D. wheeleri*.

1. *Dasyllirion cedrosanum* Trel. Proc. Amer. Phil. Soc. 50: 431. 1911.
Coahuila and Zacatecas; type from Cedros, Zacatecas.
Trunk 1 to 1.5 meters high; leaves 2 cm. wide, glaucous; inflorescence 5 meters high.
2. *Dasyllirion lucidum* Rose, Contr. U. S. Nat. Herb. 10: 90. 1906.
Puebla; type from Tehuacán.
Trunk 1 to 2 meters high; leaves 1 to 1.7 cm. wide, smooth and lustrous; inflorescence 2 to 3 meters high.
3. *Dasyllirion palmeri* Trel. Proc. Amer. Phil. Soc. 50: 432. 1911.
Known only from the type locality, San Lorenzo Canyon, Coahuila.
Plants 2.5 to 3 meters high; leaves about 1 meter long, green or slightly glaucous, smooth, dull. "Sotol."
The leaves, deprived of the spines, are used for making brooms.
4. *Dasyllirion parryanum*¹ Trel. Proc. Amer. Phil. Soc. 50: 432. 1911.
San Luis Potosí, the type from the vicinity of San Luis Potosí.
Leaves dull, minutely roughened.
5. *Dasyllirion leiophyllum* Engelm.; Trel. Proc. Amer. Phil. Soc. 50: 433. 1911.
Chihuahua. New Mexico and western Texas; type from Presidio, Texas.
Stem short; leaves about 1 meter long, green or glaucescent, smooth, rather lustrous.
6. *Dasyllirion texanum* Scheele, Linnaea 23: 140. 1850.
Dasyllirion texanum aberrans Trel. Proc. Amer. Phil. Soc. 50: 434. 1911.
Coahuila and Nuevo León. Texas; type from New Braunfels.
Trunk very short or subterranean; leaves 1 meter long or shorter, green, lustrous; inflorescence 3 to 5 meters high. "Sotol" (Texas).
7. *Dasyllirion simplex* Trel. Proc. Amer. Phil. Soc. 50: 434. 1911.
Durango; type from Tepehuanes.
Plants 1.5 meters high; leaves about a meter long, green, smooth, lustrous. "Sotol."
The leaves are employed for making baskets, and for the "sopladores" used to fan charcoal fires.
8. *Dasyllirion longistylum* Macbride, Contr. Gray Herb. n. ser. 56: 16. 1918.
Known only from the type locality, Minas de San Rafael, San Luis Potosí.
Leaves 5 to 7 mm. wide, glaucous-green, smooth, the margin with large remote teeth; fruit 5 mm. wide.
9. *Dasyllirion glaucophyllum* Hook. in Curtis's Bot. Mag. II. 14: pl. 5041. 1858.
Dasyllirion glaucum Carr. Rev. Hort. 44: 435. 1872.
Known in Mexico only from the type locality, Real del Monte, Hidalgo; also in cultivation in Europe.
Trunk short; leaves 1 meter long or longer, about 1.2 cm. wide, dull; inflorescence 4 to 6 meters high.
10. *Dasyllirion acrotriche* (Schiede) Zucc. Denkschr. Akad. Wiss. München 16: 226. 1840.

¹ Named for C. C. Parry (1823-1890), at one time botanist of the U. S. Department of Agriculture, who made extensive collections of plants in the United States, especially in the Rocky Mountains. In 1878, in company with Edward Palmer, he collected a large series of Mexican plants, chiefly in the State of San Luis Potosí.

- Yucca acrotricha* Schiede, *Linnaea* 4: 230. 1829.
Roulinia gracilis Brongn. *Ann. Sci. Nat.* II. 14: 320. 1840.
 San Luis Potosí, Veracruz, Hidalgo, and Querétaro; type from Mount Orizaba.
 Trunk 1 meter high or more; leaves less than 1 meter long, 6 to 10 or rarely 15 mm. wide, green or glaucescent; inflorescence 3 to 5 meters high or larger.
 "Cucharilla" (San Luis Potosí, *Urbina*).
11. *Dasyilirion graminifolium* Zucc. *Allg. Gartenz.* 6: 259. 1833.
 San Luis Potosí; described from cultivated plants.
 Leaves about 1 meter long, green, smooth, lustrous.
12. *Dasyilirion durangense* Trel. *Proc. Amer. Phil. Soc.* 50: 438. 1911.
 Known only from Durango, the type locality.
 Leaves 1 meter long or shorter, glaucescent.
13. *Dasyilirion serratifolium* (Schult.) Zucc. *Allg. Gartenz.* 6: 258. 1838.
Yucca serratifolia Schult. *Syst. Veg.* 7: 1716. 1830.
Dasyilirion laxiflorum Baker, *Journ. Bot. Brit. & For.* 10: 299. 1872.
 Oaxaca; described from cultivated plants.
 Plants subcaulescent; leaves 1 meter long or shorter, 1.5 to 3.5 cm. wide, whitish.
14. *Dasyilirion wheeleri* S. Wats.; *Rothr.* in Wheeler, *Rep. U. S. Surv.* 100th Merid. 6: 378. 1878.
Dasyilirion wheeleri wislizeni Trel. *Proc. Amer. Phil. Soc.* 50: 439. 1911.
 Chihuahua. Western Texas to Arizona (type from Ash Creek).
 Trunk 1 meter high or less; leaves 1 meter long or shorter, glaucous or green, nearly smooth; inflorescence 3 to 5 meters high.
15. *Dasyilirion berlandieri*¹ S. Wats. *Proc. Amer. Acad.* 14: 249. 1879.
 Known only from the type locality, La Silla, Monterrey, Nuevo León.
 The leaves of this species have not been collected.
16. *Dasyilirion longissimum* Lem. *Ill. Hort. Lem.* 3: Misc. 91. 1856.
Dasytirion quadrangulatum S. Wats. *Proc. Amer. Acad.* 14: 250. 1879.
Dasyilirion juncifolium Rehnelt, *Gartenwelt* 11: 77. 1906.
 Tamaulipas to Hidalgo; described from cultivated plants.
 Trunk 1 to 2 meters high; leaves sometimes 2 meters long, 3 to 8 mm. wide, green, dull; inflorescence 2 to 6 meters high. "Junquillo" (Querétaro, Hidalgo).

11. SMILACACEAE. Smilax Family.

1. SMILAX L. *Sp. Pl.* 1028. 1753.

REFERENCE: A. De Candolle in DC. *Monogr. Phan.* 1: 1-213. 1878.

Scandent shrubs; rhizomes often tuberiferous; stems often armed with spines; leaves alternate, usually persistent, palmately nerved, the petiole often tendril-bearing; flowers small, dioecious, umbellate, the umbels axillary; fruit a small globose berry.

The species of catbrier, greenbrier, or horsebrier, because of their spiny stems, often form almost impenetrable thickets.

¹ In honor of Jean Luis Berlandier, a Belgian, who made extensive collections between 1827 and 1830 in northeastern Mexico, especially in Tamaulipas, San Luis Potosí, Nuevo León, and Coahuila. The larger portion of his botanical collections was obtained in Texas. He died at Matamoros in 1851. His plants were widely distributed, and some of them are in the U. S. National Herbarium.

Leaves and branches copiously pilose; flowers usually tomentose.

Peduncles longer than the petioles.

Leaves copiously pilose, oval to ovate, deeply cordate at the base, obtuse or rounded and apiculate at the apex-----1. *S. mollis*.

Leaves glabrate, deltoid, subcordate at the base, long-acuminate at the apex.
2. *S. purpusii*.

Peduncles equaling or usually shorter than the petioles.

Sheaths about one-fifth as long as the petioles or shorter.

3. *S. tomentosa*.

Sheaths one-fourth to half as long as the petioles-----4. *S. subpubescens*.

Leaves and branches glabrous or nearly so; flowers glabrous.

Staminate flowers small, 1.5 to 2 or rarely 3 mm. long; anthers equaling or longer than the filaments-----5. *S. mexicana*.

Staminate flowers large, 2.5 to 8 mm. long; anthers usually shorter than the filaments.

Peduncles at anthesis shorter than the petioles-----6. *S. domingensis*.

Peduncles at anthesis longer than or equaling the petioles.

Leaves glaucous beneath-----7. *S. glauca*.

Leaves green beneath.

Peduncles about 5.5 cm. long, 5 to 6 times as long as the petiole. Fruit red-----8. *S. erythrocarpa*.

Peduncles rarely over 2 cm. long.

Pedicels half as long as the flowers-----9. *S. densiflora*.

Pedicels equaling or much longer than the flowers.

Leaves denticulate-----10. *S. moranensis*.

Leaves entire.

Fruit red-----11. *S. medica*.

Fruit black.

Younger branches with numerous stout spines; leaf blades more or less triangular, nearly or quite as broad as long.

12. *S. bona-nox*.

Younger branches unarmed or with few slender spines; leaf blades not triangular, usually twice as broad as long.

13. *S. cordifolia*.

1. *Smilax mollis* Willd. Sp. Pl. 4: 785. 1806.

Smilax pringlei Greenm. Proc. Amer. Acad. 34: 567. 1899.

Morelos to Veracruz, Tabasco, and Chiapas; type from Jalapa, Veracruz. West Indies, Central America, and northern South America.

Leaves lanceolate to broadly cordate-oval, 8 to 15 cm. long, acute or abruptly short-pointed, 5 or 7-nerved; umbels long-pedunculate. "Bejuco de chiquihuite" (Tabasco); "zarzaparrilla" (Veracruz, *Ramírez*).

2. *Smilax purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 117. 1915.

Known only from the type locality, Cerro del Boquerón, Chiapas.

Leaves coriaceous, 5 to 10 cm. long, reticulate-veined, usually 7-nerved; umbels often racemose.

3. *Smilax tomentosa* H. B. K. Nov. Gen. & Sp. 1: 272. 1815.

Oaxaca. Central America and northern South America; type from Santa Fé, Colombia.

Leaves broadly ovate-cordate to lanceolate, sometimes as much as 25 cm. long and 20 cm. wide, acute or acuminate; umbels densely many-flowered.

4. *Smilax subpubescens* A. DC. in DC. Monogr. Phan. 1: 69. 1878.

Tamaulipas and Veracruz; type from Orizaba, Veracruz.

Scandent over shrubs and trees in woods; leaves ovate or ovate-oval, 7 to 13 cm. long, cordate at the base, short-pointed, lustrous. "Zarzón" (Tamaulipas).

Specimens referred by De Candolle to *S. candelariae* A. DC.¹ belong here perhaps.

5. *Smilax mexicana* Griseb.; Kunth, Enum. Pl. 5: 167. 1850.

?*Smilax obtusa* Benth. Bot. Voy. Sulph. 175. 1844.

Smilax costaricae Vatke, Linnaea 40: 223. 1876.

Smilax gaumerii Millsp. Field Mus. Bot. 1: 357. 1898.

Sinaloa to Guerrero, Yucatán, and Tamaulipas. Central America.

Scandent shrub with angulate branches; leaves lanceolate to broadly ovate-oval, 5 to 17 cm. long, lustrous; umbels on long or short peduncles; fruit black. "Bejuco de chiquihuite" (Tabasco); "bejuco diente-de-perro," "zarza" (Guerrero); "xcoché" (Yucatán, Maya); "zarzón" (Costa Rica).

The species has been reported from Mexico as *S. cumanensis* Willd. The leaves are very variable in shape, as in most species of the genus.

6. *Smilax domingensis* Willd. Sp. Pl. 4: 783. 1806.

Smilax schlechtendalii Kunth, Enum. Pl. 5: 224. 1850.

Smilax domingensis microscola Robinson, Proc. Amer. Acad. 35: 323. 1900.

Veracruz, Puebla, Tabasco, and Chiapas. West Indies; type from Santo Domingo.

Leaves lanceolate or ovate, 7 to 15 cm. long, thick, lustrous, acute to long-acuminate. "Alcacatza" (Puebla); "chiquihuite" (Tabasco); "bejuco de membrillo," "dunguey," "dunguez blanco" (Porto Rico).

7. *Smilax glauca* Walt. Fl. Carol. 245. 1788.

? *Smilax jalapensis* Schlecht. Linnaea 18: 451. 1844.

Smilax discolor Schlecht. Linnaea 18: 454. 1844.

Veracruz. Eastern United States; type from the Carolinas.

Stems terete, armed with stout scattered prickles; leaves broadly ovate, 6 to 10 cm. long, acute or rounded at the apex, usually truncate at the base; fruit bluish black.

8. *Smilax erythrocarpa* Kunth, Enum. Pl. 5: 234. 1850.

Described from Mexico; reported from the Valley of Mexico.

Branches terete, armed with short straight prickles or unarmed; leaves ovate-oblong, 8 to 10 cm. long, acutish at the apex, rounded or subcordate at the base.

9. *Smilax densiflora* A. DC. in DC. Monogr. Phan. 1: 88. 1878.

Described from Toluca, Mexico; reported also from "San Miguel."

Stems terete, unarmed; leaves ovate, 3 to 5 cm. long, 5 or 7-nerved, acuminate at the apex, obtuse or subcordate at the base.

10. *Smilax moranensis* Mart. & Gal. Bull. Acad. Brux. 9²: 389. 1842.

Veracruz and Hidalgo, and probably elsewhere; type from Morán, Hidalgo.

Stems terete, aculeate; leaves lanceolate or ovate, 5 to 9 cm. long, 5 or 7-nerved, acuminate; fruit 6 to 7 mm. in diameter.

According to De Candolle, this is the "mecapatli" of Hernández.

11. *Smilax medica* Schlecht. & Cham. Linnaea 6: 47. 1831.

Veracruz and San Luis Potosí; type from Papantla, Veracruz; reported from Tamaulipas.

Stems angulate, unarmed or sparsely prickly; rhizome slender, striate, covered with whitish or purplish bark; leaves ovate or oblong, 10 to 20 cm. long, often lobate, 7 or 9-nerved, entire, sometimes prickly beneath; fruit 8 to 10 mm. in diameter. "Zarzaparrilla," "nanahuapatle," "quauhmecapatli," "quaumeca-

¹ In DC. Monogr. Phan. 1: 70. 1878.

patli," "zarza," "zarzaparrilla de Tulancingo," "zarzaparrilla de la sierra," "mecapatli" (*Ramírez*).

The species of *Smilax* which furnish the sarsaparilla of commerce are very imperfectly known, but this species is believed to be one of the chief sources of the drug. The Nueva Farmacopea Mexicana states that this is the only species of Eastern Mexico whose rhizomes are employed medicinally, and *Smilax medica* is one of the official sources of sarsaparilla according to the U. S. Pharmacopoea. Not much dependence can be placed upon either of these statements, however, because the species are poorly known, and the rhizomes have not been associated with botanical specimens of the plants which produce them.

The rhizomes are dug at any time of the year and dried in the sun. They contain a crystalline principle, parillin, upon which their virtues depend. This has sudorific and stimulant properties. Sarsaparilla was introduced into Spain about 1540, and was widely used as a remedy for venereal diseases. It is still employed for the same purpose, and for rheumatism, scrofulous diseases, and some cutaneous affections. It is widely employed also for flavoring beverages. Large amounts of sarsaparilla have been and still are exported from Mexico. It is said that the rhizome of a fern, known as "zarzaparrilla de Tierra Caliente," is sometimes used as an adulterant.

12. *Smilax bona-nox* L. Sp. Pl. 1030. 1753.

Veracruz. Eastern United States; West Indies.

Stems angulate, prickly or unarmed; leaves lanceolate to broadly deltoid-ovate, 3 to 10 cm. long, sometimes lobate, 5 to 9-nerved, acute, often denticulate. "Mecapatli, zarzaparrilla" (*Ramírez*).

13. *Smilax cordifolia* Humb. & Bonpl.; Willd. Sp. Pl. 4: 778. 1806.

? *Smilax acutifolia* Schlecht. Linnaea 18: 449. 1844.

? *Smilax invenusta* Kunth, Enum. Pl. 5: 234. 1850.

Smilax schiedeana Kunth, Enum. Pl. 5: 236. 1850.

Veracruz and Tabasco to Oaxaca and Colima; type from Jalapa, Veracruz.

Stems subterete or angulate, unarmed or sparsely prickly; leaves ovate or rounded-ovate, 6 to 12 cm. long, acute or acuminate, 5 to 9-nerved, usually more or less cordate at the base. "Cocolmegan," "cozolmécatl," "olcacatzin" (Veracruz, *Ramírez*); "pacas" (Tarascan, *Herrera*); "cocolmeca," "raíz de china" (*Ramírez*); "móoga" (Otomí, *Ramírez*).

This species has been reported from Mexico as *S. pseudochina* L. It is said to be used in medicine like *S. medica*.

DOUBTFUL SPECIES.

SMILAX ARISTOLOCHIAEFOLIA Mill. Gard. Dict. ed. 8. *Smilax* no. 7. 1768. *Smilax milleri* Steud. Nom. Bot. ed. 2. 2: 599. 1841. Described from Veracruz.

SMILAX BOTTERI A. DC. in DC. Monogr. Phan. 1: 89. 1878. Described from Veracruz. Perhaps the same as *S. cordifolia*.

SMILAX COGNATA Kunth, Enum. Pl. 5: 175. 1850. Described from Mexico, but probably rather a native of Brazil.

SMILAX GLAUCOCARPOS Schlecht. Linnaea 18: 450. 1844. Described from Hacienda del Carmen and Mineral del Monte. Related, according to De Candolle, to *S. mexicana* or *S. moranensis*.

SMILAX HAVANENSIS Jacq. Enum. Pl. Carib. 33. 1760. Native of the West Indies; reported from Mexico by De Candolle, perhaps erroneously.

SMILAX MULTIFLORA Mart. & Gal. Bull. Acad. Brux. 9²: 390. 1842. Described from Chinantla, Oaxaca.

SMILAX SPINOSA Mill. Gard. Dict. ed. 8. *Smilax* no. 8. 1768. Described from Veracruz.

12. AMARYLLIDACEAE. Amaryllis Family.¹

(Contributed by Dr. William Trelease.)

Plants usually herbs, often from bulbs as in the Liliaceae, from which they differ chiefly in their inferior ovary; in the warmer parts of America represented by the following monocarpic genera, some species of which produce a trunk, while the flower clusters of all are borne on more or less woody stalks that are sometimes tall and much branched.

Perianth segments distinct; filaments swollen at base; style base dilated and 3-angled; seed not lifted from the soil in germination----1. **FURCRAEA**.

Perianth more or less tubular at base; filaments and style not swollen; seed raised on the cotyledon in germination-----2. **AGAVE**.

1. **FURCRAEA** Vent. Bull. Soc. Philom. 1: 65. 1793.

REFERENCES: J. G. Baker, Handbook of the Amaryllideae 198-203. 1888; Trelease, Observations on *Furcraea*, Ann. Jard. Bot. Buitenzorg II. Suppl. 3: 905-916. pl. 35-48. 1910; Drummond, Rep. Mo. Bot. Gard. 18: 25-75. pl. 1-4. 1907.

The name is often written *Fourcroya* (Spreng. 1817) or *Furcroea* (Haw. 1819).

The leaves contain an excellent fiber resembling Sisal hemp, and variously called "pita" or "cabulla," but this is little exploited except for the Mauritius hemp, derived from the Brazilian *F. gigantea*.

Leaves denticulate but never toothed, finely striate-ridged. Leaves over 1 meter long; panicle very large. **SERRULATAE**.

Trunk tall (15 meters). Leaves concave and rather stiff----1. **F. longaeva**.

Trunk moderate (1 to 2 meters tall).

Leaves rather concave, long (2 meters), often recurved-----2. **F. roezlii**.

Leaves rather flat, short and stiff, very glaucous.

Leaves short, 50 to 60 cm. long; flowers 4 cm. long---3. **F. bedinghausi**.

Leaves twice as long; flowers 5 to 6 cm. long-----4. **F. quicheensis**.

Leaves neither denticulate nor striate, often horny-toothed. **EUFURCRAEA**.

Leaves 5 to 8 cm. wide.

Leaves narrow (5 to 6 cm. wide), straight between the short teeth.

5. **F. cahum**.

Leaves moderate (7 to 8 cm. wide), the margin concave between the teeth.

6. **F. melanodonta**.

Leaves broad (10 to 20 cm.).

Leaves with numerous marginal red-brown teeth.

Plants with a trunk sometimes 2 meters tall; leaves mostly entire above the middle-----7. **F. selloa**.

Plants mostly acaulescent; leaves usually toothed throughout.

Teeth rather short (3 mm. long) and close together (10 to 30 mm. apart); bulbils round-ovoid-----8. **F. guatemalensis**.

Teeth longer (5 to 7 mm. long) and more separated (30 to 60 mm. apart); bulbils elongate-----9. **F. cabuya**.

Leaves unarmed, otherwise as in no 9-----9a. **F. cabuya integra**.

¹ Fifteen Mexican species of *Agave*, not considered in this account, are characterized by Mr. Alwin Berger in "Die Agaven," published in 1915 but through the exigencies of the war not received until after the present account was in page proof.—WM. TRELEASE.

1. *Furcraea longaeva* Zucc. Act. Acad. Caes. Leop. Carol. 16²: 665. 1833.

Oaxaca; type from Mount Tanga. Also in adjacent Guatemala.

A tall unbranched monocarpic tree, finally surmounted by a gigantic panicle 5 meters long or more. "Yahuindayasi" (Oaxaca, Mixtec, *Reko*).

2. *Furcraea roezlii* Baker, Amaryll. 203. 1888.

Fourcroya roezlii André, Rev. Hort. 59: 353. 1887.

Furcraea longa Smith, Teysmannia. 7: 131. 1897.

Pachuca, Hidalgo; described from plants cultivated in Europe; type locality sometimes said to be near Juquila, Oaxaca, but this report probably refers to the preceding species.

A short-trunked plant, finally with panicle of equal length, the leaves characteristically sweeping the ground.

Much cultivated in warm regions under the garden names of *Agave argyrophylla*, *A. toneliana*, *Beschorneria floribunda*, *Lilia regia*, *Lilium regium*, *Roezlia bulbifera*, *R. regina*, *Yucca argyraea*, *Y. argyrophylla*, *Y. bulbifera*, *Y. parmentieri* and *Y. toneliana*.

3. *Furcraea bedinghausi* Koch, Wochenschr. Ver. Beförd. Gartenb. 6: 234. 1863.

Distrito Federal; described from plants cultivated in Europe, the type locality unrecorded.

A short-trunked smaller plant with shorter, stiffer, and flatter leaves.

Sometimes cultivated as *Beschorneria multiflora*. Specimens have been distributed as *Yucca pringlei* Greenm.

4. *Furcraea quicheensis* Trel. Trans. Acad. St. Louis 23: 148. 1915.

Guatemala; type collected near Quiché.

In size and habit intermediate between *F. longaeva* and *F. bedinghausi*. "Cheech."

5. *Furcraea cahum* Trel. Ann. Jard. Bot. Buitenzorg II. Suppl. 3: 908. pl. 39. 1910.

Yucatán; type collected near Sisal.

Subacaulescent, with narrow green flat leaves, these straight-margined between the finally blackish teeth. "Cajum" or "cajum-ci"; also "catana" (?).

6. *Furcraea melanodonta* Trel. Trans. Acad. St. Louis 23: 150. 1915.

Eastern Guatemala; type from Cruz.

Somewhat caulescent, with gray or bluish concave leaves, the margins hollowed between the black-chestnut teeth. "Maguey."

7. *Furcraea selloa* Koch, Wochenschr. Ver. Beförd. Gartenb. 3: 22. 1860.

Furcraea samalana Trel. Trans. Acad. St. Louis 23: 149. 1915.

Western Guatemala; type from the Samalá Valley.

Somewhat caulescent, with green broad long-channeled leaves, these usually toothed only below the middle, the margins hollowed between the red-brown teeth; bulbils elongate. "Maguey."

8. *Furcraea guatemalensis* Trel. Trans. Acad. St. Louis 23: 149. 1915.

Eastern Guatemala; type collected about Guatemala City.

Nearly acaulescent, the broad and long-channeled leaves grayish beneath and toothed throughout, the margin somewhat hollowed between the red-brown or chestnut teeth; bulbils ovoid. "Maguey."

9. *Furcraea cabuya* Trel. Ann. Jard. Bot. Buitenzorg II. Suppl. 3: 906. 1910.

Furcraea tuberosa Seem. Bot. Voy. Herald 216. 1854. Not *F. tuberosa* Ait. 1811.

Costa Rica (type from San Ramón) and Panama.

Nearly acaulescent, the leaves transiently somewhat glaucous, broad, long and openly concave, straight-margined between the rather long and distant yellowish teeth, these with brown or chestnut tips. "Cabuya," "cabuya con espina," or "Central American sisal."

9a. *Furcraea cabuya integra* Trel. Ann. Jard. Bot. Buitenzorg II. Suppl. 3: 907. 1910.

Furcraea gigantea Seem. Bot. Voy. Herald 216. 1854.

Costa Rica (type from San Ramón) and Panama; also (?) in Honduras and El Salvador.

Differs from the type only in having its leaves unarmed or with merely minute rudiments of teeth. "Cabuya Olancho," transmuted into "cabuya blanca."

2. AGAVE L. Sp. Pl. 323. 1753.

REFERENCES: J. G. Baker, Handbook of the Amaryllideae 163-198. 1888; Mulford, A study of the agaves of the United States, Rep. Mo. Bot. Gard. 7: 48-100. pl. 26-63. 1896; Trelease, *Agave macroacantha* and related euagaves, Rep. Mo. Bot. Gard. 18: 231-256. pl. 18-34. 1907; Trelease, The Mexican fiber agaves known as zapupe, Trans. Acad. St. Louis 18: 29-37. pl. 1-6. 1909; Trelease, The agaves of Lower California, Rep. Mo. Bot. Gard. 22: 37-65. pl. 18-72. 1912; Trelease, Revision of the agaves of the group *Applanatae*, Rep. Mo. Bot. Gard. 22: 85-97. pl. 73-99. 1912; Trelease & Ludwig, El Zapupe, pp. 1-29. ill. 1909; Trelease, Agave, in Bailey, Stand. Cycl. Hort. 1: 230-239. 1914.

The leaves contain an excellent fiber. That of *A. americana*, which is much planted and has escaped around the Mediterranean, is used in the dainty pita lacework of the Azores, etc. Much of the fiber of the *lechuguilla* type of plants is used for coarse sacking or enters into the complex of ixtle or Tampico fiber or Matamoros fiber. *Agave cantala* is grown extensively in tropical Asia for its fiber. Of recent years the zapupes have been exploited as equally worthy with the henequen or Sisal hemp, which forms the chief basis of Yucatecan commerce and is being extensively planted through tropical regions. The national drink of the Mexican Indians is fermented from the exuded sap of the large fleshy-leaved or maguey species when they are ready to bloom, and great plantations are maintained for this purpose on the table-land; and a great deal of distilled liquor, called mezcal, like the smaller-leaved species used for the purpose, is distilled from a fermented mash made from the roasted stems of many species, especially those of the group *Tequilanae*, which are grown in large numbers for this purpose, particularly about Tequila in the State of Jalisco. The glucoside saponin occurs in many species and is very abundant in the rootstocks of a few agaves and particularly in those of the related herbaceous genus *Manfreda*, and these are used for washing under the name "amole." The fiber of the leaves was used in preconquest days for making a kind of paper, upon which manuscripts were written.

The species of *Agave* are known in the United States as century plants. This name was given because of a belief that the plants flowered only when they had attained an age of a hundred years. This belief is, of course, incorrect. It is probably due to the fact that in cultivation the plants rarely bloom. In Europe the plants are often known as American aloes, because of a slight resemblance to Old World plants of the genus *Aloe*, of the family Liliaceae.

I. EUAGAVE. Flowers in a panicle.

- A. Leaves without a horny border, the spine at most decurrent for little more than its length.
- B. Leaves hard-fibrous, swordlike or dagger-like or else under 10 cm. wide.
- C. Marginal teeth numerous and strong.
- Teeth close together (5 to 10 mm. apart) and very slender.
- Leaves green-----1. *A. panamana*.
- Leaves gray-green, purple-green, or very glaucous.
- Leaves gray-green or purple-green-----2. *A. rubescens*.
- Leaves very glaucous-----3. *A. stringens*.
- Teeth more separated or heavier.
- D. Spine elongate, biconvex-----4. *A. angustifolia*.
- DD. Spine elongate, half-round or very openly grooved.
- Leaves rough-granular-----5. *A. bergeri*.
- Leaves smooth.
- Teeth slender-----6. *A. lespinassei*.
- Teeth heavy.
- Teeth scarcely raised-----7. *A. endlichiana*.
- Teeth on fleshy bases-----36. *A. sicaefolia*.
- DDD. Spine needle-shaped, round-grooved.
- Teeth heavy or raised-----8. *A. aboriginum*.
- Teeth slender-----9. *A. deweyana*.
- DDDD. Spine short and thick or subulately tapered, biconvex or shallow-grooved at base.
- E. Spine subulately slender.
- Spine chestnut. Teeth small-----10. *A. zapupe*.
- Spine red-brown or graying.
- Spine red-brown; teeth small-----20. *A. donnell-smithii*.
- Spine graying; teeth larger-----11. *A. subtilis*.
- EE. Spine similar but larger and stouter.
- Teeth separated (30 mm. apart or more).
- Teeth heavy-based-----12. *A. longisepala*.
- Teeth very slender-----13. *A. pedrosana*.
- Teeth closer (scarcely 20 mm. apart), slender.
- Leaves green-----14. *A. gutierreziana*.
- Leaves gray or white.
- Leaves gray-----15. *A. elongata*.
- Leaves white-----16. *A. collina*.
- EEE. Spine not subulate, or else short.
- Spine graying. Teeth large-----17. *A. palmaris*.
- Spine red-brown.
- Teeth large-----18. *A. rhodacantha*.
- Teeth rather small.
- Teeth close (10 mm. apart)-----19. *A. pes-mulae*.
- Teeth distant-----20. *A. donnell-smithii*.
- DDDDD. Spine conical, often round-grooved at base.
- F. Leaves green.
- Plants arborescent.
- Teeth heavy-----21. *A. karwinskii*.
- Teeth very slender-cusped-----22. *A. decipiens*.
- Plants short-stemmed or acaulescent.
- Teeth few or slender-----23. *A. sisalana*.
- Teeth numerous, tapered-----24. *A. candelabrum*.

FF. Leaves gray or lightly blue-glaucous.

Leaves numerous.

Leaves somewhat rough-----25. *A. kirchneriana*.

Leaves smooth.

Plant subacaulescent.

Teeth gradually tapered.

Teeth short.

Leaves lax-----26. *A. pacifica*.

Leaves more rigidly ascending.

Teeth distant (2 to 3 cm. apart)-----27. *A. cantala*.Teeth closer (1 to 1.5 cm. apart)-----28. *A. tequilana*.

Teeth long and strong.

Teeth sharply flexed-----29. *A. pseudotequilana*.Teeth gently curved-----30. *A. sullivanii*.Teeth abruptly slender-cusped-----31. *A. ixtli*.Plant distinctly caulescent-----32. *A. fourcroydes*.

Leaves few.

Spine grooved only at base-----33. *A. datylio*.Spine grooved to middle-----34. *A. vexans*.

FFF. Leaves very white-glaucous.

Leaves very long and concave-----35. *A. nivea*.

Leaves shorter, rather dagger-like.

Leaves not falcate.

Teeth gradually pointed-----36. *A. collina*.Teeth deltoid at base-----37. *A. macroacantha*.Leaves falcate-----38. *A. yaquiana*.

CC. Marginal teeth few or minute.

Leaves oblong, green, transiently glaucous-----23. *A. sisalana*.Leaves oblanceolate, pale-----39. *A. desmetiana*.

BB. Leaves hard-fibrous, oblanceolate-oblong.

Teeth small and slender. Spine needle-shaped-----40. *A. thomassae*.

Teeth conspicuous and strong.

Leaves relatively long (nearly 1 meter).

Spine needle-shaped.

Spine involute-----41. *A. deamiana*.Spine round-grooved-----45. *A. kellermaniana*.Spine conical, flat-grooved-----42. *A. hurteri*.

Leaves short (scarcely 0.5 meter long).

G. Spine conical, flat-grooved or shallow-grooved.

Spine brown, much twisted-----43. *A. tortispina*.Spine gray, straight-----44. *A. pachycentra*.

GG. Spine round-grooved.

Teeth close together (10 to 15 mm. apart) chestnut.

Teeth slender-cusped-----45. *A. kellermaniana*.Teeth heavily triangular-----46. *A. samarana*.Teeth more separated, red-brown-----47. *A. lagunae*.

GGG. Spine involute at base.

Teeth easily detachable-----48. *A. minarum*.

Teeth firmly attached.

Teeth small-----49. *A. seemanniana*.

Teeth large, brown.

Spine needle-shaped; teeth almost hooked-----50. *A. tenuispina*.Spine conical; teeth nearly straight-----51. *A. opacids*.

- BBB. Leaves rather fibrous, oblong, over 1 mm. long.
 Leaves rather thin and straight-margined.....52. *A. lurida*.
 Leaves fleshier.
 Margin nearly straight.....53. *A. rasconensis*.
 Margin concave between the teeth.....54. *A. vera-cruz*.
- BBBB. Leaves fleshy, obovate, deeply repand, short.
 Spine flexuous; leaves scarcely 25 cm. long.
 Spine and teeth dull rusty brown.....55. *A. verchaffeltii*.
 Spine and teeth gray, gray-brown, or red-chestnut.
 Spine and teeth gray-brown or gray.....56. *A. megalacantha*.
 Spine and teeth red-chestnut.....57. *A. guadalajarana*.
 Spine straight; leaves twice as long.....58. *A. potatorum*.
- BBBBB. Leaves rather fleshy and long, oblanceolate, repand; teeth very unequal.
 Spine and teeth red-brown.
 Leaves green.....59. *A. mescal*.
 Leaves grayish.....60. *A. fenzliana*.
 Spine and teeth copper-colored.....61. *A. cupreata*.
- BBBBBB. Leaves fleshy, large, the teeth mostly subequal.
 Leaves green-and-gray-banded, rough.....111. *A. marmorata*.
 Leaves not markedly zoned.
 Spine conical, somewhat recurved.
 Leaves not sharply reflexed.
 Leaves abruptly acute, plicate.....112. *A. abrupta*.
 Leaves not plicate.
 Spine gradually tapered.....113. *A. wercklei*.
 Spine rapidly very acute.....114. *A. expansa*.
 Leaves reflexed toward the end.....115. *A. americana*.
 Spine needle-shaped.
 Leaves reflexed.....116. *A. picta*.
 Leaves not sharply reflexed.
 Leaves rough.....117. *A. asperrima*.
 Leaves smooth.
 Spine nearly straight.....118. *A. palmeri*.
 Spine flexuous.....119. *A. flexispina*.
- AA. Leaves with the teeth usually joined by a firmly attached horny border.
 Spine sinuous, rather slender.
 Filaments inserted in middle of tube.....62. *A. shawii*.
 Filaments inserted above the middle.....63. *A. orcuttiana*.
 Spine straight.
 Teeth gradually tapered.....64. *A. sebastiana*.
 Teeth abrupt from a broad base.
 Leaves abruptly acuminate.....65. *A. pachyacantha*.
 Leaves gradually acute.....66. *A. goldmaniana*.
- AAA. Leaves mostly with long-decurrent spine, but scarcely horny-margined between the teeth.
- H. Leaves oblong, long (over 1 meter).
 Leaves green or subglaucous; perianth segments long (3 cm.)
 12. *A. longisepala*.
 Leaves white-glaucous; segments much shorter.....67. *A. applanata*.
- HH. Leaves ovate or obovate, scarcely half as long.
 Leaves rather thin; spine slender.
 Leaves acute, dull gray.....68. *A. scabra*.
 Leaves acuminate, glaucous.....70. *A. parrasana*.

- Leaves thick and fleshier; spine rather stout.
- Spine flat-grooved-----71. *A. chihuahuana*.
- Spine round-grooved, sharp-edged.
- Leaves elongate; capsule about 4 cm. long-----72. *A. parryi*.
- Leaves broad; capsule 5.5 to 7.5 cm. long.
- Leaves acute-----69. *A. huachucensis*.
- Leaves acuminate-----73. *A. patonii*.
- HHH. Leaves triangular or lance-oblong, ascending.
- Leaves elongate (fully 1 meter long).
- Perianth segments twice as long as tube-----74. *A. aurea*.
- Perianth segments shorter than tube-----75. *A. promontorii*.
- Leaves scarcely half as long.
- Teeth close together (5 to 10 mm. apart), small.
- Teeth friable, almost cusplless-----76. *A. dentiens*.
- Teeth firm, with short sharp cusps-----77. *A. disjuncta*.
- Teeth more separated, sometimes very large.
- Spine nearly straight.
- Spine strong and rather stout.
- Leaf margin repand.
- Ovary flask-shaped-----78. *A. deserti*.
- Ovary fusiform-----79. *A. consociata*.
- Leaf margin nearly straight-----80. *A. pringlei*.
- Spine very slender.
- Leaves roughened-----81. *A. cerulata*.
- Leaves smooth.
- Perianth segments 15 mm. long-----82. *A. carminis*.
- Perianth segments 20 mm. long-----83. *A. sobria*.
- Spine somewhat tortuous. Leaves roughened-----84. *A. affinis*.
- HHHH. Leaves broadly lanceolate or oblanceolate.
- Teeth small, close together (10 mm.)-----85. *A. brandegeei*.
- Teeth larger and more separated.
- Teeth gradually tapered.
- Teeth comparatively short and straight-----86. *A. margaritae*.
- Teeth long and often hooked-----87. *A. connochaetodon*.
- Teeth abruptly contracted from the base.
- Spine undulate; margin repand-----88. *A. roseana*.
- Spine and margin straight-----89. *A. avellanidens*.
- HHHHH. Leaves oblong or ovate-oblong; spine straight.
- Teeth long and firm-----90. *A. subsimplex*.
- Teeth short, detachable-----91. *A. nelsoni*.
- AAAA. Leaves horny-margined for the upper third or more, fleshy, large.
- Leaves broad (3 times, or rarely 4 or 5 times, as long as wide).
- Margin with few and rudimentary teeth or none-----92. *A. weberi*.
- Margin with numerous strong teeth.
- Teeth confluent on much of the margin-----93. *A. latissima*.
- Teeth joined by a horny margin only toward the end.
- Leaves undulate, very crenate, green-----94. *A. ferox*.
- Leaves not very crenate if green.
- Leaves deeply gutter-shaped-----96. *A. compluviata*.
- Leaves not gutter-like.
- Leaves scarcely twice as long as broad-----95. *A. mitraeformis*.

- Leaves three or four times as long as broad.
 Leaves gray or glaucous, scarcely 1.5 meters long.
 Teeth close (1.5 to 2 cm. apart) ; margin incised 97. *A. felina*.
 Teeth more separated or margin not incised.
 Leaves gray-and-green-banded, often rough.
 Teeth on fleshy hummocks 98. *A. subzonata*.
 Teeth without such hummocks 99. *A. zonata*.
 Leaves not conspicuously zoned.
 Spine needle-shaped 100. *A. gracilispina*.
 Spine stout-conical.
 Leaves acuminate 101. *A. melliflua*.
 Leaves acute.
 Teeth on fleshy hummocks 102. *A. quietifera*.
 Teeth without such hummocks 103. *A. crassispina*.
 Leaves green or slightly gray, plicate, 2 meters long.
 104. *A. tecta*.
 Leaves elongate (10 times as long as wide or longer).
 Leaves smooth.
 Leaves green (or relatively broad if gray), extremely large.
 105. *A. atrovirens*.
 Leaves gray.
 Leaves very long (over 2 meters) and narrow. Teeth small.
 106. *A. mapisaga*.
 Leaves moderate.
 Leaves scarcely repand (Pacific) 107. *A. schlechtendalii*.
 Leaves more repand (central) 108. *A. bourgaei*.
 Leaves white and very large 109. *A. mirabilis*.
 Leaves rough. Plants very glaucous except the green scape.
 110. *A. franzosini*.

II. LITTAEA. Flowers in a spike or spikelike cluster.

- A. Leaves not striate-ridged.
 B. Leaves neither filiferous nor with a detachable margin.
 C. Leaves elongate, at most minutely denticulate.
 Leaves rather fleshy, tapered from the base.
 Leaves with slender spine; flowers withering.
 Margin denticulate.
 Pedicels distinct 123. *A. yuccaefolia*.
 Pedicels on a peduncle 124. *A. eduardi*.
 Margin smooth 125. *A. houghii*.
 Leaves without spine; flowers drying rotate 122. *A. bracteosa*.
 Leaves rather stiff, oblong.
 Leaves light green, narrow (scarcely 1 cm. wide)
 120. *A. dasyliroides*.
 Leaves gray, broader (2 cm. wide) 121. *A. intrepida*.
 CC. Leaves relatively broad, at most minutely denticulate.
 Leaves without spine.
 Leaves without spine or denticles.
 Plants with elongate trunk 126. *A. attenuata*.
 Plants nearly or quite acaulescent 127. *A. ellemeetiana*.
 Leaves without spine but denticulate 128. *A. pruinosa*.

- Leaves with pungent short spine.
- Leaves not denticulate.....129. *A. vilmoriniana*.
- Leaves minutely denticulate.....130. *A. pedunculifera*.
- CCC. Leaves with evident spine and teeth.
- Spine and teeth soft and weak or small.
- Leaves glaucous or green. Teeth more or less irregularly connate.
131. *A. celsii*.
- Leaves gray-green. Teeth mostly distinct.....132. *A. micracantha*.
- Leaves green, with pale median stripe.....133. *A. pendula*.
- Spine and teeth firm and relatively large.
- Teeth close together; leaves green.....134. *A. polyacantha*.
- Teeth more separated (10 mm. apart); leaves commonly glaucous.
- Flowers yellowish white, moderate.....135. *A. xalapensis*.
- Flowers deep yellow, large (75 mm. long).....136. *A. macrantha*.
- BB. Leaves with soft dry border, spine, and teeth.....137. *A. pumila*.
- BBB. Leaves with detachable horny border and with pungent spine.
- D. Leaves falcately ascending, thin, not repand.
- Leaves green or bluish.....138. *A. lecheguilla*.
- Leaves gray-green, somewhat glaucous.....139. *A. funkiana*.
- DD. Leaves spreading, rather narrow and thin, repand.
140. *A. lophantha*.
- DDD. Leaves spreading, rather broad and usually thick.
- Leaves relatively thin, without pale ventral stripe....141. *A. horrida*.
- Leaves thicker.
- Leaves usually with pale ventral stripe.....142. *A. roezliana*.
- Leaves without pale ventral stripe.
- Leaves fleshy, incurved.....143. *A. ghiesbreghtii*.
- Leaves fibrous, straight.....144. *A. obscura*.
- DDDD. Leaves often falcate, ascending, thick and stiff.
- Spine short (25 mm. long).
- Teeth long (5 to 15 mm.) if widely separated....145. *A. triangularis*.
- Teeth scarcely 5 mm. long, distant.....146. *A. potrerana*.
- Spine long (over 50 mm. long). Spike very dense....147. *A. kerchovi*.
- DDDDD. Leaves spreading, oblong, thin, or else fleshy rather than hard.
- Horny margin of the leaf continuous.
- Teeth not on green hummocks.
- Leaves gray-green or blue-green, rather few...148. *A. inopinabilis*.
- Leaves light green or glaucous.
- Leaves light green, scarcely glaucous.
- Spike very compact.....149. *A. convallis*.
- Spike rather loose.....150. *A. expatriata*.
- Leaves glaucous.
- Leaves flaccidly recurved.....151. *A. dissimulans*.
- Leaves not recurved.....152. *A. angustiarum*.
- Teeth saddling fleshy hummocks.
- Leaves rough. Teeth very broad.....153. *A. xylonacantha*.
- Leaves smooth.
- Teeth mammaeform.....154. *A. washingtonensis*.
- Teeth triangular.....155. *A. splendens*.
- Horny margin interrupted in the middle.....156. *A. vittata*.
- DDDDDD. Leaves straight, 3-edged, very hard...157. *A. victoriae-reginae*.
- BBBB. Leaves with (characteristically) detachable marginal threads, and
with pungent spine.

Leaves small (scarcely 1 cm. wide and 10 cm. long), denticulate at base.

Spine flat.

Marginal threads coarse-----158. *A. parviflora*.

Marginal threads fine-----159. *A. toumeyana*.

Spine and leaf tip involute-----160. *A. hartmani*.

Leaves elongate, or broader in dwarf forms.

Leaves not recurving.

E. Leaves narrow (scarcely 1 cm. wide).

Leaves denticulate at base-----161. *A. mulfordiana*.

Leaves not denticulate-----162. *A. schottii*.

EE. Leaves moderately broad (1 to 2 cm.), not denticulate.

Threads coarse, shaving-like-----163. *A. schidigera*.

Threads fine, coiling-----164. *A. angustissima*.

EEE. Leaves relatively broad (2.5-4 cm.), denticulate on suckers.

165. *A. filifera*.

Leaves recurving, very long and narrow-----166. *A. geminiflora*.

AA. Leaves striate-ridged, linear, without coarse teeth or marginal threads or horny margin.

Leaves long and narrow (0.5 cm. wide, 60 to 90 cm. long); spine very slender.

167. *A. striata*.

Leaves shorter and broader (1 cm. wide, 25 to 50 cm. long); spine stouter.

Leaves densely clustered, rhombic in section-----168. *A. echinoides*.

Leaves fewer or laxer, often 3-sided.

Leaves nearly smooth on the margin-----169. *A. stricta*.

Leaves scabrid on the margin-----170. *A. falcata*.

1. *Agave panamana* Trel., sp. nov.

Leaves thin, 5 cm. wide and 65 cm. long, with a blackish needle-shaped spine scarcely 2 mm. wide and 10 mm. long, and small upcurved teeth 15 mm. apart and 1 to 2 mm. long; inflorescence 1 to 3 meters tall; flowers 60 mm. long, with segments equaling the tube, the filaments inserted about the upper third; freely bulbiferous.

Panama (type, in the herbarium of the New York Botanical Garden, from Urava Island, *Howe*, in 1909).

Known as "vara de San José."

2. *Agave rubescens* Salm-Dyck, Hort. Dyck. 8, 306. 1834.

Agave flaccida Salm-Dyck, Hort. Dyck. 306. 1834.

Agave punctata Salm-Dyck, Hort. Dyck. 8, 306. 1834.

Agave densispina Cels, Cat. 1865.

? *Agave erubescens* Ellemeet, Belg. Hort. 1871: 119. 1871.

Puebla and Oaxaca; type cultivated in Europe from an unspecified locality.

Nearly acaulescent; leaves gray, tinged with purple, 5 cm. wide, 75 cm. long, with a brown spine 4 mm. wide and 25 mm. long, and very slender, upcurved, orange or brown teeth 10 to 20 mm. apart and 3 to 4 mm. long, the translucent margin straight between them.

3. *Agave stringens* Trel., sp. nov.

Leaves concave, thin and recurving, very glaucous, 1 to 2 cm. wide and 60 cm. long or more, with a dark brown conical spine about 2 mm. wide and 8 mm. long, and very sharp and slender, red or brown, curved teeth scarcely 5 mm. apart and 1 to 2 mm. long, the intervening cartilaginous margin nearly straight.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from Río Blanco barranca, *Trelease*, in 1904.

4. *Agave angustifolia* Haw. Syn. Pl. Succ. 72. 1812.

Agave wrightii Drummond, Rep. Mo. Bot. Gard. 18: 27. 1907.

Yucatán or Honduras ?; what appears to be this, also, from Campeche (*v. Christman*), in the Berlin herbarium; type cultivated in Europe from the island of St. Helena, where, as everywhere in warm countries, it is planted.

Subcaulescent; leaves gray-green, 8 cm. wide, 40 to 65 cm. long, with red-brown ungrooved spine 4 mm. wide and 25 to 40 mm. long, and dark, variously bent, very slender teeth 20 to 25 mm. apart and 3 to 5 mm. long.

5. *Agave bergeri* Trel.; Berger, Agaven 250. 1915.

Leaves gray-green, granular-roughened, about 8 cm. wide and 100 cm. long, with red-chestnut or graying, half-round, rough spine 5 to 6 mm. wide and 20 to 25 mm. long, and red or black, hooked, very slender teeth 15 to 25 mm. apart and 5 mm. long; inflorescence 5 meters tall; flowers 60 mm. long, green-yellow, with segments twice as long as the tube; capsules 30 mm. broad and 60 mm. long, somewhat stipitate and beaked; seeds 8 mm. wide and 12 mm. long; bulbiferous.

Region ?; type, in the herbarium of the Missouri Botanical Garden, cultivated in Europe as *A. rigida*, *Berger*, in 1908.

6. *Agave lespinassei* Trel. Trans. Acad. St. Louis 18: 33. 1909.

Veracruz; type from Tuxpan.

Acaulescent; leaves yellow-green, 6 to 7 cm. wide, 150 cm. long, with red-brown spine 5 to 6 mm. wide and 30 to 35 mm. long, and very slender, mostly upcurved, red-brown teeth 15 to 20 mm. apart and 1 to 2 mm. long, the intervening cartilaginous margin somewhat hollowed. "Zapupe de Tepezintla," "zapupe de Vincent."

7. *Agave endlichiana* Trel. Trans. Acad. St. Louis 18: 34. 1909.

Veracruz; type from Huatusco.

Acaulescent; leaves green, transiently glaucous, 5 to 9 cm. wide, 80 to 125 cm. long, with a garnet or chestnut spine 4 to 5 mm. wide and 15 to 30 mm. long, and heavy, upcurved, garnet or chestnut teeth 10 to 30 mm. apart and 3 mm. long, the intervening translucent margin nearly straight. "Ixtle," "ixtle manso."

8. *Agave aboriginum* Trel. Trans. Acad. St. Louis 18: 34. 1909.

Veracruz; type from Tuxpan.

Acaulescent; leaves yellow-green, somewhat gray, 5 to 11 cm. wide, 70 to 150 cm. long, with brown, somewhat decurrent spine 4 mm. wide and 35 to 50 mm. long, and heavy upcurved teeth 20 to 35 mm. apart and 5 to 8 mm. long sometimes with intercalated smaller ones, the intervening margin nearly straight. "Zapupe silvestre," "zapupe cimarrón," "zapupe de Sierra Chontla"; "wild zapupe."

9. *Agave deweyana*¹ Trel. Trans. Acad. St. Louis 18: 35. 1909.

Tamaulipas and Veracruz; type from Victoria, Tamaulipas.

Acaulescent; leaves yellow-green, somewhat transiently glaucous, 5 to 10 cm. wide, 150 cm. long, with brown or purplish spine 3 to 4 mm. wide and 15 to 40 mm. long, and slender upcurved teeth 15 to 45 mm. apart and 2 to 3 mm. long. "Zapupe de Tantoyuca," "zapupe de Huatusco," "zapupe verde"; "green zapupe."

10. *Agave zapupe* Trel. Trans. Acad. St. Louis 18: 32. 1909.

Veracruz; type from Tuxpan.

Acaulescent; leaves dark green but glaucous, 8 to 10 cm. wide, 150 to 200 cm. long, with red-brown or blackening spine 4 mm. wide and 15 to 25 mm.

¹ Named for L. H. Dewey (1865-), of the U. S. Department of Agriculture, well known for his work upon the fiber plants of Mexico and other regions.

long, and slender upcurved teeth 15 to 30 mm. apart and 2 to 3 mm. long. "Zapupe azul," "zapupe de Estopier," "zapupe de San Bernardo"; "blue zapupe."

11. *Agave subtilis* Trel., sp. nov.

Leaves ascending, glaucous, 10 to 15 cm. wide, 150 cm. long, with an acuminate gray spine 5 mm. wide and 25 mm. long, this flattened to the middle, and with rather slender-cusped, mostly upcurved teeth 20 to 50 mm. apart and 4 to 5 mm. long.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from Tequila, *Griffiths* H, in 1909.

"Chato"; a good mezcal species.

12. *Agave longisepala* Tod. Hort. Panorm. 2: 34. 1891.

Jalisco(?); type cultivated in Europe; cultivated for mezcal at Tequila as "mezcal grande."

Leaves spreading, gray-green, 15 to 20 cm. wide, 200 cm. long, with a large conical or acuminate, flat-based, chestnut spine often 10 mm. wide and 25 mm. long, and with deltoid teeth 30 to 50 mm. apart and 5 to 10 mm. long, the prevailingly upcurved cusps often suppressed; flowers 70 mm. long, with short tube, the segments 30 mm. long.

13. *Agave pedrosana* Trel., sp. nov.

Leaves green, lightly glaucous, 10 to 15 cm. wide, 100 to 150 cm. long, with flexuous heavy flat-based chestnut spine about 10 mm. wide and 30 mm. long, and with slender upcurved teeth 30 to 60 mm. apart and 2 to 4 mm. long.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, collected at San Pedro, near Guadalajara, *Trelease*, in 1903.

14. *Agave gutierreziana* Trel., sp. nov.

Leaves green, about 15 cm. wide and 200 cm. long, with a rather small subulate ungrooved graying spine scarcely 5 mm. wide and 20 mm. long, and with slender, sharply upcurved teeth 10 to 25 mm. apart and 5 to 6 mm. long.

Chiapas; type, in the herbarium of the Missouri Botanical Garden, from Tuxtla Gutiérrez, *Gutiérrez*, in 1908.

"Magueyón."

15. *Agave elongata* Jacobi, Hamb. Gart. Zeit. 20: 501. 1864.

Agave spectabilis Tod. Hort. Panorm. 2: 4. 1879.

Region ?; type cultivated in Europe.

Leaves spreading, gray-glaucous, 10 to 13 cm. wide, 200 cm. long, with rather attenuate, chestnut or graying, flat-based spine 5 to 6 mm. wide and 20 to 30 mm. long, and slender, mostly upcurved teeth 10 to 15 mm. apart and 5 mm. long.

16. *Agave collina* Greenm. Proc. Amer. Acad. 32: 296. 1897.

Morelos; type collected above Cuernavaca.

Acaulescent; leaves glaucous, somewhat green-banded across the back, 5 to 8 cm. wide, 75 cm. long, with red-brown or purplish brown spine 3 to 5 mm. wide and 20 to 30 mm. long, and rather heavy, upcurved, blackish teeth 10 to 25 mm. apart and 3 to 5 mm. long, the yellowish margin nearly straight between them.

17. *Agave palmaris* Trel., sp. nov.

Leaves ascending, gray, more or less glaucous, 10 to 15 cm. wide, 150 cm. long, with recurved, red or graying spine 4 mm. wide and 15 mm. long, and mostly upcurved, slender teeth 20 to 30 mm. apart and 5 mm. long.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from Mazatepec, *Dewey* 657.

"Mano larga," "chino bermejo." A good mezcal species; apparently cultivated for fiber in Sinaloa. A form with open spoon-shaped blunt spine fully 10 mm. wide (var. *monstrosa*) is cultivated as "zapalote."

18. *Agave rhodacantha* Trel., sp. nov.

Leaves green, lightly glaucous, 15 to 20 cm. wide, 250 cm. long or more, with black-chestnut flat-based spine 5 mm. wide and 20 mm. long, and large heavy up-curved teeth 20 to 60 or 70 mm. apart and 10 mm. long, from large lenticular bases.

Sinaloa; type, in the herbarium of the Missouri Botanical Garden, from Mocorito, *Lundstrom*, in 1909.

"Espinoza."

19. *Agave pes-mulae* Trel., sp. nov.

Leaves ascending, blue-green, glaucous, 6 to 8 cm. wide, 100 to 150 cm. long, with red-brown spine about 3 mm. wide and 15 mm. long, and sharply upcurved slender triangular teeth about 10 mm. apart and 3 mm. long.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from Tequila, *Griffiths* B, in 1909.

"Pato de mula," "plé de mula." A good mezcal species.

20. *Agave donnell-smithii*¹ Trel. Trans. Acad. St. Louis 23: 144. 1915.

Guatemala; type from Escuintla.

Acaulescent; leaves light green, glaucous beneath, 8 cm. wide, 75 to 100 cm. long or more, with garnet or chestnut spine 4 mm. wide and 12 to 15 mm. long, and rather slender upcurved teeth 15 to 25 mm. apart and 2 to 3 mm. long.

21. *Agave karwinskii* Zucc. Act. Acad. Caes. Leop. Carol. 16²: 677. 1833.

? *Agave laxa* Salm-Dyck, Hort. Dyck. 8. 1834.

? *Agave viridissima* Baker, Gard. Chron. n. ser. 8: 137. 1877.

Agave corderoyi Baker, Gard. Chron. n. ser. 8: 398. 1877.

Agave bakeri Ross, Boll. Soc. Sci. Nat. ed. Econom. Palermo. 1894³.

Puebla and Oaxaca; type cultivated in Europe, presumably from Tehuacán.

Trunk becoming 4 meters tall; leaves green or very transiently glaucous, concave, 2 to 4 cm. wide, 35 to 70 cm. long, with dark brown spine 3 to 6 mm. wide and 25 to 50 mm. long, and strong, upcurved, nearly black teeth 25 to 45 mm. apart and 3 to 5 mm. long, the margin nearly straight between them. "Candelillo."

22. *Agave decipiens* Baker, Kew Bull. Misc. Inf. 1892: 183. 1892.

Agave laxifolia Baker in Curtis's Bot. Mag. 122: pl. 7477. 1896.

Southern Florida, around the coast (type cultivated in Europe without recorded locality); presumably native in Yucatán.

Trunk 2 to 3 meters tall; leaves green, outcurved, rather fleshy and concave, 4 to 10 cm. wide, 70 to 125 cm. long, with dark chestnut spine 3 to 5 mm. wide and 10 to 25 mm. long, and very slender flexous teeth 10 to 25 mm. apart and 2 mm. long, these on fleshy prominences of the margin.

Cultivated (from a plant of Baja California) as *A. spiralis*. "False sisal."

¹ Named for Capt. John Donnell Smith (1829-), of Baltimore, Maryland, well known for his extensive publications upon the botany of Central America. Capt. Smith has made collections in Central America, and has directed botanical explorations in many parts of that region. His large herbarium, which contains a wide representation of Mexican plants, and his library, have been presented to the Smithsonian Institution, and are incorporated in the U. S. National Herbarium.

- 23. *Agave sisalana*** Perrine, U. S. Sen. 25th Congr. Sess. 2. Doc. 300. *pl.* 1, 2, 4. 1838.

Agave rigida sisalana Baker, Kew Bull. Misc. Inf. 1889: 254. 1889.

Yucatán; type cultivated in Florida from introduced plants.

Acaulescent; leaves at length bright glossy green, at first lightly glaucous, nearly flat, 10 cm. wide, 150 cm. long, with a chestnut spine 4 to 5 mm. wide and 20 to 25 mm. long, the straight margin typically unarmed or with a few very rudimentary teeth. "Yaxci," "yax-qui," "green agave," "Sisal hemp," or "Bahama hemp."

The species most extensively planted, as a source of fiber, outside of Yucatán. Called "maguey tuxtleco" in Chiapas.

Sometimes occurring in a form as prickly as the preceding species (*f. armata* Trel. Mem. Nat. Acad. Sci. 11: 49. 1913); and exceptionally with a trunk about 1 meter tall.

- 24. *Agave candelabrum*** Tod. Hort. Panorm. 1: 66. 1876.

Agave rumphii and *Agave laxa* Hort.

Region ?; type cultivated in Europe.

Leaves uniformly spreading, green, 7 cm. wide, 100 to 150 cm. long, with conical brown spine 3 mm. wide and 15 to 20 mm. long, and sharply upcurved teeth 10 to 25 or 30 mm. apart and 4 mm. long, the intervening margin straight.

Perhaps a green extreme of *A. cantala*.

- 25. *Agave kirchneriana*** Berger, Agaven 252. 1915.

Acaulescent; leaves dull gray-green, slightly roughened, 7 cm. wide, 125 cm. long, with polished chestnut spine 5 mm. wide and 20 mm. long, and slender upcurved blackish teeth 15 to 20 mm. apart and 3 to 5 mm. long; flowers green, 50 to 55 mm. long, the openly conical tube half as long as the segments.

Guerrero; type from Xochipila or Zumpango.

"Maguey delgado"; yielding superior fiber and mezcal.

- 26. *Agave pacifica*** Trel., sp. nov.

Acaulescent; leaves yellow-green, very lightly glaucous and zoned, 3.5 to 5 cm. wide, 50 to 75 cm. long, the purplish red-brown spine 15 to 25 mm. long, often abruptly contracted and slender above the decurrent base, the teeth usually upcurved-triangular, 15 to 25 mm. apart and 3 to 5 mm. long, the intervening cartilaginous margin straight; flowers greenish yellow, 50 mm. long, the openly conical tube half as long as the segments; capsules shortly stipitate and beaked, 25 mm. broad and 45 mm. long.

Sonora, Sinaloa, and Tepic; type, in the herbarium of the Missouri Botanical Garden, from Creston Island, Mazatlán, Sinaloa, *Trelease*, in 1904.

- 27. *Agave cantala*** Roxb. Hort. Beng. 25. 1814.

Agave vivipara of authors, not L.

- *Agave flaccida* Haw. Syn. Pl. Succ. 72. 1812.

Furcraea cantala Haw. Suppl. Pl. Succ. 42. 1819.

Furcraea madagascariensis Haw. Suppl. Pl. Succ. 42. 1819.

Agave madagascariensis Spreng. Syst. Veg. 2: 79. 1825.

Agave cantula Roxb. Fl. Ind. 2: 167. 1832.

Region ?; type cultivated in India.

Acaulescent; leaves glaucous, slightly green-lined longitudinally, falcate or straight, ascending, 6 to 10 cm. wide, 150 cm. long, with slender-pointed conical brown spine 3 to 4 mm. wide and 15 to 20 mm. long, and red-chestnut, upcurved, gradually very sharp-pointed teeth 20 to 30 mm. apart and 5 to 6 mm. long.

A close ally of the "zapupe" and especially the "Tequila mezcal" species; cultivated for its fiber in the Philippines as "maguey" or "Manila aloe," and in India where it is the source of "Bombay hemp" or "Bombay aloe fiber."

Apparently one of the west-Mexican allies of *A. tequilana*, perhaps early taken for its fiber to the Philippines and thence to India, from the Acapulco region.

28. *Agave tequilana* Weber, Bull. Mus. Hist. Nat. 8: 220. 1902.

Jalisco; type from about Tequila.

Shortly caulescent; leaves rather light bluish green and persistently glaucous, thin and nearly flat, 8 to 10 cm. wide, 125 cm. long or more, with red-brown or purple-brown spine 3 to 4 mm. wide and 15 to 20 mm. long, and triangular upcurved reddish teeth 10 to 15 mm. apart and 3 to 4 mm. long, the intervening whitish margin slightly hollowed. "Mezcal azul" or "chino azul."

The common source of the distilled liquor, "mezcal de Tequila." A number of related forms are found in cultivation with this typical "azul." These, probably all specifically separable as with the "zapupe" complex, to which they are related, are known as "mano larga," "bermejo," "chato," "chino bermejo," "zapalote," "pié de mula" or "pato de mula," and "según" or "ziguín."

29. *Agave pseudotequilana* Trel., sp. nov.

Shortly caulescent; leaves yellow-green, glaucous, rather thick, openly concave, 15 cm. wide, 175 to 200 cm. long, with dark red-brown, conical or acuminate tapered spine 4 to 7 mm. wide and 10 to 15 or 20 mm. long, and sharply upcurved or flexed, triangular teeth on broad bases, 15 to 20 or 35 mm. apart and 5 to 10 mm. long, the intervening margin nearly straight; inflorescence ample, paniced; flowers unknown; capsules broadly oblong, 25 mm. broad and 45 mm. long, accompanied by bulbils.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from Tuxpan.

"Mezcal blanco" or "mezcal cucharo."

30. *Agave sullivanii* Trel., sp. nov.

Leaves green, about 10 cm. wide and 100 cm. long, with a chestnut, very short-conical spine, this abruptly pointed, or less commonly conical, and round-grooved at base, 5 mm. wide and 10 to 15 mm. long, the teeth triangular, upcurved, 20 mm. apart and 4 to 6 mm. long.

Region ?; type, in the herbarium of the Missouri Botanical Garden, cultivated for mezcal at La Paz, Baja California, *Sullivan*, in 1910.

31. *Agave ixtli* Karw. in Salm-Dyck, Hort. Dyck. 8, 304. 1834.

Yucatán; type cultivated in Europe, from Yucatán.

Acaulescent; leaves grayish, somewhat concave, scarcely 50 cm. long, with spine and prickles much as in *A. fourcroydes*.

"Ixtle"; apparently including the plants known as "bab-ci," "chelem" (which is *A. silvestris* D'Utra, Bol. Agr. S. Paulo, 1909: 169. 1909, and *A. prolifera* Schott, in sched.), "chucum-ci," "citam-ci" (which is *A. minima* D'Utra, loc. cit.), "pita-ci," "xix-ci," and "xtuc-ci." The specific name is variously and often erroneously spelled.

32. *Agave fourcroydes* Lem. Ill. Hort. 11: Misc. 65. 1864.

Agave rigida elongata Baker, Kew Bull. Misc. Inf. 1892: 33. 1892.

Yucatán; type cultivated in Europe from an unrecorded locality.

Trunk becoming 2 meters tall; leaves gray, rather flat, 8 to 10 cm. wide, 150 to 250 cm. long, with black-brown spine 4 to 6 mm. wide and 20 to 30 mm. long, and moderately slender, somewhat upcurved, blackish teeth 10 to 20 mm.

apart and 1 to 4 mm. long, the margin nearly straight between their somewhat raised bases. "Sacqui," "sac-ci," "gray agave," or "henequén."

The source of the larger part of the "Sisal hemp" exported from Yucatán.

33. *Agave datylio* Weber, Bull. Mus. Hist. Nat. 8: 223. 1902.

Baja California; type from La Paz.

Acaulescent; leaves yellow-green or gray-green, 3 to 4 cm. wide, 30 to 75 cm. long, with purplish or blackish spine 4 to 6 mm. wide and 20 to 30 mm. long, and glossy, chestnut, heavily triangular or slender-cusped teeth 20 to 30 or 50 mm. apart and 3 to 5 mm. long, the intervening margin nearly straight.

34. *Agave vexans* Trel. Rep. Mo. Bot. Gard. 22: 62. 1911.

Baja California; type from Mulegé.

Acaulescent; leaves gray-green, 2 cm. wide, 20 to 45 cm. long, with gray-brown spine 3 to 5 mm. wide and 25 to 35 mm. long, and triangular or slender-cusped, detachable teeth 15 to 20 mm. apart and 3 to 4 mm. long.

35. *Agave nivea* Trel. Trans. Acad. St. Louis 23: 143. 1915.

Guatemala; type from El Rancho.

Acaulescent; leaves very glaucous, very concave, 15 cm. wide, 200 cm. long, with black-chestnut spine 3 mm. wide and 15 to 20 mm. long, and triangular slender-cusped teeth 30 to 50 mm. apart and 3 mm. long, their bases often fleshy, the intervening margin nearly straight.

36. *Agave sicaefolia* Trel. Trans. Acad. St. Louis 23: 141. 1915.

Guatemala; type from El Rancho.

Acaulescent; leaves gray, flat or concave, 7 to 8 cm. wide, 60 to 75 cm. long, with purplish chestnut spine 4 mm. wide and 30 to 40 mm. long, and mostly upcurved, slender teeth 15 to 35 mm. apart and 3 to 5 mm. long, the intervening margin sometimes with smaller straight teeth.

37. *Agave macroacantha* Zucc. Act. Acad. Caes. Leop. Carol. 16²: 676. 1833.

Agave pugioniformis Zucc. Act. Acad. Caes. Leop. Carol. 16²: 676. 1833.

Agave flavescens Salm-Dyck, Hort. Dyck. 8, 305. 1834.

Agave flavescens macroacantha Jacobi, Hamb. Gart. Zeit. 1864: 500. 1864.

Agave bessereriana Van Houtte, Cat. 1868: 32. 1868.

Agave subfalcata Jacobi, Wochenschr. Ver. Beförd. Gartenb. 1869: 179. 1869.

Agave linearis Jacobi, Wochenschr. Ver. Beförd. Gartenb. 1869: 179. 1869.

Agave concinna Baker, Gard. Chron. n. ser. 8: 137. 1877.

Agave sudburyensis Baker, Gard. Chron. n. ser. 8: 137. 1877.

Agave paucifolia Baker, Gard. Chron. n. ser. 9: 266. 1878.

Agave oligophylla Baker, Gard. Chron. n. ser. 10: 492. 1878.

? *Agave wiesenburgensis* Wittm. Gart. Zeit. 4: 13. 1885.

Agave baxteri Baker, Amaryll. 178. 1888.

? *Agave integrifolia* Baker, Amaryll. 185. 1888.

Puebla; type cultivated in Europe, probably from Tehuacán.

Acaulescent; leaves glaucous, 2 to 4 (or 7) cm. wide, 20 to 55 cm. long, with dark brown or blackish spine 4 to 6 mm. wide and 15 to 25 mm. long or more, and heavy-based, rather upcurved teeth 15 to 20 mm. apart and 2 to 3 mm. long. "Espadilla."

38. *Agave yaquiana* Trel., sp. nov.

Acaulescent; leaves falcately erect, glaucous and green-zoned, 5 cm. wide, 75 cm. long, with brown decurrent spine 4 mm. wide and 25 mm. long, and rather heavy, mostly upcurved, triangular teeth 15 to 20 or even 50 mm. apart and 36 mm. long, the intervening cartilaginous margin very slightly hollowed.

Sonora; type, in the herbarium of the Missouri Botanical Garden, from rocky hillsides between Hermosillo and Ures, *Trelease* 391.

"Mezcal."

39. *Agave desmettiana* Jacobi, Hamb. Gart. Zeit. 22: 217. 1866.

? *Agave pallida* Jacobi, Hamb. Gart. Zeit. 22: 112. 1866.

? *Agave regeliana* Jacobi, Hamb. Gart. Zeit. 22: 214. 1866.

? *Agave ananassoides* de Jonge & Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1868: 147. 1868.

Agave miradorensis Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1868: 156. 1868.

Veracruz; type cultivated in Europe, presumably from El Mirador, Huatusco, though said to be from Brazil.

Leaves glaucous, nearly straight, 3 to 7 or 10 cm. wide, 75 to 100 cm. long, with slender spine 4 to 5 mm. wide and 20 to 25 mm. long, entire above but with minute, nearly colorless teeth some 5 mm. apart toward the base.

40. *Agave thomasae* Trel. Trans. Acad. St. Louis 23: 138. 1915.

Guatemala; type cultivated at Quezaltenango.

Leaves green, glaucous, 15 cm. wide, 60 cm. long, with chestnut needle-shaped spine 2 mm. wide and 25 mm. long, and minute, nearly straight teeth 5 to 10 mm. apart and 1 to 2 mm. long, the margin straight between them.

41. *Agave deamiana*¹ Trel. Trans. Acad. St. Louis 23: 139. 1915.

Guatemala; type from Fiscal.

Leaves grayish, 10 cm. wide and 100 cm. long, with purplish brown, needle-shaped spine 3 to 4 mm. wide and 40 mm. long, and slender teeth 10 to 20 mm. apart and 2 to 4 mm. long, the margin straight between them.

42. *Agave hurteri* Trel. Trans. Acad. St. Louis 23: 136. 1915.

Guatemala; type from Zunil.

Leaves somewhat glaucous, 10 cm. wide, 75 to 100 cm. long, with straight chestnut spine 8 mm. wide and 40 mm. long, and more or less hooked, relatively slender teeth 10 to 20 mm. apart and 5 to 10 mm. long, the intervening margin straight.

43. *Agave tortispina* Trel. Trans. Acad. St. Louis 23: 135. 1915.

Guatemala; type from Cruz.

Leaves yellow-green, white-glaucous, 10 cm. wide, 25 to 30 cm. long, with red or smoky brown, very flexuous spine 4 mm. wide and 30 mm. long, and heavy, nearly straight teeth 15 to 25 mm. apart and 3 to 5 mm. long on prominent fleshy hummocks.

44. *Agave pachycentra* Trel. Trans. Acad. St. Louis 23: 135. 1915.

Guatemala; type from Cruz.

Leaves green, blue-glaucous, 15 to 20 cm. wide, 35 to 60 cm. long, with large gray spine 8 mm. wide and 50 to 60 mm. long, and heavy recurved teeth 25 to 50 mm. apart and 5 to 10 mm. long, these on prominent fleshy hummocks.

45. *Agave kellermaniana*² Trel. Trans. Acad. St. Louis 23: 142. 1915.

Guatemala; type from Fiscal.

Leaves very glaucous, 8 to 10 cm. wide and 100 cm. long or larger, with purple-chestnut spine 4 to 5 mm. wide and 30 to 35 mm. long, and upcurved slender teeth 10 to 25 mm. apart and 3 to 5 mm. long, these sometimes on fleshy prominences.

¹ Named for Charles C. Deam, of Bluffton, Indiana, well known for his investigations of the flora of Indiana. Mr. Deam has also obtained an extensive collection of plants in Guatemala.

² Named for W. A. Kellerman (1850-1908), of Ohio, known especially for his investigations of parasitic fungi. He made large collections of plants in Guatemala.

46. *Agave samalana* Trel. Trans. Acad. St. Louis 23: 142. 1915.

Guatemala; type from Esperanza.

Leaves glaucous, 15 cm. wide, 60 cm. long, with reddish or chestnut needle-shaped spine 3 to 4 mm. wide and 35 to 55 mm. long, and rather straight triangular teeth 5 to 20 mm. apart and 1 to 3 or 5 mm. long, the nearly straight intervening margin denticulate.

47. *Agave lagunae* Trel. Trans. Acad. St. Louis 23: 143. 1915.

Guatemala; type from Amatitlán.

Leaves very glaucous, 8 to 10 cm. wide, 40 cm. long, with garnet spine 3 to 5 mm. wide and 20 to 30 mm. long, and variously curved teeth 20 to 40 mm. apart and 3 to 5 mm. long, these on rather prominent fleshy hummocks between which the margin is straight.

48. *Agave minarum* Trel. Trans. Acad. St. Louis 23: 139. 1915.

Guatemala; type collected near El Rancho.

Leaves yellow-green, 6 cm. wide, 60 cm. long, with brown spine 5 mm. wide and 45 mm. long, and detachable teeth 5 to 10 mm. apart, the intervening margin straight.

49. *Agave seemanniana*¹ Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1868: 154. 1868.

Nicaragua (type from Segovia) and Guatemala.

Leaves glaucous, 8 cm. wide, 35 cm. long, with purplish brown spine 2 to 4 mm. wide and 20 to 30 mm. long, and triangular teeth 10 to 20 mm. apart and 2 to 3 mm. long, the margin hollowed between them.

50. *Agave tenuispina* Trel. Trans. Acad. St. Louis 23: 140. 1915.

Guatemala; type from Cruz.

Leaves glaucous, 20 cm. wide, 70 cm. long, with dull brown needle-like spine 3 mm. wide and 60 to 70 mm. long, and rather heavy curved teeth 20 to 40 mm. apart and 5 to 10 mm. long, the margin hollowed between them.

51. *Agave opacidens* Trel. Trans. Acad. St. Louis 23: 140. 1915.

Guatemala; type from Cruz.

Leaves glaucous, 8 to 10 cm. wide, 75 cm. long, with dull brown spine 6 mm. wide and 50 to 60 mm. long, and heavy, nearly straight teeth 20 to 50 mm. apart and 5 to 8 mm. long, these on rather fleshy prominences.

52. *Agave lurida* Ait. Hort. Kew. 1: 472. 1789.

Veracruz; type cultivated in Europe; scarcely known except in cultivation.

Leaves glaucous, rather thin and curved, with a slender spine 3 to 4 mm. wide and 25 to 30 mm. long, and small teeth about 10 mm. apart and 3 mm. long, these usually not on fleshy bases.

53. *Agave rasconensis* Trel., sp. nov.

Leaves rather thin and more or less outcurved, about 10 cm. wide and 75 cm. long, gradually acute, glaucous, with needle-shaped, somewhat round-grooved, glossy red-brown spine about 4 mm. wide and 30 mm. long, and broadly triangular teeth 20 to 50 mm. apart and 6 mm. long, these on somewhat raised prominences between which the margin is nearly straight; inflorescence about 8 meters tall, paniculate; flowers 90 to 95 mm. long, short-pedicel, somewhat stipitate, the tube 12 to 15 mm. deep, scarcely half as long as the segments,

¹Berthold Seemann (1825-1871) was a native of Hanover, who from 1847 to 1851 was naturalist of H. M. S. *Herald*. In Mexico he collected in the states of Sinaloa and Durango, and probably elsewhere. He collected also in Panama, and published an extended account of his botanical discoveries.

the filaments inserted in its throat; capsules 25 mm. broad and 50 mm. long, stipitate but scarcely beaked; seeds 7 mm. wide and 10 mm. long.

San Luis Potosí; type, in the herbarium of the Missouri Botanical Garden, from Rascón, *Trelease* 75.

54. *Agave vera-cruz* Mill. Gard. Dict. ed. 8. *Agave* no. 7. 1768.

Agave mexicana and *Agave theometel* of authors.

Veracruz (?); type cultivated in Europe, nominally from that region; also established in Peru. Extensively planted about the Mediterranean, and cultivated as "blue aloe" in Mauritius, Amoy, and India.

Leaves glaucous, rather fleshy and straight, 15 to 17 cm. wide, 150 cm. long, with short stout gray spine 5 to 6 mm. wide and 20 to 25 mm. long, and deltoid teeth on low fleshy prominences.

55. *Agave verschaffeltii* Lem. in Verschaffelt, Cat. 1866-7, *f.*; Ill. Hort. 15: *pl.* 564. 1868.

Puebla; type cultivated in Europe, pretty clearly from about Tehuacán.

Leaves glaucous, 7 cm. wide, 15 to 17 cm. long, obovate-oblong, acuminate, with twisted light brown spine and long rust-brown teeth on very high fleshy prominences. "Papalometl."

A beautiful polymorphic small species, at one time popular in European gardens under distinctive varietal names, of which over 30 have been listed—one of the introducers advertising as many varieties as there are plants. Among the names preoccupied by these as specific are *A. albida*, *A. amoena*, *A. auricantha*, *A. bedinghausii*, *A. bonneti*, *A. cochleata*, *A. crenata*, *A. croucheri*, *A. cucullata*, *A. elegans*, *A. imbricata*, *A. leopoldi*, *A. prolifera*, *A. pulverulenta*, *A. quadreta*, *A. rotundifolia*, *A. saundersii*, *A. serrata*, *A. serrulata*, *A. simsii*, *A. streptacantha*, and *A. tehuacanensis*.

56. *Agave megalacantha* Hemsl. Diag. Pl. Mex. 55. 1880.

Valley of Mexico; type from the lava fields.

Leaves gray, short-obovate, acuminate, 10 cm. wide, 15 to 20 cm. long, with brown or gray spine 5 mm. wide and 40 mm. long, and rather stout, mostly upcurved teeth about 20 mm. apart and 5 mm. long, these from very high fleshy prominences.

57. *Agave guadalajarana* Trel., sp. nov.

Leaves dull and pale but scarcely glaucous, cuneate-obovate, rather obtuse, 8 cm. wide and 12 cm. long, with red-chestnut curved spine 3 mm. wide and 25 mm. long, and triangular teeth, the upper ones 7 mm. long and from high fleshy prominences; inflorescence paniced, with short, more or less connate pedicels; flowers 60 mm. long, the perianth segments equaling or shorter than the tube; capsules stipitate and beaked, 15 to 20 mm. wide, 35 mm. long.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from Guadalajara, *Pringle* 4473.

58. *Agave potatorum* Zucc. Act. Acad. Caes. Leop. Carol. 16²: 675. 1833.

Puebla; type cultivated in Europe (from about Tehuacán?).

Leaves oblanceolate, acute, 8 to 10 cm. wide, 30 to 40 cm. long, with straight, dull brown spine, and rather small teeth on low fleshy prominences, gray in the typical form, and green in that which has been called *A. scolymus* Karw. (in Salm-Dyck, Hort. Dyck. 307. 1834).

59. *Agave mescal* Koch, Wochenschr. Ver. Beförd. Gartenb. 8: 94. 1865.

Agave hookeri Jacobi, Hamb. Gart. Zeit. 22: 168. 1866.

Michoacán (type locality about Tejulpico on the Balsas River?), Sinaloa, and Sonora.

Leaves dark green, oblong-obovate, acute, 15 to 25 cm. wide, 100 to 150 cm. long, rather thin, with slender brown spine and rather long teeth from the tops of fleshy prominences between which other teeth occur on the hollowed margin. "Mezcal," "lechuguilla."

60. *Agave fenzliana* Jacobi, Hamb. Gart. Zeit. 22: 170. 1866.

Agave inaequidens Koch, Wochenschr. Ver. Beförd. Gartenb. 3: 28. 1860.

Michoacán (?); type cultivated in Europe.

Leaves dull light green, 15 to 20 cm. wide and 150 cm. long or more, with long brown spine and unequal, rather small teeth more or less raised on prominences.

61. *Agave cupreata* Trel. & Berger; Berger, Agaven 197. 1915.

Leaves gray, oblanceolate, acute, 20 cm. wide, 75 cm. long, with copper-colored, somewhat twisted spine 5 mm. wide and 45 mm. long, and large, variously curved, unequal, similarly colored, flat teeth 30 to 60 mm. apart and 10 to 15 mm. long, these clasping the tops of large fleshy prominences; panicle 10 meters tall; flowers yellow, 55 to 60 mm. long, the tube about 10 mm. long.

Michoacán and Guerrero; type from the Sierra Madre.

"Maguey de mezcal."

62. *Agave shawii* Engelm. Trans. Acad. St. Louis 3: 314. 1875.

Northwestern Baja California, near the coast. Southern California; type from Point Loma.

Trunk 1 meter tall; leaves green, glossy, acuminate, 6 to 12 cm. wide, 25 to 50 cm. long, with flexuous needle-shaped red spine 3 to 6 mm. wide and 20 to 40 mm. long, and large, garnet, variously curved teeth 10 to 25 mm. apart and 10 to 15 mm. long, connected by a horny band; filaments inserted about the middle of the perianth tube.

63. *Agave orcuttiana*¹ Trel. Rep. Mo. Bot. Gard. 22: 47. 1912.

Northwestern Baja California, near the coast; type from San Quintín.

Trunk reaching a height of 3 meters; leaves green, with gray spine 4 mm. wide and 20 to 25 mm. long, and large curved gray teeth with horny connection; filaments inserted above the middle of the tube.

64. *Agave sebastiana* Greene, Bull. Calif. Acad. 1: 214. 1885.

Western coast region and islands of middle Baja California; type from Cedros Island.

Leaves glaucous, rather acute, 6 to 10 cm. wide, 15 to 30 cm. long, with red-brown or gray spine 5 to 6 cm. wide and 20 to 50 mm. long, and nearly straight teeth 15 mm. apart and 3 to 5 or even 10 to 15 mm. long, with horny connection; filaments inserted above the middle of the tube.

65. *Agave pachyacantha* Trel. Rep. Mo. Bot. Gard. 22: 48. 1912.

Northwestern coast region of Baja California; type from Todos Santos Bay.

Leaves rather gray, acuminate, 10 to 12 cm. wide, 25 to 40 or 75 cm. long, with straight heavy chestnut spine 6 to 9 mm. wide and 25 to 40 mm. long, and mostly recurved, heavy teeth 15 mm. apart and 10 mm. long (or sometimes almost suppressed), with connecting horny line; filaments inserted toward the top of the tube.

¹ Named for C. R. Orcutt (1864-), for many years a resident of California, who has collected plants in various parts of Mexico, but especially in Baja California. Many specimens of his collection are in the U. S. National Herbarium.

66. *Agave goldmaniana* Trel. Rep. Mo. Bot. Gard. 22: 49. 1911.

Eastern Baja California; type from Yubai.

Trunk short; leaves grayish, 10 cm. wide, 50 cm. long, with nearly straight blackish spine 7 mm. wide and 40 mm. long, and teeth 15 to 30 mm. apart and up to 10 mm. long, these very nearly triangular, often connected by a horny band, the intervening margin nearly straight.

67. *Agave applanata* Koch, Wochenschr. Ver. Beförd. Gartenb. 1862: 83. 1862.

Veracruz; on the lava fields about Limón; type cultivated in Europe, without recorded locality.

Leaves glaucous, 10 to 15 cm. wide, 100 to 150 cm. long, with purplish or gray, somewhat flexuous, long-decurrent spine 6 to 7 mm. wide and 35 to 45 mm. long, and more or less recurved, triangular teeth 25 to 50 mm. apart and 5 to 8 mm. long, the upper ones connected by a horny line.

68. *Agave scabra* Salm-Dyck, Bonplandia 7: 86. 1859.

Agave wislizeni Engelm. Trans. Acad. St. Louis 3: 320. 1875.

Agave noah Nickels, Cat. 26: 20.

Coahuila; type from San Sebastián, Sierra de Noa.

Leaves dull gray, smooth, acute, 10 to 15 cm. wide, 20 to 25 cm. long, with somewhat curved and decurrent, chestnut or gray spine 3 to 4 mm. wide and 15 to 20 mm. long, and more or less curved, narrowly triangular teeth 15 to 20 mm. apart and 3 to 8 mm. long, the margin between them slightly hollowed.

69. *Agave huachucensis* Baker, Amaryll. 172. 1888.

Southern Arizona (type locality, Huachuca Mountains), and perhaps adjacent Mexico.

Leaves in a globose cluster, dull gray, essentially smooth, acute, 10 to 15 cm. wide, 16 to 30 cm. long, with more or less flexuous and decurrent, red-chestnut or gray spine 5 to 6 mm. wide and 25 mm. long, and usually recurved, narrowly triangular teeth 15 mm. apart and 4 to 7 mm. long, the margin between these usually concave.

70. *Agave parrasana* Berger, Notizbl. Bot. Gart. Berlin 4: 250. 1906.

Coahuila; type from Sierra de Parrás.

Leaves green, lightly glaucous, obovate, long-acuminate, 6 to 8 cm. wide, 10 cm. long or more, with slender-tipped spine 3 to 4 mm. wide and 50 mm. long, and more or less recurved triangular teeth about 10 mm. apart and 5 mm. long, on fleshy prominences.

71. *Agave chihuahuana* Trel. Rep. Mo. Bot. Gard. 22: 90. 1911.

Chihuahua; type locality near Chihuahuá.

Leaves grayish, somewhat acuminate, 10 to 15 cm. wide, 15 to 25 cm. long, with purplish chestnut spine 4 to 7 mm. wide and 25 to 35 mm. long, and triangular teeth 15 to 25 mm. apart and 6 mm. long, the margin between them nearly straight; filaments inserted far above the middle of the tube.

72. *Agave parryi* Engelm. Trans. Acad. St. Louis 3: 311. 1875.

Mountains of northern Chihuahua. Southern Arizona and New Mexico; type from Santa Rita, New Mexico.

Leaves gray, acute or somewhat acuminate, 6 to 10 cm. wide, 25 to 30 cm. long (exceptionally 15 cm. wide and 40 cm. long), the spines nearly straight, from chestnut becoming gray, 5 to 6 mm. broad and 20 to 25 mm. long, the teeth straightish or gently recurved, 15 to 20 mm. apart, 3 to 5 mm. long; filaments inserted nearly in the throat of the perianth tube.

73. *Agave patonii* Trel. Rep. Mo. Bot. Gard. 22: 92. 1911.

Durango; type locality, Chinacates.

Leaves grayish, more or less acuminate, 20 cm. wide, 30 cm. long, with nearly straight purplish spine 6 mm. wide and 30 to 35 mm. long, and relatively

slender recurved teeth 20 to 25 mm. apart and 6 to 7 mm. long, the intervening margin nearly straight; filaments inserted in the throat of the perianth tube.

74. *Agave aurea* T. S. Brandeg. Proc. Calif. Acad. II. 2: 207. 1889.

Eastern Baja California; type locality, Purísima.

Leaves gray-green, acuminate, 10 to 15 cm. wide, 75 to 100 cm. long, with conical or acuminate chestnut spine 3 to 5 mm. wide and 20 to 30 mm. long, and very unequal, triangular, often upcurved teeth 10 to 20 mm. apart and 4 to 8 mm. long, from fleshy prominences.

75. *Agave promontorii* Trel. Rep. Mo. Bot. Gard. 22: 50. 1911.

Cape region of Baja California; type locality, Sierra de la Laguna.

Leaves rather glaucous; spine more acuminate and curved.

76. *Agave dentiens* Trel. Rep. Mo. Bot. Gard. 22: 51. 1911.

Islands off the Sonora coast; type from San Esteban Island.

Leaves glaucous gray-green, 3 to 5 cm. wide, 30 to 50 cm. long, with ash-colored or brown-tipped spine 3 to 4 mm. wide and 20 to 30 mm. long, and minute whitish friable teeth 5 to 10 mm. apart and scarcely 1 mm. long, the margin nearly straight.

77. *Agave disjuncta* Trel. Rep. Mo. Bot. Gard. 22: 51. 1911.

Islands of Baja California; type locality, San Benito Island.

Differs from the preceding in its firmer browner teeth.

78. *Agave deserti* Engelm. Trans. Acad. St. Louis 3: 310, 370. 1875.

Colorado Desert of southern California (type locality east of San Felipe), and possibly adjacent Baja California.

Leaves gray, slightly granular, 5 cm. wide, 15 to 30 cm. long, with brown or fading, needle-shaped spine 3 mm. wide and 30 mm. long, and rather friable teeth 5 to 10 mm. apart and 3 to 4 mm. long, from rather prominent fleshy hummocks; ovary flask-shaped, 15 to 20 mm. long, equaling the perianth.

79. *Agave consociata* Trel. Rep. Mo. Bot. Gard. 22: 53. 1911.

Southern California and adjacent Baja California; type locality, San Felipe, California.

Leaves gray, 6 cm. wide, 20 to 30 cm. long, with brown spine 3 to 4 mm. wide and 25 to 30 mm. long, and triangular teeth 10 to 30 mm. apart and 4 to 8 mm. long, the intervening margin somewhat hollowed; ovary fusiform, 25 to 30 mm. long, exceeding the perianth.

80. *Agave pringlei* Engelm.; Trel. Rep. Mo. Bot. Gard. 22: 54. 1911.

Baja California; type from the central plateau.

Leaves gray, 5 cm. wide, 15 to 40 cm. long, with drab or brown-tipped spine 3 to 5 mm. wide and 25 to 35 mm. long, and easily detachable triangular teeth 15 to 25 mm. apart and 3 to 5 mm. long, the intervening margin nearly straight.

81. *Agave cerulata* Trel. Rep. Mo. Bot. Gard. 22: 55. 1911.

Central Baja California; type locality, Calmallí.

Leaves gray or glaucous, somewhat rough, 2 to 4 cm. wide, 30 cm. long, with gray-brown spine 2 to 4 mm. wide and 30 mm. long, and friable teeth 10 to 15 or 25 mm. apart and 3 mm. long, from fleshy marginal hummocks.

82. *Agave carminis* Trel. Rep. Mo. Bot. Gard. 22: 55. 1911.

Islands of eastern Baja California; type locality, Carmen Island.

Leaves grayish, smooth, 5 cm. wide, 30 to 40 cm. long, with needle-shaped, light brown spine 2 mm. wide and 35 mm. long, and firm, variously curved, narrowly triangular teeth 20 to 30 mm. apart and 5 mm. long, from low fleshy prominences between which the margin is nearly straight.

83. *Agave sobria* T. S. Brandeg. Proc. Calif. Acad. II. 2: 207. 1899.

East-central Baja California; type locality, mesas about Comondú.

Leaves glaucous, about 60 cm. long, with chestnut or glaucous, narrowly triangular, variously curved teeth 20 to 30 mm. apart and 8 to 10 mm. long, the intervening margin more or less hollowed.

84. *Agave affinis* Trel. Rep. Mo. Bot. Gard. 22: 56. 1911.

Eastern Baja California; type locality, Concepción Bay.

Leaves glaucous gray-green, rough, 5 cm. wide, 50 cm. long, with somewhat wavy, light brown or faded, nearly straight, narrowly triangular teeth 10 to 20 or 40 mm. apart and 5 to 7 mm. long, from low prominences between which the margin is somewhat concave.

85. *Agave brandegeei* Trel. Rep. Mo. Bot. Gard. 22: 57. 1911.

Cape region of Baja California; type from the mountains.

Leaves grayish yellow-green, 10 cm. wide, 60 cm. long, with stout, conical or acuminate, recurved, red-brown spine 4 mm. wide and 20 mm. long, and gently upcurved, broadly triangular teeth 10 mm. apart and 2 mm. long, the intervening margin straight.

86. *Agave margaritae* T. S. Brandeg. Proc. Calif. Acad. II. 2: 206. 1889.

Islands of southwestern Baja California; type locality, Magdalena Island.

Leaves green or transiently glaucous, acuminate, 6 to 10 cm. wide, 12 to 20 cm. long, with somewhat undulate, needle-shaped, chestnut or fading spine 3 mm. wide and 25 mm. long, and narrowly triangular, curved teeth 10 mm. apart and 6 to 8 mm. long, on low fleshy prominences.

87. *Agave connochaetodon* Trel. Rep. Mo. Bot. Gard. 22: 58. 1911.

Southwestern Baja California; type locality, Santa María Bay.

Leaves somewhat glaucous light green, 6 cm. wide, 25 cm. long, with red or drab, flexuous, needle-shaped spine 3 to 4 mm. wide and 40 to 50 mm. long, and triangular, often much hooked teeth 15 to 20 mm. apart and 10 to 15 mm. long, the intervening margin hollowed.

Perhaps a form of the preceding with larger and peculiarly curved marginal teeth.

88. *Agave roseana* Trel. Rep. Mo. Bot. Gard. 22: 59. 1911.

Southeastern Baja California; type locality, Espíritu Santo.

Leaves glaucous gray-green, 15 cm. wide, 50 cm. long, with glaucous, purplish brown or fading, tortuous, needle-shaped spine 3 to 4 mm. wide and 50 to 70 mm. long, and large, flat, broadly triangular, often much and diversely curved teeth 30 mm. apart and 10 to 25 mm. long, on large fleshy prominences.

89. *Agave avellanidens* Trel. Rep. Mo. Bot. Gard. 22: 60. 1911.

East-central Baja California; type locality, Paraíso.

Leaves long-acuminate, 11 cm. wide and 60 cm. long or more, with conical wavy drab spine 5 mm. wide and 50 mm. long, and similarly colored, variously curved, very broadly triangular teeth 25 to 50 mm. apart (sometimes with an intermediate smaller one) and 10 mm. long, the intervening margin slightly hollowed.

90. *Agave subsimplex* Trel. Rep. Mo. Bot. Gard. 22: 60. 1911.

Islands of Sonora; type locality, Seal Island, near Tiburón.

Leaves very glaucous, 5 cm. wide, 15 cm. long, with nearly straight, light gray, needle-shaped spine 3 mm. wide and 20 mm. long, and purplish black or red or fading, narrow triangular, variously curved teeth 10 to 20 mm. apart and 5 to 10 mm. long, on fleshy prominences between which the margin is nearly straight.

91. *Agave nelsoni* Trel. Rep. Mo. Bot. Gard. **22**: 61. 1911.

North-central Baja California; type locality, San Fernando.

Leaves glaucous, 7 cm. wide, 18 to 35 cm. long, with blackish or fading spine 5 mm. wide and 30 cm. long, and fragile, brown or whitish, broadly triangular teeth 10 to 20 mm. apart and 5 mm. long, the intervening margin nearly straight.

92. *Agave weberi* Cels; Poisson, Bull. Mus. Hist. Nat. **7**: 231. 1901.

Coahuila, Nuevo León, Durango, and San Luis Potosí; type cultivated in Europe, from Moctezuma, San Luis Potosí.

Leaves nearly straight, 15 cm. wide, 120 to 200 cm. long, green, somewhat glaucous, with straight brown spine 5 mm. wide and 40 to 50 mm. long, the margin typically without teeth but sometimes bearing a very few small rudimentary teeth; capsules 30 mm. broad and 55 mm. long, stipitate but scarcely beaked; bulbiferous.

"Maguey liso"; yielding aguamiel and containing a usable fiber.

93. *Agave latissima* Jacobi, Hamb. Gart. Zeit. **20**: 499, 551. 1864.

Agave gracilis Jacobi, Abh. Schles. Ges. Vaterl. Cult. **1870**: 150. 1870.

Agave macroculmis Tod. Hort. Panorm. **2**: 51. 1891.

Michoacán; type cultivated in Europe.

Leaves bright green or slightly glaucous, 20 to 30 cm. wide, 100 to 150 cm. long, with a stout conical spine as much as 25 mm. long, or a very heavy compressed spine base 20 mm. wide and 10 to 20 mm. long bearing a somewhat refracted tip 3 mm. wide and 5 mm. long, and short triangular teeth 20 to 30 mm. apart and 1 to 2 mm. long, or these commonly closer together or almost or quite confluent and from half-round graying horny bases.

Yielding "aguamiel" and fiber. Sometimes grown in gardens as *A. coccinea*.

94. *Agave ferox* Koch, Wochenschr. Ver. Beförd. Gartenb. **3**: 23. 1860.

Valley of Mexico; type cultivated in Europe under a name suggesting confusion with the next.

Leaves acuminate, rather abruptly outcurved above the middle, undulate and very deeply crenate, green, 30 cm. wide, 120 cm. long, with long, sometimes flexed, gray spine 8 to 10 mm. wide and 60 mm. long, and rather recurved teeth 15 mm. long and 30 to 60 mm. apart on very high fleshy prominences.

95. *Agave mitraeformis* Jacobi, Abh. Schles. Ges. Vaterl. Cult. **1868**: 145. 1868.

Agave coarctata Jacobi, Abh. Schles. Ges. Vaterl. Cult. **1868**: 147. 1868.

Puebla and adjacent Veracruz; type cultivated in Europe; the name taken for the common "maguey cimarrón" of the vicinity of Tehuacán.

Leaves long-acuminate, concave, slightly gray-and-green-zoned, 30 cm. wide, 75 cm. long, with long, relatively slender spine and large triangular teeth between which the margin is concave.

Cultivated sometimes as *A. bonnettiana* and *A. selloum*.

96. *Agave compluviata* Trel. in Bailey, Stand. Cycl. Hort. **1**: 234. 1914.

Durango; type locality, Pueblito.

Leaves gray, zoned with green, acute, deeply gutter-shaped, with upcurved sides, the back somewhat ridged, 40 cm. wide and 120 cm. long or more, with rather long conical gray spine and triangular, more or less recurved, rather large teeth between which the margin is somewhat hollowed. "Maguey verde."

Cultivated for aguamiel and a sort of pulque.

97. *Agave felina* Trel., sp. nov.

Leaves dull, glaucous, 20 cm. wide, 150 cm. long, with slightly flexuous spine 7 mm. wide and 45 mm. long, and clawlike teeth 15 to 20 mm. apart and 5 to 10 mm. long, the intervening margin repand or often incised.

Durango; type, in the herbarium of the Missouri Botanical Garden, from Pueblito, *Trelease*.

"Maguey chino."

98. *Agave subzonata* Trel., sp. nov.

Leaves gray, somewhat zoned with green, smooth or slightly rough, acute, 30 cm. wide, 120 cm. long, with stout gray spine 5 to 10 mm. wide and 30 mm. long, and rather heavy curved triangular teeth 40 to 50 mm. apart on very high fleshy prominences; panicle 5 meters tall, sparingly branched at top; filaments inserted about the middle of the rather long perianth tube; capsules stipitate and beaked, 2 cm. broad, 4.5 cm. long; seeds 5 mm. wide, 6 to 7 mm. long.

Nuevo León; type, in the herbarium of the Missouri Botanical Garden, collected at Monterrey, *Trelease*; common in hedges.

99. *Agave zonata* Trel. in Bailey, Stand. Cycl. Hort. 1: 234. 1914.

Nuevo León; type locality, Monterrey; common in hedges.

Leaves broadly and distinctly green-and-gray-banded, rough, acuminate, 25 cm. wide and 100 cm. long or more, with long, rather slender spine and rather distant triangular teeth between which the margin is very concave; capsules stipitate but scarcely beaked, 2.5 cm. broad, 4 to 4.5 cm. long; seeds about 5 mm. wide and 8 mm. long. "Maguey verde."

100. *Agave gracilispina* Engelm.; Leichtlin, Cat. 1882; Trel. in Bailey, Stand. Cycl. Hort. 1: 234. 1914.

Agave salmiana gracilispina Rol.-Goss. Rev. Hort. 68: 11. 1896.

San Luis Potosí; type locality, San Luis Potosí.

Aspect of the next, but the spine very long and needle-like. "Maguey blanco."

Planted for pulque. The leaf fiber of this and some of the following, as well, as of the marginate species, is known as "ixtle."

101. *Agave melliflua* Trel. in Bailey, Stand. Cycl. Hort. 1: 234. 1914.

Nuevo León; type locality, Monterrey.

Leaves light gray, slightly roughened, long-acuminate, 30 cm. wide, 120 to 200 cm. long, with long, relatively slender, gray spine 4 to 6 mm. wide and 35 to 45 mm. long, and heavy-based, abruptly rather triangular-cusped teeth 20 to 50 mm. apart and 10 mm. long, on fleshy prominences; panicle 5 to 6 meters tall, rather narrow, sometimes bulbiferous; capsules stipitate and somewhat beaked, 2.5 cm. wide and 5 cm. long.

"Maguey serrano," "maguey manso," "maguey chino"; cultivated for aguamiel and the so-called pulque fermented from it there.

102. *Agave quiotifera* Trel.; Ochoterena, Mem. Soc. Alzate 33: 102. 1913.

Durango; type locality, Pueblito.

Leaves light gray, acute, moderately concave, about 30 cm. wide and 120 cm. long or more, with conical gray spine 8 mm. wide and 150 mm. long, and triangularly recurved teeth 25 to 40 mm. apart and about 4 mm. long, on low fleshy or horny bases between which the margin is nearly straight; inflorescence 6 meters tall; flowers 70 to 80 mm. long, yellow, the tube and segments equal.

"Maguey ceniso"; cultivated in hedges; sometimes used for aguamiel, or the flower stalk allowed to develop and cut for "quioté," which is sold on the streets and chewed like sugar cane.

103. *Agave crassispina* Trel. in Bailey, Stand. Cycl. Hort. 1: 234. 1914.

San Luis Potosí and Durango; type locality, about San Luis Potosí.

Aspect of the preceding, but the leaves 25 cm. wide and 100 cm. long, only slightly gray, the spine very stout, 15 to 18 mm. wide, 50 to 80 mm. long, and

the large teeth 25 to 50 or 70 mm. apart and 10 to 15 mm. long, from abruptly dilated bases, sometimes on very prominent fleshy hummocks. "Maguey cimarrón."

Agave crassispina culta Trel., var. nov., differs from the type in its smaller spine and marginal teeth. San Luis Potosí; type locality, San Luis Potosí. "Maguey manso"; planted for pulque.

104. *Agave tecta* Trel. Trans. Acad. St. Louis 23: 145. 1915.

Guatemala; type cultivated in hedges at Quezaltenango.

Leaves gray-green, very thick and broad, spreading, plicate above the middle, 50 cm. wide, 200 cm. long, with purple-chestnut or gray spine 5 to 7 mm. wide and 45 to 65 mm. long, and recurved triangular teeth 40 to 70 mm. apart and 8 mm. long; scape densely covered by broad appressed imbricate bracts. "Maguey."

105. *Agave atrovirens* Karw. in Salm-Dyck, Hort. Dyck. 7, 302. 1834.

Oaxaca and Puebla; type locality, Mount Tanga, near Cajonos, Oaxaca.

Leaves dark green, very thick, ascending at the end, contracted at base, 30 to 40 cm. wide, 200 to 250 or even 400 cm. long, with elongate conical gray spine, and triangular teeth about 10 mm. long from low widened bases between which the margin is nearly straight. "Maguey verde grande."

Very extensively planted on the plains of Apam, in many forms, and the principal source of the pulque industry of Mexico, amounting to something like five million pesos annually. The most prized of the many forms planted are "maguey manso" and "maguey manso fino." Some mezcal called "mezcal de pulque" is distilled from pulque.

No fewer than 32 forms from about Apam are enumerated and their spines and marginal teeth pictured by P. and I. Blasquez in a "Tratado del Maguey," published at Puebla; and half as many more are listed for the District of Cholula. These lists contain the following Latin names—hardly employed according to botanical usage: *Agave acerva*, *A. aspera*, *A. blanda*, *A. cereus*, *A. cervus*, *A. cholulensis*, *A. cinerea*, *A. citrulacea*, *A. crispa*, *A. echidne*, *A. elegans*, *A. flava*, *A. foliosa*, *A. funis*, *A. glauca*, *A. insulsa*, *A. lutea*, *A. lutea mayor*, *A. maculata*, *A. maximiliana*, *A. miniata*, *A. nigra*, *A. pallida*, *A. praestans*, *A. procera*, *A. profusa*, *A. rubra*, *A. silvestris*, *A. smaragdina*, *A. spinaceum*, *A. spinosa*, *A. spinosissima*, *A. superba*, *A. torosa*, *A. variegata*, *A. vesca*, *A. violacea*, and *A. viridis*. Aztec names, based on the word metl and not maguey, are given frequently to the forms recognized by planters.

Quite as disconcerting as to differentiate these, is any effort to recognize a number of the nominal species of this group based on young plants cultivated in European gardens a generation ago. A gray-leaved form closely allied to the green *atrovirens* but with leaves less narrowed at base is var. *salmiana* (*A. salmiana* Otto in Salm-Dyck, *Bonplandia* 7: 88. 1859), the scape of which is densely covered by long, somewhat spreading bracts, and of which the most glaucous extreme is *A. salmiana glauca* Becker (*Monatsschr. Kakteenk.* 8: 150). An exceptionally broad-leaved form is var. *cochlearis* (*A. cochlearis* Jacobi, *Abh. Schles. Ges. Vaterl. Cult.* 1871: 151. 1871), known in Sicilian gardens as *A. whitakeri*.

106. *Agave mapisaga* Trel., sp. nov.

Leaves green, slightly glaucous, narrow, rather straight but outcurving in age, 15 cm. wide, 175 to 250 cm. long, with rather short and recurved, chestnut or gray spine 4 to 8 mm. wide and 30 to 35 mm. long, and small but broad-based teeth 15 to 30 mm. apart and 1 to 2 mm. long, the intervening margin

nearly straight; inflorescence 8 meters tall or more; flowers green-yellow, 70 mm. long, the perianth segments equaling the tube.

Distrito Federal; type, in the herbarium of the Missouri Botanical Garden, from Tacubaya, *Trelease*.

"Maguey mapisaga"; planted for pulque.

107. *Agave schlechtendalii* Jacobi, Hamb. Gart. Zeit. 20: 555. 1864.

Region ?; type cultivated in Europe from seed said to have come from Sonora.

Known only from young plants rather closely comparable with those of *atrovirens*, but the gray leaves thinner and more outcurving.

108. *Agave bourgaei*¹ Trel., sp. nov.

Leaves gray, as much as 10 to 15 cm. wide and 150 cm. long, with conical gray spine 3 mm. wide and 30 mm. long, and triangular teeth some 10 mm. apart, the intervening margin more or less hollowed; panicle 3 meters tall or more; flowers 70 to 75 mm. long, the perianth segments nearly twice as long as the tube, the filaments inserted above the upper third of the tube.

Valley of Mexico; type, in the herbarium of the Museum of Natural History, Paris, collected on the lava fields, *Bourgeau* 1020; also *Bourgeau* 1399 and *Pringle* 6677.

109. *Agave mirabilis* Trel., sp. nov.

Leaves smooth, bright dark green when abraded, but densely white-pruinose, 40 cm. wide, 200 to 250 cm. long, often reflexed above the middle, with long gray spine 6 mm. wide and 80 mm. long, and triangular, more or less recurved teeth mostly 30 to 60 mm. apart and 10 to 15 mm. long, these abruptly dilated at base; inflorescence 8 to 10 meters tall, the thick (25 cm.) scape with very narrow reflexed bracts; flowers 70 to 80 mm. long, the tube and segments equal; capsules 25 mm. broad, 40 mm. long, not stipitate but shortly apiculate; seeds 6 to 7 mm. wide, 8 to 10 mm. long.

Puebla ?; type, in the herbarium of the Missouri Botanical Garden, from Las Vigas, *Trelease*.

"Maguey blanco"; planted in hedges.

110. *Agave franzosini* Baker, Kew Bull. Misc. Inf. 1892: 3. 1892.

Locality ?; type cultivated on the Riviera.

Leaves very rough, glaucous, often recurving, 20 to 30 cm. wide, 200 to 300 cm. long, with stout decurrent conical smoky-gray grooved spine 10 mm. wide and 55 mm. long, and abruptly broadly triangular teeth 30 to 70 mm. apart and 5 to 10 mm. long, these often from fleshy prominences; scape green.

111. *Agave marmorata* Roezl, Belg. Hort. 33: 238. 1883.

Agave todaroi Baker, Amaryll. 195. 1888.

Puebla; type locality unquestionably the Cerro Colorado near Tehuacán.

Leaves very rough, gray, green-zoned, 25 to 40 cm. wide, 100 to 150 cm. long, with short, stout, curved, dull red spine 5 to 15 mm. wide and 20 mm. long, and large, rough, rusty brown teeth 15 to 40 mm. apart and 5 to 10 mm. long, sometimes in pairs, from fleshy prominences. "Maguey curandero," or "pitsomel."

¹ E. Bourgeau was a member of the French Scientific Commission of 1865-66. He had had previously wide experience as a botanical collector in the Old World, and his Mexican collection was an extensive one. It was gathered chiefly in the Valley of Mexico and in Veracruz. A large number of his specimens are in the U. S. National Herbarium. He died at Paris in 1877.

112. *Agave abrupta* Trel., sp. nov.

Leaves straight or somewhat upcurved, 15 to 30 cm. wide, 150 to 175 cm. long, very glaucous, very concave and deeply plicate toward the abrupt end, with heavy, conical, somewhat recurved spine 8 mm. wide and 25 mm. long, and small, variously curved, triangular teeth 15 to 30 or 40 mm. apart and only about 2 mm. long, but from conspicuous fleshy or horny prominences; inflorescence 7 to 8 meters tall.

Jalisco; type, in the herbarium of the Missouri Botanical Garden, from La Barca, *Trelease*, in 1901; cultivated in hedges.

113. *Agave wercklei* Weber, sp. nov.

Acaulescent; leaves glaucous, bluish or white, abruptly upcurved above the base, 15 cm. wide, 125 to 200 cm. long, with somewhat recurved, grooved, conical, brown or gray spine 4 to 6 mm. wide and 25 to 35 mm. long, and triangular straight brown teeth 15 to 25 mm. apart and 3 mm. long, these sometimes on fleshy prominences or with the intervening margin hollowed; inflorescence 8 meters tall; flowers chrome-yellow, pumpkin-scented, 60 mm. long, the perianth segments twice as long as the tube; capsules 15 mm. broad and 45 mm. long; seeds 4 mm. wide and 6 mm. long; bulbiferous.

Costa Rica; type, in the herbarium of the Missouri Botanical Garden, cultivated at San José, *Alfaro & Tonduz* 17553.

Sometimes cultivated under the name of *A. costaricensis*.

114. *Agave expansa* Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1868: 151. 1868.

Region ?; type cultivated in Europe.

Leaves gray, oblong, uniformly spreading, straight, acute, concave, about 20 cm. wide and 200 cm. long, with brown or gray, straight or slightly recurved, grooved spine 8 to 10 mm. wide and 25 to 30 mm. long, this acutely pointed from the very base, and with heavily triangular teeth 30 to 60 mm. apart and 5 to 8 mm. long, these with dilated bases, often from fleshy hummocks.

Extensively planted in southern Arizona (Tucson) and California (Los Angeles) as *A. americana*, from which its unreflexed leaves and more acutely pointed, somewhat prismatic spine distinguish it.

115. *Agave americana* L. Sp. Pl. 323. 1753.

Native ?; type cultivated in Europe, probably originally from a Mexican hedge-row; established freely about the Mediterranean.

Leaves gray, acute, outcurved or reflexed at end, 15 to 20 cm. wide, 200 to 250 cm. long, with brown, somewhat curved, conical spine 5 mm. wide and 25 mm. long, and triangular, more or less recurved teeth 15 to 50 mm. apart and about 5 mm. long, on fleshy prominences.

It is this plant, cultivated in the Azores, etc., from which the "pita" used in the drawn work of those islands is procured. Early records of the economic uses of "*Agave americana*" and "*A. mexicana*" commonly refer to other species, such as *A. fourcroydes* and *A. atrovirens*.

116. *Agave picta* Salm-Dyck, Bonplandia 7: 88. 1859.

Native ?; type cultivated in Europe.

Equally large and very similar, the darker and clearer green leaves 17 to 18 cm. wide, 225 cm. long, with a marginal band of yellow (as in one form, var. *marginata*, of the preceding), the spine straight and needle-shaped. "Maguey pinto," "maguey listado."

Much planted. On the Mediterranean coast seedlings are said to be invariably green (var. *viridis* Trel. in Bailey, Stand. Cycl. Hort. 1: 235. 1914; *A. ingens* Berger, Hort. Mortolensis. 12, 360. 1912), and no doubt correspond to the normal type of foliage.

117. *Agave asperrima* Jacobi, Hamb. Gart. Zeit. 20: 561. 1864.

Texas, on the lower Rio Grande; and adjacent Coahuila, Zacatecas, and Durango; type cultivated in Europe, supposedly from Texas.

Leaves dull glaucous green, rough, 15 to 20 cm. wide, 120 cm. long, with decurrent brown spine 3 to 4 or 6 mm. wide and 30 to 55 mm. long, and variously curved triangular teeth 20 to 30 mm. apart and 7 to 10 mm. long, these saddling and sometimes confluent over high fleshy hummocks.

Seeds were distributed to gardens by Engelmann as *A. longispina*.

118. *Agave palmeri*¹ Engelm. Trans. Acad. St. Louis 3: 319. 1875.

New Mexico, Arizona, and adjacent Sonora; type locality, mountains of southern Arizona.

Leaves blue-green, smooth, varying much in shape and attenuation, ascending or outcurved or spreading, about 8 to 10 cm. wide and 45 to 70 cm. long, with nearly straight, needle-shaped, somewhat decurrent, garnet or purplish, finally fading spine 2 to 4 mm. wide and 20 to 40 mm. long, and variously straight or curved, very unequal, triangular teeth commonly 10 to 20 mm. apart and 3 to 5 mm. long, the intervening margin straight or much hollowed.

119. *Agave flexispina* Trel., sp. nov.

Leaves green or bluish, smooth, regularly spreading, deeply concave, 6 cm. wide and 12 cm. long (or much more?), with flexuous spine 5 mm. wide and 30 mm. long, this very openly flat-grooved, with acute margin at base, the slender unequal teeth scarcely 10 mm. apart and often nearly 10 mm. long, the margin between them sharply incised; flowers nearly sessile, agreeing with those of the last preceding species.

Durango; type, in the herbarium of the Missouri Botanical Garden, from Tepehuanes, *Palmer* 330, in 1906.

120. *Agave dasylirioides* Jacobi & Bouché, Hamb. Gart. Zeit. 21: 344. 1865.

Guatemala?; type cultivated in Europe; Berlin Herbarium material referring the collection to the igneous mountains near Quezaltenango, *Warscewicz*, or southern Mexico.

Leaves outcurved and then ascending, thin and flat, light green, 10 to 15 mm. wide, 25 to 30 cm. long, unarmed except for the small flattened brown spine; spike 1.5 to 2 meters tall, recurving.

121. *Agave intrepida* Greenm. Proc. Amer. Acad. 34: 567. 1899.

Morelos; type locality, El Parque, above Cuernavaca.

Leaves gray, spreading, 2 cm. wide, 50 cm. long, with somewhat flexuous needle-like brown spine 1 to 2 mm. wide and 10 mm. long, the margin almost microscopically denticulate; spike 1 to 1.5 meters tall, commonly recurving.

122. *Agave bracteosa* S. Wats. Gard. Chron. n. ser. 18: 776. 1882.

Nuevo León; type locality, near Monterrey.

Leaves gray, rather soft, openly ascending with recurved tips, 4 cm. wide, 45 cm. long, without spine, the margin minutely denticulate; inflorescence 1 to 2 meters tall, the scape densely covered with outcurved narrow bracts; flowers 30

¹ The species is named in honor of Edward Palmer (1831–1911), an Englishman by birth, who was for most of his life a resident of the United States. He spent many years in Mexico in botanical exploration, and his collections are surpassed in extent, probably, by those of no other collector. His work in Mexico began about 1870 and was continued until 1910. He collected chiefly in the northern states, but some of his plants were obtained as far south as Guerrero and Veracruz. His earlier collections were the basis of special reports by Gray and Watson, and many new species have been based upon his specimens.

mm. long, the marcescent perianth segments about equaling the tube. "Amole de Castilla."

123. *Agave yuccaefolia* DC. in Red. Liliac. 6. *pl.* 328, 329. 1812.

Region ?; type cultivated in Europe; said to be from Real del Monte, Hidalgo.

Trunk short; leaves glaucous, rather soft, recurved, 2.5 cm. wide, 60 cm. long, long-tapering, with minute slender spine, the margin minutely denticulate; inflorescence 3 meters tall; flowers 35 mm. long, the perianth segments almost distinct.

124. *Agave eduardi* Trel., sp. nov.

Habit ?; leaves glaucous, 6 cm. wide, 100 cm. long, long-attenuate, with slender brown spine about 1 mm. wide and 10 mm. long, and entire margin; scape covered by long narrow bracts; pedicels connate into a peduncle some 15 mm. long; flowers yellow, 40 mm. long; ovary flask-shaped, 20 mm. long, the tube narrow, about one-third as long as the segments, the filaments inserted in its throat; capsules scarcely glaucous, 8 mm. broad, 20 mm. long.

Durango; type, in the herbarium of the Missouri Botanical Garden, from San Ramón, *Palmer* 135, in 1906.

125. *Agave houghii* Hort.

A similar, if separable, plant, of the barranca of the Río Blanco, near Guadalajara, Jalisco, with stronger spine and smooth margin.

126. *Agave attenuata* Salm-Dyck, Hort. Dyck. 7, 303. 1834.

Agave glaucescens Hook. in Curtis's Bot. Mag. III. 18: *pl.* 5333. 1862.

Hidalgo; type cultivated in Europe (from about Real del Monte ?).

Trunk 1 to 1.5 meters tall, sometimes prostrate; leaves 15 to 20 cm. wide, 60 to 100 cm. long, glaucous, without either spine or prickles; spike 1.5 to 3 meters tall, often recurving, sometimes very bulbiferous in age.

127. *Agave ellemetiana* Jacobi, Hamb. Gart. Zeit. 21: 457. 1864.

Veracruz ?; type cultivated in Europe (from about Jalapa ?).

Nearly acaulescent; leaves 15 cm. wide and 60 cm. long or more, glaucous, without either spine or prickles; spike 1.5 to 3 meters tall, straight.

128. *Agave pruinosa* Lem. in Jacobi, Hamb. Gart. Zeit. 21: 449. 1864.

Agave debaryana Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1869: 164. 1869.

Agave kellockii Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1869: 165. 1869.

Michoacán ?; cultivated in Europe; the Volcán Jorullo is given as the source of *A. debaryana*.

Nearly acaulescent; very similar to the preceding, but the leaves with close-set minute denticles.

129. *Agave vilmoriniana* Berger, Repert. Nov. Sp. Fedde 12: 503. 1913.

Jalisco ?; cultivated in Europe, introduced by Diguët.

Leaves green or bluish or glaucous, softly fleshy, narrowly linear-lanceolate, acuminate, with slender, subulate, shortly decurrent spine 3 to 4 mm. long, the margin without teeth.

130. *Agave pedunculifera* Trel., sp. nov.

Habit ?; leaves 12 to 15 cm. wide, 65 cm. long, thin, glaucous, oblanceolate, acuminate, with dull red-brown needle-shaped spine 2 mm. wide and 15 mm. long, the margin with minute denticles about 2 mm. apart; inflorescence small, the pedicels aggregated on short slender forking peduncles 15 to 20 mm. long; capsules fusiform, 5 to 8 mm. broad, 20 mm. long; seeds dull, very small, 2 mm. wide, 2.5 mm. long.

Sinaloa; type, in the U. S. National Herbarium, from Colomas, *Rose* 1713.

131. *Agave celsii* Hook. in Curtis's Bot. Mag. III. 12: pl. 4934. 1856.? *Agave brauniana* Jacobi, Hamb. Gart. Zeit. 22: 216. 1866.? *Agave thompsoniana* Jacobi, Hamb. Gart. Zeit. 22: 262. 1866.? *Agave smithiana* Jacobi, Hamb. Gart. Zeit. 22: 263. 1866.? *Agave humboldtiana* Jacobi, Hamb. Gart. Zeit. 22: 264. 1866.

San Luis Potosí; type cultivated in Europe from an unrecorded locality.

Leaves glaucous, 10 cm. wide, 30 to 45 cm. long, with slender weak spine scarcely 1 mm. wide and 5 to 10 mm. long, and very irregular, close-set or confluent, green teeth 5 to 10 mm. apart and 2 to 3 mm. long, a little horny at the tip only.

The four synonyms, based on specimens cultivated from about San Luis Potosí, seem to refer to forms of this species with greener foliage; and *A. rupicola* Regel, *A. lamprochlora* Jacobi, and *A. perlucida* Jacobi differ little.

132. *Agave micracantha* Salm-Dyck, Bonplandia 7: 93. 1859.

Hidalgo or Veracruz?; type cultivated in Europe from an unrecorded locality.

Leaves gray-green, 8 to 12 cm. wide, 40 to 60 cm. long, with slender weak spine and small close-set dark teeth, these sometimes almost suppressed.

Nominal but closely related species cultivated in gardens from unrecorded localities and evidently of this alliance, are *A. albicans* Jacobi, *A. chloracantha* Salm-Dyck, *A. bernhardii* Jacobi, *A. bouchei* Jacobi, *A. haseloffii* Jacobi, ? *A. martiana* Koch, *A. mitis* Salm, *A. muilmanni* Jacobi, *A. oblongata* Jacobi; and *A. wallisii* Jacobi, said to be from Colombia.

133. *Agave pendula* Schnitts. Zeitschr. Gartenb. Ver. Darmstadt 6: 7. 1857.*Agave aloina* Koch, Wochenschr. Ver. Beförd. Gartenb. 3: 37. 1860.*Agave sartorii* Koch, Wochenschr. Ver. Beförd. Gartenb. 3: 37. 1860.*Agave noackii* Jacobi, Hamb. Gart. Zeit. 22: 261. 1866.*Agave rubrocincta* Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1868: 153. 1868.*Agave caespitosa* Tod. Hort. Panorm. 1: 32. 1876.

Veracruz; type cultivated in Europe, but collected at El Mirador, Huatusco.

More or less caulescent, the trunk sometimes 60 cm. tall; leaves deep green with paler median stripe above, about 8 cm. wide and 100 cm. long, with scarcely pungent end and minute brown teeth 5 mm. apart and 1 mm. long; inflorescence nodding.

134. *Agave polyacantha* Haw. Rev. Pl. Succ. 35. 1821.*Agave densiflora* Hook. in Curtis's Bot. Mag. III. 13: pl. 5006. 1857.? *Agave chiapensis* Jacobi, Hamb. Gart. Zeit. 22: 213. 1865.*Agave ottonis* Jacobi, Hamb. Gart. Zeit. 22: 320. 1865.*Agave salmdyckii* Baker, Gard. Chron. n. ser. 8: 490. 1877.

Veracruz (type cultivated in Europe, from an unspecified source, about 1800) and Chiapas ?.

Leaves green though transiently glaucous, 5 to 15 cm. wide, 25 to 60 or 100 cm. long, with dark firm spine 2 to 3 mm. wide and 15 mm. long, and rather small close-set brown teeth 3 to 5 or 10 mm. apart and 2 to 3 mm. long; spike sometimes budding at tip and base.

Species evidently of this group, but of unrecorded habitat, are *A. botterii* Baker, *A. decaisneana* Jacobi, *A. engelmanni* Trel., *A. galeottei* Baker, *A. guedeneyri* Houll., and *A. warelliana* Baker.

Other less closely placed garden aloid species, supposedly from Mexico, are *A. ehrenbergii* Jacobi, *A. goeppertiana* Jacobi, *A. horizontalis* Jacobi, *A. kewensis* Jacobi, *A. lindleyi* Jacobi, *A. melanacantha* Lem., *A. regia* Baker, *A. rudis* Lem., and *A. rupicola* Regel.

135. *Agave xalapensis* Roezl in Jacobi, Hamb. Gart. Zeit. 21: 61. 1864.

Agave uncinata Jacobi, Hamb. Gart. Zeit. 21: 104. 1864.

Veracruz above Cruz Verde, Las Vigas; type cultivated in Europe, from unrecorded locality.

Leaves green or glaucous, 5 to 12 cm. wide, 25 to 75 cm. long, with dark firm brown spine 3 to 5 mm. wide and 5 to 30 mm. long, and red or blackish strong flat teeth 5 to 7 mm. apart and 5 mm. long; spike often budding at tip.

136. *Agave macrantha* Tod. Hort. Panorm. 2: 11. 1879.

Region ?; type cultivated in Europe.

Leaves spatulate-obovate, uncurved, glaucous, as much as 12 cm. wide and 30 to 50 cm. long, with chestnut spine 8 mm. wide and 20 to 30 mm. long, and firm brown teeth 6 to 15 mm. apart and 2 to 3 mm. long; flowers large for the group, about 80 mm. long, the yellow or bronzed perianth segments nearly 15 mm. wide and twice as long as the tube.

137. *Agave pumila* Baker, Amaryll. 172. 1888.

Region ?; type cultivated in Europe.

Very small (scarcely 5 cm. in diameter), with few round fleshy concave leaves, these dark-lined on the back and with soft whitish spine, and teeth somewhat connected by a similar margin.

The smallest of all agaves. Sometimes cultivated under the name *A. simoni* or *A. simonis*.

138. *Agave lecheguilla* Torr. U. S. & Mex. Bound. Bot. 213. 1859.

Agave poselgeri Salm-Dyck, Bonplandia 7: 92. 1859.

Agave multineata Baker, Amaryll. 168. 1888.

? *Agave nissoni* Baker, Gard. Chron. 1874: 529. 1874.

Texas and Chihuahua to Tamaulipas and Zacatecas, in a variety of forms; type locality, western Texas.

Leaves falcately ascending, green or bluish, the upper face often with a paler stripe and the back with narrow green lines, 2 to 3 cm. wide, 40 to 60 cm. long, with brown or graying spine 4 mm. wide and 30 to 50 mm. long, and mostly gently recurved triangular teeth 20 to 40 mm. apart and 3 to 7 mm. long, joined by a nearly straight detachable horny border scarcely 1 mm. wide. With flowers in short compact glomerules it is f. *glomeruliflora* Engelm. (*A. glomeruliflora* Berger, Hort. Mortol. 12. 1911).

"Lechuguilla"; much used for cordage, brushes, bagging, etc., and exported as "ixtle."

139. *Agave funkiana* Koch & Bouché, Wochenschr. Ver. Beförd. Gartenb. 3: 47. 1860.

Nuevo León and Tamaulipas; type cultivated in Europe, without recorded locality.

Leaves scarcely falcate, ascending, light green or gray-green, slightly glaucous, with pale ventral stripe and dark-lined back, 3 to 5 cm. wide, 50 to 75 cm. long, with brown-tipped gray spine 3 mm. wide and 15 to 25 mm. long, and mostly gently recurved triangular teeth 20 to 50 mm. apart and 5 mm. long, joined by a nearly straight or slightly concave detachable border about 1 mm. wide.

"Ixtle de Jaumave"; of better quality than the last preceding species.

140. *Agave lophantha* Schiede, Linnaea 4: 581. 1829.

Agave heteracantha Zucc. Act. Acad. Caes. Leop. Carol. 16³: 675. 1833.

Veracruz; type locality, Malpais de Naulingo.

Leaves uniformly spreading, apple-green or dark blue-green, sometimes with pale ventral stripe and dark dorsal lines, 3 to 5 cm. wide, 30 to 60 cm. long,

with gray-brown spine 3 mm. wide and 20 mm. long, and conspicuously unequal and variously curved, narrowly triangular teeth 20 to 30 mm. apart and 3 to 7 mm. long.

When the median stripe is most pronounced it is var. *univittata* (*A. univittata* Haw. Phil. Mag. 10: 415. 1831); but the marking is not confined to this species.

141. *Agave horrida* Jacobi, Hamb. Gart. Zeit. 20: 546. 1864.

Morelos, abundant above Cuernavaca on the lava fields; type cultivated in Europe without indication of locality.

Leaves uniformly spreading, rather thin, green, without ventral stripe or dorsal lines, 6 to 7 cm. wide, 30 cm. long, with red-brown graying spine 3 mm. wide and 20 to 40 mm. long, and large flat hooked teeth 15 to 30 mm. apart and 5 to 15 mm. long, the connecting undulate horny border 2 to 3 mm. wide.

142. *Agave roezliana* Baker, Gard. Chron. n. ser. 7: 528. 1877.

Agave horrida laevior Jacobi, Wochenschr. Ver. Beförd. Gartenb. 1869: 178. 1869.

Puebla; type cultivated in Europe, but now known to have come from Tehuacán.

Leaves uniformly spreading, thick, green, sometimes with paler ventral stripe but not dark-lined on the back, 5 to 10 cm. wide, 30 to 40 cm. long, with brown or fading spine 3 mm. wide and 20 to 25 mm. long, and heavily triangular teeth 10 to 15 mm. apart and 6 to 20 mm. long, the nearly straight horny intervening margin 1 to 3 mm. wide.

Plants with very short and broad leaves and exceptionally large teeth constitute var. *nana* (*A. horrida nana* Laurentius, Cat. 1869: 12. 1869; *A. gilbeyi horrida* Baker, Gard. Chron. 1873: 1305. 1873); and a form with elongate, narrowly oblong leaves and often reduced teeth is var. *peacockii* (*A. peacockii* Croucher, Gard. Chron. 1873: 1400. 1873).

143. *Agave ghiesbrechtii* Koch, Wochenschr. Ver. Beförd. Gartenb. 5: 83. 1862.

Region ?; type cultivated in Europe.

Leaves upcurving, concave, fleshy, grayish green or bluish green, without distinct ventral stripe or dorsal lines, 5 to 7 cm. wide, 18 to 20 cm. long, with spine scarcely 15 mm. long, and gray, triangular, nearly straight teeth scarcely 10 mm. apart and 5 mm. long, the connecting horny border under 2 mm. wide.

The form with shorter, more heavily bordered leaves is *A. rohanii* Jacobi (Hamb. Gart. Zeit. 20: 545. 1864); and that with elongate, narrowly bordered leaves is *A. leguayiana* J. Verschaffelt (Pr. Cour. 1868: 2. 1868).

144. *Agave obscura* Schiede, Linnaea 18: 413. 1844.

Agave grandidentata Jacobi, Hamb. Gart. Zeit. 22: 114. 1866.

Agave horrida micracantha Baker, Gard. Chron. n. ser. 7: 621. 1877.

Veracruz; common on the lava beds about Limón; type locality, lava fields of La Joya.

Densely subglobose; leaves uniformly spreading, gray, 10 cm. wide, 30 cm. long, with gray spine 3 to 8 mm. wide and 25 to 30 mm. long, and triangular, straight or variously curved teeth 5 to 10 mm. apart and 3 to 5 mm. long, the intervening margin 1 to 2 mm. wide. "Lechuguilla."

145. *Agave triangularis* Jacobi, Wochenschr. Ver. Beförd. Gartenb. 1869: 178. 1869.

• Puebla; type cultivated in Europe from near Tehuacán.

Leaves ascending, thick and very rigid, dull gray-green, without ventral stripe or dorsal lines, about 5 cm. wide and 25 cm. long, with gray spine 3 mm. wide and 20 to 25 mm. long, and large, gently curved teeth 15 to 25 mm. apart and 5 to 15 mm. long, the nearly straight intervening margin 1 to 2 mm. wide.

With numerous but small teeth it is var. *rigidissima* (*A. rigidissima* Jacobi, Wochenschr. Ver. Beförd. Gartenb. 1869: 179. 1869); and with few and

minute or no teeth it is var. *subintegra* (*A. kerchovei inermis* Baker, Gard. Chron. n. ser. 7: 527. 1877).

146. *Agave potrerana* Trel., sp. nov.

Leaves falcately ascending, triangular, rigid, transiently glaucous, without ventral stripe or dorsal lines, 5 to 6 cm. wide, 30 cm. long, with gray spine 3 mm. wide and 25 mm. long, and narrowly triangular, rather straight teeth commonly 10 to 15 mm. apart and 3 to 4 mm. long, the nearly straight connecting horny margin about 1 mm. wide; flowers about 50 mm. long, the perianth segments and tube about equal; capsules oblong-pyriform, 10 to 12 mm. broad, 30 to 35 mm. long; seeds 3 mm. wide, 4 mm. long.

Chihuahua; type, in herbarium of the Missouri Botanical Garden, from Potrero Peak, *Pringle* 302.

147. *Agave kerchovei* Lem. Ill. Hort. 11: 64. 1864.

Puebla ?; type cultivated in Europe.

Leaves uniformly spreading or ascending, triangular, rigid, gray-green, 7 to 10 cm. wide, 40 to 50 cm. long, with gray spine about 5 mm. wide and 50 to 70 mm. long, and triangular teeth 30 to 50 or even 100 mm. apart and 10 to 20 mm. long, each sometimes with an adjoining denticle, the straight connecting margin 2 to 3 mm. wide; spike extremely compact.

148. *Agave inopinabilis* Trel., sp. nov.

Leaves falcately spreading or ascending, oblong or gradually narrowed from base to point, gray-green or bluish-green, somewhat glaucous when young, 4 to 6 cm. wide, 100 cm. long, with dull brown or fading spine 5 mm. wide and 50 mm. long, and large, flat, brown, hazel-colored, or dead-gray, triangular, often doubled teeth commonly 50 to 100 mm. apart and 10 to 30 mm. long, the connecting margin 2 to 4 mm. wide; capsules oblong, 8 to 12 mm. wide, 12 to 30 mm. long; inflorescence rather lax; flowers claret-colored, 35 mm. long, the perianth segments almost distinct; seeds 2 mm. wide, 4 mm. long.

Puebla; type, in the herbarium of the Missouri Botanical Garden, from Tehuacán, *Trelease*, in 1903.

149. *Agave convallis* Trel., sp. nov.

Leaves uniformly spreading, light green, 6 cm. wide, 50 cm. long, with gray spine 4 mm. wide and 25 mm. long, and heavily triangular, brown-tipped, somewhat recurved teeth 50 to 60 mm. apart and 6 to 10 mm. long, the nearly straight intervening border about 1 or 2 mm. wide but lenticularly widened beneath each tooth; inflorescence 3 to 4 meters tall; flowers creamy or bronzed, 35 to 40 mm. long, with very short tube.

Oaxaca; type, in herbarium of the Missouri Botanical Garden, from El Parián, *Trelease* 4, in 1905.

150. *Agave expatriata* Rose, Rep. Mo. Bot. Gard. 11: 82. 1900.

Region ?; type cultivated at Washington.

Leaves uniformly spreading, light green, 6 to 9 cm. wide, 75 cm. long, with slender spine 15 to 25 mm. long, and triangular, unequal, variously curved teeth 10 to 20 mm. apart and 5 to 10 mm. long, the intervening straight border about 1 mm. wide.

151. *Agave dissimulans* Trel., sp. nov.

Leaves widely and flaccidly spreading or recurved, glaucous, more or less tinged with red, 7 cm. wide, 80 to 100 cm. long, with gray spine about 5 mm. wide and 50 mm. long, and heavily triangular, somewhat curved teeth 15 to 30 mm. apart and 6 to 15 mm. long, the intervening straight border 1 or 2 mm. wide; inflorescence 2 to 3 meters tall; flowers whitish, glaucous, 30 mm. long, with very short tube; capsules 12 mm. broad, 20 to 25 mm. long.

Oaxaca; type, in the herbarium of the Missouri Botanical Garden, from Mexia, *Trelease*.

152. *Agave angustiarum* Trel., sp. nov.

Leaves openly spreading, rather thin, glaucous, 5 to 13 cm. wide, 80 to 100 cm. long, with very slender spine 25 to 35 mm. long, and rather slender and curved teeth 15 to 40 mm. apart and 2 to 6 mm. long, the nearly straight intervening border scarcely over 1 mm. wide; inflorescence 1.5 to 4 meters tall; flowers glaucous greenish white, 35 to 40 mm. long, with very short tube; capsules 12 to 15 mm. broad, 25 mm. long; seeds 2 to 3 mm. wide, 3 to 5 mm. long.

Guerrero; type, in the herbarium of the Missouri Botanical Garden, from the canyon between Naranjo and Los Amates, *Trelease*.

153. *Agave xylonacantha* Salm-Dyck, Bonplandia 7: 92. 1859.

Agave amurensis Jacobi, Hamb. Gart. Zeit. 20: 548. 1864.

Agave kochii Jacobi, Hamb. Gart. Zeit. 22: 117. 1866.

Hidalgo and San Luis Potosí; type cultivated in Europe, said to be from San Luis Potosí, but later records include Ixmiquilpan and Real del Monte.

Leaves loosely spreading, rather thin, undulate or contorted, dull, mostly grayish green, rough, the back with darker lines, 5 to 12 cm. wide, 30 to 60 cm. long, with flexuous gray spine about 5 mm. wide and 40 to 50 mm. long, and large, triangular or confluent broad and very irregular teeth 15 to 40 mm. apart, these 10 to 15 mm. long, and nearly as broad over green prominences between which the nearly straight connecting horny margin is 1 to 2 mm. wide.

154. *Agave washingtonensis* Baker & Rose, Rep. Mo. Bot. Gard. 9: 121. 1898.

Region ?; type cultivated at Washington.

Leaves spreading, dark green, smooth, 7 to 10 cm. wide, 75 cm. long, with very short slender spine and small mammaeform teeth scarcely 10 mm. apart and 2 mm. long, these concave at base and connected by a very narrow horny border.

155. *Agave splendens* Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1870: 147. 1870.

Region ?; type cultivated in Europe.

Leaves uniformly spreading, often with axillary branches, dark blue-green, glaucous when young, smooth, somewhat pale-banded above and dark-lined beneath, 4 to 5 cm. wide, 35 to 60 cm. long or more, with slender, more or less flexuous, gray spine 30 mm. long, and unequal, often doubled, variously curved, triangular teeth 20 to 40 mm. apart and 6 to 12 mm. long, these concave at base and connected by a moderately heavy border.

156. *Agave vittata* Regel, Gartenflora 7: 313. 1858.

Agave haynaldi Tod. Hort. Panorm. 1: 88. 1876.

Agave toneliana Baker, Gard. Chron. 1881: 362. 1881.

Nuevo León; type cultivated in Europe, probably from the mountains about Monterrey.

Leaves spreading along a distinct short trunk, dark green, often with pale ventral stripe, 6 to 7 cm. wide, 70 cm. long, with slender brown-tipped spine 20 mm. long, and variously curved triangular teeth 25 to 50 mm. apart and 4 to 7 mm. long, these on more or less oblique fleshy prominences, the very narrow connecting horny border frequently absent from the middle of the leaf.

157. *Agave victoriae-reginae* Moore, Gard. Chron. n. ser. 4: 484. 1875.

Agave consideranti Carr. Rev. Hort. 1875: 429. 1875.

Nuevo León, Coahuila, and Durango; type locality near Monterrey, Nuevo León.

Leaves very many, very hard and crowded in a round cluster, dark green, 4 to 6 cm. wide, 15 to 20 cm. long, acutely 3-sided, with 1 or 3 black apical

spines 5 to 10 mm. long, these decurrent into marginal and usually dorsal detachable horny borders.

"Noa"; the short but strong fiber used for bundles.

With fewer leaves, and consequently forming a less compact plant, it is f. *nickelsi* (*A. nickelsi* Rol. Goss. Rev. Hort. 1895: 579. 1895). "Pintillo."

158. *Agave parviflora* Torr. U. S. & Mex. Bound. Bot. 214. 1859.

Sonora; type locality, Sierra del Pajarito. Also in adjacent Arizona.

Small and globose; leaves ascending, numerous, green, dotted with gray, scarcely 1 cm. wide and 4 to 6 cm. long, denticulate at the base, elsewhere bearing a few coarse outcurved marginal threads, the straight flattened spine 1 mm. wide and 5 mm. long.

159. *Agave toumeyana* Trel., sp. nov.

Rather larger, laxer, and fewer-leaved than the preceding; leaves 1 cm. wide, 5 to 10 cm. long, with flat brown spine scarcely 1 mm. wide and 5 mm. long, the margin minutely hyaline-denticulate below the middle, at length bearing numerous long slender white marginal threads; flowers 15 mm. long, with short tube; capsules 7 mm. broad, 12 mm. long; seeds 2 mm. wide, 3 mm. long.

Southern Arizona; type, in herbarium of the Missouri Botanical Garden, from Pinal Mountains, *Toumey* in 1892; also in adjacent Sonora ?

160. *Agave hartmani*¹ S. Wats. Proc. Amer. Acad. 26: 156. 1891.

Eastern Sonora (type cultivated at Cambridge, Massachusetts) and adjacent Chihuahua.

Resembling *A. parviflora*; leaves falcate, with concave-based spine and finer marginal threads.

161. *Agave mulfordiana* Trel., sp. nov.

Agave schottii serrulata Mulford, Rep. Mo. Bot. Gard. 7: 73. 1896.

Dimensions and aspect of the following and with similar marginal threads, but the base denticulate.

Southern Arizona; type, in the herbarium of the Missouri Botanical Garden, from Rincon Mountains, *Toumey* in 1894; also adjacent Sonora ?

162. *Agave schottii* Engelm. Trans. Acad. St. Louis 3: 305. 1875.

Agave geminiflora sonorae Torr. U. S. & Mex. Bound. Bot. 214. 1859.

Arizona (type locality, Sierra del Pajarito) and adjacent Sonora.

Leaves falcately ascending, rather few, green, scarcely 1 cm. wide and 15 to 30 cm. long, untoothed, with brown or golden spine 1 mm. wide and 5 mm. long, and a few very thin outcurving marginal threads.

"Amole"; the crown used as a substitute for soap.

Without marginal threads it is var. *atricha*, the type cultivated at St. Louis, without record.

163. *Agave schidigera* Lem. Ill. Hort. 9: pl. 330. 1860.

Agave filifera adornata Scheidw. Wochenschr. Ver. Beförd. Gartenb. 4: 287. 1861.

Littaea roezlii Fonville, Rev. Hort. 1862: 39. 1862.

Agave vestita S. Wats. Proc. Amer. Acad. 25: 163. 1890.

Michoacán (type cultivated, from about the Volcán Jorullo), Zacatecas, Mexico, and Jalisco (the type of *A. vestita*, with more prismatic threads, from about Guadalajara).

¹ C. V. Hartman and F. E. Lloyd made an extensive collection of plants in Chihuahua and Sonora from 1890 to 1893, while accompanying Carl Lumholtz in his archaeological explorations. The collection was reported upon by Robinson and Fernald (Proc. Amer. Acad. 30: 114-123. 1894). A set of the plants is in the U. S. National Herbarium.

Leaves green or purplish, uniformly spreading, 1.5 to 2 cm. wide, mostly 30 cm. long, not toothed, with rather numerous coarse and shaving-like marginal threads sometimes 2 mm. wide, the spine 5 to 10 mm. long or almost suppressed.

164. *Agave angustissima* Engelm. Trans. Acad. St. Louis **3**: 306. 1875.

Tepic (the type from "Ocotillo, direction of Tepic") and Sinaloa.

Leaves green or almost red, numerous, uniformly spreading or falcate, 1 to 1.5 cm. wide, 30 to 60 cm. long, not toothed, with numerous long, slender, mostly loosely coiled marginal threads and flattened spine 5 mm. long. "Palmilla."

With leaves scarcely 30 cm. long it is var. *ortgiesiana* (*A. schidigera ortgiesiana* Baker, Gard. Chron. n. ser. **7**: 303. 1877; *A. ortgiesiana* Roezl, Belg. Hort. **1880**: 52. 1880; *A. maritima* Hort.); common on the seaside rocks about Manzanillo, Colima.

165. *Agave filifera* Salm-Dyck, Hort. Dyck. 309. 1834.

Hidalgo and San Luis Potosí; type cultivated in Europe without locality.

Leaves clear green to dark green or purplish, rather numerous, uniformly spreading or somewhat upcurved, 2.5 to 4 cm. wide, 20 to 25 cm. long, not toothed, with numerous slender, recurved or coiled marginal threads, the openly grooved spine 15 to 20 mm. long. "Amole," "lechuguilla mansa."

With leaves twice as long, without increase in width, those of suckers commonly denticulate, it is var. *filamentosa* Baker (Gard. Chron. n. ser. **7**: 303. 1877; *A. filamentosa* Salm-Dyck, Bonplandia **7**: 94. 1859). A very compact form somewhat resembling *A. parviflora*, with leaves scarcely 10 cm. long, is var. *compacta* J. Verschaffelt (Cat. **9**: 41. 1865-6; *A. perplexans* Trel. in Bailey, Stand. Cycl. Hort. **1**: 238. 1914).

166. *Agave geminiflora* Gawl. Journ. Sci. **2: 88. 1817.**

Bonaparteia juncea Haw. Syn. Pl. Succ. 68. 1812.

Yucca boscii Desf. Tabl. Écol. Bot. Mus. ed. 2. 28, 274. 1815, name only.

Littaea geminiflora Tagliabue, Bibl. Ital. **1**: 100. 1816.

Bonaparteia flagelliformis Henckel, Flora **3**: 45. 1820.

Dracaena filamentosa Scanagatta in Schult. Syst. Veg. 729. 1829.

Dracaena boscii Steud. Nom. Bot. ed. 2. **1**: 528. 1840.

Agave geminiflora filamentosa Hook. in Curtis's Bot. Mag. **82**: under pl. 4950. 1856.

Region ?; type cultivated in Europe; sometimes, but doubtless erroneously, thought to be South American.

Leaves of various shades of green, very numerous, gracefully spreading, recurved in age, 5 mm. wide, 60 to 90 cm. long, biconvex, entire, with flattened spine scarcely 5 mm. long and long, usually very slender marginal threads.

When the margin bears no threads it is var. *atricha* Trel. (in Bailey, Stand. Cycl. Hort. **1**: 238. 1914; *A. geminiflora* Hook. in Curtis's Bot. Mag. **82**: under pl. 4950; Lindl. Bot. Reg. pl. 1145; *A. knightiana* Drummond in Curtis's Bot. Mag. IV. **5**: under pl. 8271. 1909).

167. *Agave striata* Zucc. Act. Acad. Caes. Leop. Carol. **16³: 678. 1833.**

Hidalgo; type cultivated in Europe from Real del Monte.

Leaves numerous, uniformly spreading, grayish, rhombically biconvex, 4 to 6 mm. wide, 60 to 90 cm. long, somewhat scabrid on the margin, the surface with close round ribs separated by narrow whitened grooves, the needle-shaped spine 1 to 2 mm. wide and 15 to 20 mm. long; ovary stout, protruding into the perianth.

With fewer more laxly spreading or recurving leaves it is var. *recurva* Baker (Gard. Chron. n. ser. **8**: 556. 1877; *A. recurva* Zucc. Abh. Akad. Wiss. Muenchen **4**: 22. 1845). "Estoquillo," "espadín."

Agave paucifolia Tod. (Hort. Bot. Panorm. 1: 77. pl. 19. 1877) differs scarcely more than in its fewer leaves, these as wide as in the next species.

168. *Agave echinoides* Jacobi, Abh. Schles. Ges. Vaterl. Cult. 1868: 163. 1868.

Agave striata echinoides Baker, Gard. Chron. n. ser. 8: 556. 1877.

.Region ?; type cultivated in Europe.

Leaves numerous, straight or slightly falcate, gray-green, rhombically biconvex, 1 cm. wide, 25 to 30 cm. long, slightly scabrid on the margin, the surface with close narrow ribs, the triangular spine 3 mm. wide and 25. mm. long; ovary slender, not protruding into the tube.

169. *Agave stricta* Salm-Dyck, Bonplandia 7: 94. 1859.

Agave hystrix Cels, Cat. 1861: 19. 1861.

Agave striata stricta Baker, Gard. Chron. n. ser. 8: 556. 1877.

Puebla, common about Tehuacán; type cultivated in Europe.

Often densely cespitose; leaves numerous, falcately upcurved, often in a globose cluster, gray-green or purplish to nearly white, triquetrously biconvex, 6 to 10 mm. wide, 25 to 35 cm. long, at most slightly scabrid, the surface with distinctly separated ribs, the red-brown or fading spine 3 to 4 mm. wide and 25 mm. long; ovary slender, scarcely protruding into the tube.

The purplish form is known in gardens as f. *purpurea*; the rosy form, as f. *rosea*; and the most glaucous form as var. *glaucæ* (or *Agave* or *Littæa dealbata*), of which there is a dwarfer form, f. *nana*.

170. *Agave falcata* Engelm. Trans. Acad. St. Louis 3: 304, 370. 1875.

Agave californica Baker, Gard. Chron. n. ser. 8: 556. 1877.

Coahuila (type locality, Buenavista), Durango, Zacatecas, and Nuevo León.

Leaves rather numerous spreading, often falcate, gray or purplish, evanescently glaucous, from biconvex or half-round becoming 3-sided, 7 to 15 mm. wide, 15 or commonly 30 to 50 cm. long, finely striate-ridged, the margin minutely denticulate, the triquetrously needle-shaped spine 2 to 3 mm. wide, 15 or 35 to 40 mm. long.

"Guapilla," "palmita," "espadín," "soyate," "sotolito"; furnishing "ixtle" or "Tampico fiber."

13. DIOSCOREACEAE. Yam Family.

1. DIOSCOREA L. Sp. Pl. 1032. 1753.

REFERENCE: Uline, Bot. Jahrb. Engler 22: 421-431. 1896.

Scandent plants, usually with large fleshy roots; leaves mostly broad and cordate, palmately 3 to many-nerved and reticulate-veined, entire or lobed; flowers small, usually dioecious, racemose or spicate; fruit a 3-valved capsule.

It is difficult to determine which, if any, of the species should be included in the present treatment. Some of them certainly have large, more or less persistent stems, but this character is rarely shown in herbarium specimens. The writer has included most of the larger plants, although probably most of them should have been omitted. There have been excluded a number of species which are evidently wholly herbaceous.

Stems winged-----1. *D. alata*.

Stems not winged.

Leaves conspicuously lobed.

Uppermost leaves conspicuously lobate-----2. *D. lobata*.

Uppermost leaves entire-----5. *D. convolvulacea*.

Leaves entire.

Staminate flowers solitary along the rachis of the raceme.

Staminate flowers 3 mm. long or larger.

Stamens 6; flowers green.

Stamens all antheriferous.....3. *D. pallens*.

Stamens partly (3) reduced to staminodia.....4. *D. densiflora*.

Stamens 3; flowers purplish.....5. *D. convolvulacea*.

Staminate flowers about 2 mm. long. Stamens 3.

Leaves large, mostly 12 to 18 cm. wide, the basal sinus often closed.

6. *D. grandifolia*.

Leaves mostly 6 cm. wide or narrower, the basal sinus open.

7. *D. capillaris*.

Staminate flowers fasciculate or spicate in the racemes.

Staminate flowers pubescent. Stamens 6.

Flowers greenish white.....8. *D. laxiflora*.

Flowers purplish.....9. *D. dugesii*.

Staminate flowers glabrous.

Flowers in short dense spikes, these arranged in racemes.

10. *D. spiculiflora*.

Flowers fasciculate or in short loose racemes.

Stamens 3. Flowers 2 to 3 mm. long, greenish white.

Staminate flowers 3 mm. long.....11. *D. platycolpota*.

Staminate flowers scarcely more than 2 mm. long.....12. *D. pringlei*.

Stamens 6.

Stamens subequal.....13. *D. macrostachya*.

Stamens unequal.

Flowers purplish, the racemes mostly solitary.

14. *D. composita*.

Flowers green, the racemes in loose panicles.....15. *D. floribunda*.

1. *Dioscorea alata* L. Sp. Pl. 1033. 1753.

Cultivated in Mexico and in some places, as in Oaxaca, apparently naturalized. Native probably of Asia, but widely cultivated.

Leaves mostly orbicular-cordate, taper-pointed, glabrous, sometimes very large; flowers greenish. Known in Mexico as "igname," "ifame," or "ñame;" "ñangate" (Oaxaca).

The large roots of the yam are valuable for human food.

2. *Dioscorea lobata* Uline, Bot. Jahrb. Engler 22: 427. 1896.

Dioscorea lobata morelosana Uline, Proc. Amer. Acad. 35: 323. 1900.

Morelos, Mexico, and Veracruz; type collected near the City of Mexico.

Leaves puberulent, shallowly or deeply lobed.

3. *Dioscorea pallens* Schlecht. Linnaea 17: 610. 1843.

Veracruz, the type from Jalapa.

Plants glabrous; capsule 1.2 to 1.4 cm. long.

4. *Dioscorea densiflora* Hemsl. Biol. Centr. Amer. Bot. 3: 356. 1884.

Veracruz to Chiapas; type from Valley of Córdoba. Guatemala and Honduras.

Glabrous except upon the racemes; flowers in very long slender spikes.

5. *Dioscorea convolvulacea* Schlecht. & Cham. Linnaea 6: 49. 1831.

Dioscorea galeottiana Kunth, Enum. Pl. 5: 409. 1850.

Dioscorea convolvulacea viridis Uline, Bot. Jahrb. Engler 22: 427. 1896.

Mexico to Michoacán and Oaxaca.

Leaves usually puberulent; flowers long-pedicellate, purplish; capsules 1.5 to 2.5 cm. long.

D. convolvulacea viridis is a form with 3-lobed leaves.

6. *Dioscorea grandifolia* Schlecht. Linnaea 17: 602. 1843.

Jalisco to Morelos and Puebla; type from Acatlán, Puebla.

7. *Dioscorea capillaris* Hemsl. Biol. Centr. Amer. Bot. 3: 354. 1884.

Dioscorea hirsuta Mart. & Gal. Bull. Acad. Brux. 9²: 391. 1842. Not *D. hirsuta* Blume, 1827-28.

Guerrero to Veracruz, Tabasco, and Oaxaca; type from Mirador, Veracruz. Central America.

Glabrous or pubescent; leaves often very large.

8. *Dioscorea laxiflora* Schlecht. Linnaea 17: 606. 1843.

Dioscorea remotiflora Kunth, Enum. Pl. 5: 409. 1850.

Dioscorea sparsiflora Hemsl. Biol. Centr. Amer. Bot. 3: 360. 1884.

Sinaloa to San Luis Potosí and Oaxaca; type from Atotonilco el Grande, Hidalgo.

Glabrous or pubescent; leaves often very large; capsules about 2 cm. long. "Bejuco de visnaga," "falsa cocolmeca" (Oaxaca).

Roots often very large, covered with irregular plates.

9. *Dioscorea dugesii*¹ Robinson, Proc. Amer. Acad. 29: 330. 1894.

Dioscorea violacea Uline, Bot. Jahrb. Engler 22: 423. 1896.

Guanajuato (type locality) to Oaxaca.

Plants puberulent.

10. *Dioscorea spiculiflora* Hemsl. Biol. Centr. Amer. Bot. 3: 361. pl. 92. 1884.

Yucatán (type locality). Guatemala.

Plants glabrous.

11. *Dioscorea platycolpota* Uline; Robinson, Proc. Amer. Acad. 36: 471. 1901.

Known only from the type locality, near Iguala, Guerrero.

Plants glabrous; leaves orbicular-cordate.

12. *Dioscorea pringlei* Robinson, Proc. Amer. Acad. 29: 323. 1894.

Jalisco, the type from Guadalajara.

Plants glabrous.

13. *Dioscorea macrostachya* Benth. Pl. Hartw. 73. 1841.

Dioscorea macrophylla Mart. & Gal. Bull. Acad. Brux. 9²: 392. 1842.

Dioscorea leiboldiana Kunth, Enum. Pl. 5: 355. 1850.

? *Testudinaria cocolmeca* Procopp, Bot. Centralbl. 49: 201. 1892.

Veracruz and probably elsewhere; type from Panistlahuaca and Tepinistlahuaca. Central America.

Plants glabrous; capsules 2 to 3 cm. long.

Testudinaria cocolmeca is referred here with doubt by Uline; it may be referable rather to *D. remotiflora*, or perhaps it is a distinct species. The plant so named is very imperfectly known.

14. *Dioscorea composita* Hemsl. Biol. Centr. Amer. Bot. 3: 354. 1884.

Veracruz, Oaxaca, and Chiapas; type from Orizaba, Veracruz. Central America.

Glabrous or nearly so; capsules about 3 cm. long.

15. *Dioscorea floribunda* Mart. & Gal. Bull. Acad. Brux. 9²: 391. 1842.

Veracruz, Oaxaca, and Tabasco; type from Jalapa, Veracruz. Central America.

¹ Alfredo Duges, a native of France, came to Mexico in 1853. For many years he held the chair of natural history in the college of the State of Guanajuato. He was a diligent student of the plants and animals of Mexico, and published many papers upon natural history. He obtained extensive collections of plants, many of which are in the Gray Herbarium, and a few in the U. S. National Herbarium. He died in 1910. The genus *Dugesia*, of the family Asteraceae, was named in his honor by Gray.

Glabrous; leaves thick and firm, with prominent venation. "Corrimiento" (Tabasco).

14. CASUARINACEAE. Beefwood Family.

1. CASUARINA L. Amoen. Acad. 4: 143. 1759.

1. *Casuarina equisetifolia* L. Amoen. Acad. 4: 143. 1759.

Commonly cultivated in Mexico and often growing without cultivation. Native of tropical Asia and Australia; naturalized also in southern Florida.

Large pinelike tree, sometimes 20 meters high, with a trunk 1 meter in diameter, with slender verticillate spreading branches; bark gray; young branchlets drooping, pale, resembling the stems of *Equisetum*, the leaves reduced to whorled scales; staminate flowers in slender terminal spikes; fruit conelike, 1 to 2 cm. in diameter; wood very hard, strong, close-grained, flesh-colored or in age brown, its specific gravity about 0.93. "Pino" (Yucatán, Cuba); "ciprés" (Yucatán); "pino de Australia" (Cuba); "sauce" (Nicaragua). Known in English-speaking regions as beefwood.

A common and handsome tree in parks in Mexico. In regions where the tree is native the bark is used for tanning and dyeing, yielding a reddish or blue-black dye. The bark is used in medicine for its tonic and astringent properties.

15. PIPERACEAE. Pepper Family.

The genus *Peperomia* is the only other Mexican representative of the family. Its species are mostly low herbs. Some of them may be shrubs, but there is no satisfactory evidence that they are.

1. PIPER L. Sp. Pl. 28. 1753.

REFERENCE: C. De Candolle in DC. Prodr. 16¹: 240-388. 1869.

Shrubs or small trees; leaves alternate, entire, stipulate; flowers perfect or unisexual, small, greenish, sessile in very dense terete spikes, or sometimes racemose; fruit a small berry.

The species are widely distributed in the moist and tropical regions of Mexico, but they are more abundant farther south. They are separated by rather small differences, and, as so limited, most of them are of very limited distribution. In some localities the plants are used medicinally, for various purposes. The plants are more or less aromatic. The leaves are used for seasoning, and the fruit of some species is edible. *Piper nigrum* L., of the East Indies, furnishes the black pepper of commerce, which is widely used as a condiment. It is cultivated in the East Indies, Asia, Philippines, West Indies, and elsewhere. *P. cubeba* L., also of the East Indies, furnishes the cubeb berries of commerce, which are used in medicine for various catarrhal affections. *Piper betle* L. is the betel pepper, whose leaves are chewed by the natives of the Pacific Islands.¹ In South America some of the species have a wide reputation for the cure of snake bites.

The species of *Piper* are most commonly known in Mexico by the name of "cordoncillo."

Spikes of flowers congested at the ends of axillary branchlets.

Subgenus 1. *Heckeria*.

¹ See Safford, Contr. U. S. Nat. Herb. 9: 353-354. 1905.

Spikes solitary, opposite the leaves.

Flowers pedicellate-----Subgenus 2. *Ottonia*.

Flowers sessile.

Stamens 2 or 3.

Stamens 2-----Subgenus 3. *Coccobryon*.

Stamens 3-----Subgenus 4. *Carpunya*.

Stamens 4 to 6.

Stamens 4-----Subgenus 5. *Steffensia*.

Stamens 5 or 6-----Subgenus 6. *Enckea*.

Subgenus 1. *HECKERIA*.

Leaves peltate-----1. *P. cuernavacanam*.

Leaves not peltate.

Petioles as long as the blades or longer-----2. *P. cordillerianum*.

Petioles scarcely more than half as long as the blades-----3. *P. umbellatum*.

Subgenus 2. *OTTONIA*.

Leaves pubescent beneath on the nerves-----4. *P. muelleri*.

Leaves glabrous.

Leaves 7-nerved, about 6.5 cm. wide-----5. *P. yucatanense*.

Leaves 5-nerved, 2.5 to 4 cm. wide.

Stamens 4-----6. *P. neesianum*.

Stamens 5 or 6-----7. *P. disjunctum*.

Subgenus 3. *COCCOBRYON*.

Leaves acuminate, the lower ones cordate at the base, 7 or 9-nerved.

8. *P. diandrum*.

Leaves long-acuminate, the lower ones rounded at the base, 5 or 7-nerved.

9. *P. papantlense*.

Subgenus 4. *CARPUNYA*.

Anthers articulate-----10. *P. karwinskianum*.

Anthers not articulate.

Leaves subcoriaceous-----11. *P. caladiifolium*.

Leaves membranaceous.

Leaves puberulent beneath along the nerves-----12. *P. sanctum*.

Leaves glabrous.

Peduncles as long as the petioles-----13. *P. commutatum*.

Peduncles much shorter than the petioles-----14. *P. zacuapanum*.

Subgenus 5. *STEFFENSIA*.

Stigmas 2-----15. *P. bourgeau*.

Stigma 3.

Style present-----16. *P. teapense*.

Style none.

Fruit trigonous or obovoid.

Bracts cucullate with inflexed apex or obovate.

Leaves pinnate-nerved-----17. *P. lapathifolium*.

Leaves palmate-nerved-----18. *P. schlechtendalii*.

Bracts peltate or truncate-peltate at the apex.

Leaves palmate-nerved.

Leaves glabrous, equal at the base.

Leaves 2.5 to 3 cm. wide.....19. *P. lepturum*.

Leaves 14 to 21 cm. wide.....20. *P. megalophyllum*.

Leaves pubescent, very unequal at the base, about 9 cm. wide.

21. *P. auritum*.

Leaves pinnate-nerved.

Leaves glabrous, 11 to 12 cm. long, 5.5 cm. wide...22. *P. oblongum*.

Leaves pubescent.

Leaves conspicuously bullate.....25. *P. palmeri*.

Leaves not bullate.

Leaf blades 16 to 25 cm. long, 6 to 12 cm. wide.

23. *P. dilatatum*.

Leaf blades about 11 cm. long and 5 cm. wide.

24. *P. pseudoasperifolium*.

Fruit tetragonous.

Bracts cucullate, the apex inflexed.

Leaves pinnate-nerved.

Leaf blades broadly elliptic, 21 to 23 cm. long, 11 cm. wide.

26. *P. rohrii*.

Leaf blades oblong, about 16.5 cm. long and 7 cm. wide.

27. *P. cordovanum*.

Leaves palmate-nerved.

Leaves puberulent beneath along the nerves, 20 to 24 cm. long, 14 to 19 cm. wide, ovate-rounded.....28. *P. potomorphe*.

Leaves glabrous, 5.5 to 7.5 cm. long, 2.5 cm. wide, lanceolate to ovate.

29. *P. variifolium*.

Bracts peltate, truncate-peltate, or truncate at the apex.

Leaves palmate-nerved, acutish at the base.....30. *P. berlandieri*.

Leaves pinnate-nerved.

Central nerve emitting lateral nerves along its whole length.

Leaves pubescent beneath, ovate or ovate-oblong.

31. *P. tuberculatum*.

Leaves glabrous, lance-ovate or lance-oblong.

32. *P. geniculatum*.

Central nerve emitting lateral nerves for only part its length.

Leaves glabrous.

Petioles about 30 mm. long.....33. *P. melanostictum*.

Petioles 8 to 10 mm. long.....34. *P. oaxacanthum*.

Leaves pubescent, at least beneath.

Petioles mostly 10 to 15 mm. long.

Leaf blades rounded or cordate at the base.

Leaves glabrous on the upper surface...35. *P. macrophyllum*.

Leaves pilosulous and scabrous on the upper surface.

36. *P. aduncum*.

Leaf blades acute or acutish at the base.

Leaves glabrous on the upper surface.

37. *P. chamissonis*.

Leaves scabrous on the upper surface.

Peduncles hirtellous; leaves 4 to 7 cm. wide.

38. *P. jalapense*.

Peduncles glabrous; leaves about 8 cm. wide.

39. *P. fischerianum*.

Petioles short, usually 4 to 6 mm. long.

Leaf blades acute at the base.

Leaves 7 to 8 cm. wide, not bullate, thin.

Fruit hirsute; leaves acute-acuminate.

40. *P. descourtilsianum*.

Fruit glabrous; leaves subobtuse-acuminate.

41. *P. colipanum*.

Leaves about 4 cm. wide, somewhat bullate, rigid.

42. *P. misantlense*.

Leaf blades cordate to obtuse at the base.

Leaves glabrous and smooth on the upper surface.

Leaf blades obtuse at the base-----43. *P. citrifolium*.

Leaf blades cordate or semicordate at the base.

Leaves about 14 cm. long and 6.5 cm. wide.

44. *P. decipiens*.

Leaves about 23 cm. long and 14 cm. wide.

45. *P. liebmannii*.

Leaves scabrous on the upper surface.

Leaves conspicuously bullate, the pubescence of the lower surface appressed.

Leaf blades elliptic-lanceolate, 6 to 11 cm. wide.

46. *P. hispidum*.

Leaf blades oblong-lanceolate, about 4.5 cm. wide.

47. *P. mexicanum*.

Leaves not bullate, the pubescence not appressed.

Leaf blades tomentose beneath, about 4 cm. wide.

48. *P. leucophyllum*.

Leaf blades hirtellous beneath, 5.5 to 6 cm. wide.

49. *P. angustifolium*.

Subgenus 6. ENCKEA.

Ultimate nerves of the leaves conspicuously transverse-parallel.

Leaves hirtellous beneath, linear-acuminate at the apex.

50. *P. melastomoides*.

Leaves glabrous beneath, acuminate or short-acuminate at the apex.

Leaves rigid, the upper ones obtuse or acutish at the base; petioles about 1.5 cm. long-----51. *P. smilacifolium*.

Leaves membranaceous, cordate at the base; petioles 2 to 4 cm. long.

52. *P. marginatum*.

Ultimate nerves not conspicuously transverse-parallel.

Leaves pubescent on both surfaces.

Petioles 15 to 30 mm. long; leaves deeply cordate at the base.

53. *P. decrescens*.

Petioles 2 to 6 mm. long; leaves rounded or shallowly cordate at the base.

54. *P. kunthii*.

Leaves glabrous on the upper surface, glabrous or pubescent beneath.

Leaf blades broadly rounded-ovate, glabrous-----55. *P. jaliscanum*.

Leaf blades ovate or narrower.

Leaves 6 to 10 cm. long, 2.5 to 4 cm. wide.

Petioles 5 mm. long; leaves puberulent beneath along the nerves.

56. *P. lindenbergii*.

Petioles 8 mm. long; leaves glabrous-----57. *P. unguiculatum*.

Leaves 11 to 12 cm. long, 4.5 to 6 cm. wide.

Leaves puberulent beneath, 7-nerved, rounded or cordate at the base.

58. *P. medium*.

Leaves glabrous, 5-nerved, acute at the base-----59. *P. uhdei*.

1. *Piper cuernavacatum*¹ C. DC. *Linnaea* 37: 363. 1873.

Known only from the type locality, Cuernavaca, Morelos.

Branchlets velutinous-puberulent; leaves long-petiolate, the blades ovate-rounded, peltate, 18 cm. long, 21 cm. wide, acute at the apex, deeply cordate at the apex.

2. *Piper cordillerianum* C. DC. in DC. *Prodr.* 16¹: 332. 1869.

Cordillera of Veracruz, at 1,050 meters. Guatemala.

Leaves long-petiolate, the blades reniform-orbicular, 21 cm. long, 30 cm. wide, short-acuminate at the apex, deeply cordate at the base.

3. *Piper umbellatum* L. *Sp. Pl.* 30. 1753.

Heckeria umbellata Kunth, *Linnaea* 13: 569. 1839.

Veracruz to Colima and southward. Central America, West Indies, and South America; type from Santo Domingo.

Shrub, 1 to 2.5 meters high; leaves long-petiolate, the blades round-reniform, 17 to 18 cm. long, 22 to 23 cm. wide, attenuate-acute at the apex, deeply cordate at the base. "Mano de zopilote" (Tabasco); "santilla de culebra" (Oaxaca, Reko); "baquiña," or "basquiña" (Porto Rico).

4. *Piper muelleri*² C. DC. in DC. *Prodr.* 16¹: 243. 1869.

Veracruz; type from Orizaba. Honduras.

Branches glabrous, or when young densely hirtellous; leaves short-petiolate, the blades ovate-acuminate, 12.5 cm. long, 4.5 cm. wide, 7-nerved, rounded at the base.

5. *Piper yucatanense* C. DC. *Linnaea* 37: 334. 1873.

Forests of Yucatán.

Branchlets glabrous; leaves nearly sessile, the petioles about 3 mm. long, the blades ovate-acuminate, 12 cm. long, 6.5 cm. wide, rounded at the base, 7-nerved.

6. *Piper neesianum* C. DC. in DC. *Prodr.* 16¹: 256. 1869.

Veracruz. Nicaragua.

Branchlets glabrous; petioles 5 to 10 mm. long; leaf blades lanceolate or elliptic-lanceolate, 6 to 8.5 cm. long, 2 to 4 cm. wide, acuminate, acute at the base.

7. *Piper disjunctum* C. DC. *Linnaea* 37: 334. 1873.

Oaxaca and Veracruz; type collected between Huatusco and Jalapa, Veracruz.

Branchlets glabrous; petioles 6 mm. long; leaf blades ovate-lanceolate, 8 to 10 cm. long, 2.5 to 3 cm. wide, long-acuminate, acute or obtuse at the base.

8. *Piper diandrum* C. DC. *Linnaea* 37: 364. 1873.

Veracruz to Michoacán; type from Pital, Veracruz. Guatemala.

Shrub, 3 to 3.5 meters high; branchlets glabrous; petioles 1.5 to 2.5 cm. long; leaf blades ovate, 11 to 15 cm. long, 5.2 to 11 cm. wide, rounded, truncate, or cordate at the base.

¹ Misspelled "*Cuernavacatum*" in the original description.

² Frederick Mueller was an Alsatian, who was sent to Mexico in 1853 by Schlumberger of Mulhouse. He collected chiefly between Veracruz and Orizaba. He disappeared suddenly and was never heard of afterwards, and it is presumed that he was murdered.

9. *Piper papantlense* C. DC. in DC. Prodr. 16¹: 338. 1869.

Veracruz; type from Papantla. Central America.

Branchlets glabrous; petioles 1.2 cm. long; leaf blades ovate or ovate-lanceolate, 10.5 cm. long, 5 cm. wide.

10. *Piper karwinskianum* Kunth; C. DC. in DC. Prodr. 16¹: 327. 1869.

Schilleria karwinskiana Kunth, Linnaea 13: 700. 1839.

Known only from the type locality, near the City of Mexico.

Branchlets short-villous; petioles about 1 cm. long; leaf blades obliquely elliptic, acuminate, rounded at the base, soft-puberulent on both surfaces.

11. *Piper caladiifolium* (Miquel) C. DC. in DC. Prodr. 16¹: 330. 1869.

Artanthe caladiifolia Miquel, Syst. Piper. 387. 1844.

Mexico, the locality not known. Central America.

Branchlets glabrous; leaves long-petiolate, the blades ovate-cordate, short-acuminate, 13 to 21 cm. long, 10 to 14 cm. wide.

12. *Piper sanctum* (Miquel) Schlecht.; C. DC. in DC. Prodr. 16¹: 330. 1869.

Artanthe sancta Miquel, Syst. Piper. 389. 1844.

Veracruz and probably elsewhere; type from Atlacomulco.

Leaf blades rounded-cordate, about 21 cm. long and 18 cm. wide, short-acuminate, puberulent. The following names are reported for this species, although some probably belong to other species, and doubtless most of them are applied to various species indiscriminately: "Santa María" (Tabasco); "acuyo," "hoja de aján" (Veracruz); "hierba santa" (Veracruz, Oaxaca); "santilla de comer" (Oaxaca, *Reko*); "tlamapaquelite," "tianepaquelite," "tlanepaquilitl" (Veracruz, Oaxaca; Nahuatl); "hoja santa;" "hoja de anís."

The leaves have been used by the early and present inhabitants of Mexico as a condiment. In popular medicine the plant is used as a stimulant and as a local anesthetic, and for toothache, stomach affections, and venereal diseases.

13. *Piper commutatum* Steud. (Nom. Bot. ed. 2. 2: 340. 1841, nomen nudum).

Piper plantagineum Lam. err. det. Cham. & Schlecht. Linnaea 6: 353. 1831.

Piper plantagineum Cham. & Schlecht.; C. DC. in DC. Prodr. 16¹: 330. 1869.

Not *P. plantagineum* Lam. 1791.

Described from Mexico, the locality not known.

Branchlets glabrous; petioles 2 cm. long; leaf blades ovate, 9 cm. long, 5 cm. wide, acuminate, rounded or subcordate at the base, glabrous.

14. *Piper zacuapanum* C. DC. in DC. Prodr. 16¹: 330. 1869.

Piper tiliacifolium Schlecht. & Cham. Linnaea 6: 352. 1831. Not *P. tiliacifolium* Desv. 1825.

Veracruz; type from Zacuapan.

Branchlets glabrous; petioles about 6 cm. long; leaf blades ovate, 14 cm. long, 12 cm. wide, acuminate, cordate at the base.

15. *Piper bourgeau* C. DC. Linnaea 37: 358. 1873.

Known only from the type locality, Cuernavaca, Morelos.

Branchlets densely canescent-villous; petioles 1.2 cm. long; leaf blades oblong-lanceolate, 21 cm. long, 8 cm. wide, acuminate, subcordate at the base, soft-pubescent on both surfaces.

16. *Piper teapense* C. DC. in DC. Prodr. 16¹: 260. 1869.

Known only from the type locality, Teapa, Tabasco.

Branchlets pubescent; petioles 5 mm. long; leaf blades ovate-oblong, 13 cm. long, 5.8 cm. wide, acuminate, cordate at the base, glabrous on the upper surface, pubescent beneath.

17. *Piper lapathifolium* (Kunth) Steud. Nom. Bot. ed. 2. 2: 341. 1841.

Schilleria lapathifolia Kunth, Linnaea 13: 714. 1839.

Veracruz; type from Jalapa. Central America and northern South America.

Shrub, 3.5 to 4.5 meters high; branchlets glabrous; petioles 4 cm. long; leaf blades oblong-ovate, about 24 cm. long and 11 cm. wide, short-acuminate, cordate at the base, glabrous above, hirtellous beneath along the nerves.

18. *Piper schlechtendalii*¹ Steud. Nom. Bot. ed. 2, 2: 343. 1841.

Enckea schlechtendalii Miquel, Syst. Piper. 362. 1844.

Piper schlechtendahlianum C. DC. in DC. Prodr. 16¹: 324. 1869.

Known only from the type locality, Misantla, Veracruz.

Branchlets glabrous; petioles 6 mm. long; leaf blades elliptic-lanceolate or lanceolate, 6 to 10 cm. long, 2.5 to 3.5 cm. wide, long-acuminate, obtuse or acute at the base, glabrous.

19. *Piper lepturum* Kunth; C. DC. in DC. Prodr. 16¹: 320. 1869.

Schilleria leptura Kunth, Linnaea 13: 679. 1839.

Oaxaca. Brazil; type from Rio Janeiro.

Branchlets glabrous; petioles 1 cm. long; leaf blades lanceolate or oblong-lanceolate, 11 to 14 cm. long, 2.5 to 3 cm. wide, acuminate, cordate to acutish at the base, glabrous.

20. *Piper megalophyllum* C. DC. Linnaea 37: 357. 1873.

Pital and Mirador, Veracruz, the type localities.

Branchlets glabrous; petioles 6 to 9 cm. long; leaf blades rounded-ovate, 16 to 25 cm. long, 14 to 21 cm. wide, acuminate, cordate at the base, glabrous.

21. *Piper auritum* H. B. K. Nov. Gen. & Sp. 1: 54. 1815.

San Luis Potosí to Oaxaca and Yucatán; type from somewhere in Mexico. Central America; Colombia.

Shrub 1 to 4.5 meters high; branchlets glabrous; petioles 1.5 cm. long; leaf blades ovate-oblong, about 16 cm. long and 9 cm. wide, attenuate to the apex, cordate at the base. "Momo" (Tabasco); "xmacolan" (Yucatán, Maya); "acoyo" (Veracruz); "hoja de la estrella" (Costa Rica); "Santa María," "cordoncillo" (Nicaragua); "anisillo," "monca blanca" (Costa Rica); "hoja de jute," "juniapra" (Guatemala, Pittier).

In Veracruz the leaves are used for seasoning tamales. In Costa Rica the fresh leaves are applied to relieve headache.

22. *Piper oblongum* H. B. K. Nov. Gen. & Sp. 1: 52. 1815.

Reported (by C. De Candolle) from Veracruz. Central America and northern South America; type from Venezuela.

Branchlets glabrous; leaves short-petiolate, the blades elliptic, acuminate, acutish at the base; spikes about 8 cm. long.

23. *Piper dilatatum* L. Rich. Act. Soc. Hist. Nat. Paris 1: 105. 1792.

Veracruz. Central America, West Indies, and South America.

Shrub 2 to 3 meters high; branchlets nearly glabrous; petioles 5 to 15 mm. long; leaf blades ovate-elliptic or obovate-elliptic, acuminate.

24. *Piper pseudoasperifolium* C. DC. in DC. Prodr. 16¹: 318. 1869.

Known only from Oaxaca, the type locality.

Branchlets hirsute; petioles 1 cm. long; leaf blades lance-elliptic, 11 cm. long, 5 cm. wide, acuminate, obtuse at the base.

25. *Piper palmeri* C. DC.; Rose, Contr. U. S. Nat. Herb. 1: 354. 1895.

Piper palmeri manzanilloanum C. DC.; Rose, Contr. U. S. Nat. Herb. 1: 354. 1895.

Colima; type from the city of Colima.

¹ Named for Diedrich Franz Leonhard von Schlechtendal (1794-1866), professor of botany at Halle. He published several important papers describing early collections of Mexican plants.

Shrub 1.8 meters high; branchlets retrorse-pubescent; petioles 1 cm. long or shorter; leaf blades ovate-lanceolate, about 15 cm. long and 5.5 cm. wide, acuminate, unequal at the base. "Matico" (Colima); "hachogue" (Colima, Rose).

The plant is said to be used for washing clothes. A decoction is employed as a remedy for colic in man and horses, and for cutaneous diseases.

26. *Piper rohrii* C. DC. in DC. Prodr. 16¹: 296. 1869.

Oaxaca. Central America and South America; type from French Guiana.

Branchlets glabrous; petioles 2.5 cm. long; leaf blades short-acuminate, sub-attenuate at the base, glabrous.

27. *Piper cordovanum* C. DC. Linnaea 37: 352. 1873.

Known only from the type locality, Valley of Córdoba, Veracruz.

Branchlets glabrous; petioles 3.5 cm. long; leaf blades acuminate, unequal and obtuse at the base, glabrous.

28. *Piper potomorphe* (Miquel) C. DC. in DC. Prodr. 16¹: 308. 1869.

Artanthe potomorphe Miquel, Syst. Piper. 403. 1844.

Known only from the type locality, Cordillera of Veracruz.

Petioles 7 to 8 cm. long; leaf blades short-acuminate, deeply cordate at the base.

29. *Piper variifolium* (Miquel) C. DC. in DC. Prodr. 16¹: 308. 1869.

Enckea variifolia Miquel, Syst. Piper. 355. 1844.

Veracruz.

Branchlets glabrous; petioles 6 to 8 mm. long; leaf blades acute or acuminate, rounded at the base.

30. *Piper berlandieri* C. DC. in DC. Prodr. 16¹: 295. 1869.

Tamaulipas to Veracruz and Oaxaca; type collected between Tampico and Real del Monte.

Shrub or small tree, 2 to 6 meters high; petioles about 1.5 cm. long; leaf blades obovate-oblong, about 9.5 cm. long and 4.5 cm. wide, short-acuminate, acutish at the base, glabrous.

31. *Piper tuberculatum* Jacq. Icon. Pl. Rar. 2: 2. pl. 210. 1786.

Veracruz to Tepic, Oaxaca, and Tabasco. Central America, West Indies, and South America.

Shrub or small tree, 2 to 6 meters high; branchlets puberulent; leaf blades obliquely ovate or ovate-oblong, 7 to 14 cm. long, 4 to 6 cm. wide, subacuminate, very unequal at the base. "Cordoncillo" (Tabasco, Chiapas).

32. *Piper geniculatum* Swartz, Prodr. Veg. Ind. Occ. 15. 1788.

Veracruz to Tabasco and Chiapas. Central America, West Indies, and South America; type from Jamaica.

Shrub or small tree, up to 6 meters high; leaves short-petiolate, the blades lance-ovate or lance-oblong, sometimes 25 cm. long and 12 cm. wide, acuminate, very unequal at the base. "Cordoncillo" (Tabasco).

33. *Piper melanostictum* (Miquel) C. DC. in DC. Prodr. 16¹: 274. 1869.

Artanthe melanosticta Miquel, Syst. Piper. 404. 1844.

Known only from Tabasco, the type locality.

Branchlets glabrous; leaf blades ovate-oblong, 19 cm. long, 7.5 cm. wide; subobtuse, unequal at the base.

34. *Piper oaxacanum* C. DC. in DC. Prodr. 16¹: 274. 1869.

Known only from the type locality, Oaxaca.

Branchlets glabrous; leaf blades oblong-elliptic or ovate-elliptic, 16.5 cm. long, 6.5 cm. wide, acuminate, unequal and acute at the base.

35. *Piper macrophyllum* H. B. K. Nov. Gen. & Sp. 1: 46. 1815.

Veracruz. Central America, West Indies, and South America; type from Venezuela.

Shrub, about 3 meters high; branchlets glabrous; leaf blades elliptic-oblong, 17 to 24 cm. long, 8 to 12 cm. wide, acuminate; spikes 4 to 5 cm. long.

36. *Piper aduncum* L. Sp. Pl. 29. 1753.

San Luis Potosí to Tepic and Chiapas. Central America, West Indies, and South America; type from Jamaica.

Shrub, 2 to 4.5 meters high; branchlets hirsute or glabrate; leaf blades oblong-elliptic, 17 to 20 cm. long, 7 to 8 cm. wide, acuminate. "Cordoncillo" (Hidalgo, Veracruz); "cordoncillo blanco" (Hidalgo, Veracruz, Nicaragua); "platanillo" (Cuba); "higuillo," "higuillo oloroso" (Porto Rico).

The plant is said to have astringent, stimulant, and diuretic properties. In Brazil it is used to treat ulcers.

37. *Piper chamissonis* (Miquel) Steud. (Nom. Bot. ed. 2. 2: 340. 1841, nomen nudum); C. DC. in DC. Prodr. 16¹: 283. 1869.

Artanthe chamissonis Miquel, Syst. Piper. 457. 1844.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Petioles 1 cm. long; leaf blades oblong, 15 cm. long, 7 cm. wide, short-acuminate.

38. *Piper jalapense* (Miquel) C. DC. in DC. Prodr. 16¹: 277. 1869.

Artanthe jalapensis Miquel, Syst. Piper. 444. 1844.

Veracruz to Oaxaca; type from Jalapa, Veracruz. Guatemala.

Shrub, up to 4.5 meters high; branchlets densely hirtellous; petioles 1 to 1.5 cm. long; leaf blades ovate-oblong or elliptic-oblong, 13 to 19 cm. long, acuminate; spikes 10 cm. long.

39. *Piper fischerianum* C. DC. in DC. Prodr. 16¹: 277. 1869.

Mexico, the locality not known.

Branchlets glabrous; petioles 1 cm. long; leaf blades lance-elliptic, 19.5 cm. long, acuminate, appressed-hirtellous beneath along the nerves.

40. *Piper descourtilsianum*¹ C. DC. in DC. Prodr. 16¹: 277. 1869.

Veracruz; type from Mirador.

Branchlets glabrous; leaf blades oblong-elliptic, 15.5 cm. long, long-acuminate, glabrous above, puberulent beneath along the nerves.

41. *Piper colipanum* C. DC. Linnaea 37: 348. 1873.

Veracruz; type from Colipa.

Branchlets glabrous; leaf blades oblong-elliptic, 19 cm. long, glabrous above, puberulent beneath.

42. *Piper misantlense* C. DC. in DC. Prodr. 16¹: 286. 1869.

Known only from the type locality, Misantla, Veracruz.

Branchlets glabrous; leaf blades oblong, 14 cm. long, acuminate, glabrous above, puberulent beneath.

43. *Piper citrifolium* Lam. Tabl. Encycl. 1: 80. 1791.

Veracruz and probably Yucatán. Central America, West Indies, and northern South America.

Branchlets hirtellous; leaf blades elliptic-lanceolate or ovate-lanceolate, 12 to 21 cm. long, 5 to 7.5 cm. wide, long-acuminate; spikes 4 to 5 cm. long.

¹Named for Michael Étienne Descourtilz, a French physician, who spent many years in the West Indies, North America, etc. He published a "Flore médicale des Antilles," in 8 volumes, illustrated by 600 colored plates.

44. *Piper decipiens* (Miquel) C. DC. in DC. Prodr. 16¹: 273. 1869.

Artanthe decipiens Miquel, Syst. Piper. 462. 1844.

Known only from the type locality, Cordillera of Veracruz.

Branchlets pubescent; leaf blades ovate-oblong, 14 cm. long, acuminate, puberulent or hirtellous beneath.

45. *Piper liebmannii* C. DC. Linnaea 37: 344. 1873.

Veracruz; type from Mirador.

Branchlets glabrous; leaf blades oblong-elliptic, acute, hirtellous or hirsute beneath; spikes 7.5 cm. long.

46. *Piper hispidum* Swartz, Prodr. Veg. Ind. Occ. 15. 1788.

Piper hirsutum Swartz, Fl. Ind. Occ. 1: 60. 1797.

Veracruz to Tepic and Oaxaca. Central America, West Indies, and South America; type from Jamaica.

Shrub, 2 to 5 meters high; branchlets hirsute; leaf blades 12 to 19 cm. long; spikes 10 to 11 cm. long. "Higuillo," "higuillo oloroso" (Porto Rico).

47. *Piper mexicanum* (Miquel) C. DC. in DC. Prodr. 16¹: 276. 1869.

Artanthe mexicana Miquel, Syst. Piper. 458. 1844.

Tepic to Oaxaca; type from Cordillera of Oaxaca. Guatemala.

Branchlets hirtellous; leaf blades oblong-lanceolate, 14 cm. long, acuminate, unequal at the base.

48. *Piper leucophyllum* (Miquel) C. DC. in DC. Prodr. 16¹: 278. 1869.

Artanthe leucophylla Miquel, Syst. Piper. 460. 1844.

Jalisco to Morelos, Puebla, and Guerrero.

Shrub, 1 to 4 meters high; branchlets tomentose; leaf blades oblong-lanceolate, about 14 cm. long, subacuminate. "Cordoncillo" (Guerrero).

A decoction of the plant is used in Guerrero for fevers and as a wash to kill parasites upon the human scalp.

49. *Piper angustifolium* Ruiz & Pav. Fl. Peruv. Chil. 1: 38. pl. 57. 1798.

Veracruz to Tepic. Central America, West Indies, and South America; type from Peru.

Branchlets densely villous; leaf blades elliptic-lanceolate, 16 cm. long or shorter, acuminate. The following names are said to apply to the plant, although they are probably not confined to this species: "Achiotlín," "soldadillo" (Veracruz); "achotlín" (Colima); "cordoncillo" (Jalisco, Veracruz, Oaxaca, Hidalgo, Nicaragua); "mático" (Oaxaca, Nicaragua); "rabo de zorra," "santilla montés" (Oaxaca); "platanillo," "platanillo de monte" (Cuba).

The leaves, known in commerce as "mático," are an article of export from some parts of tropical America. They are used in medicine to stop the flow of blood and for venereal diseases. It is probable that many different species furnish the "mático" of commerce. In Mexico this plant is used as an astringent and a balsamic stimulant.

50. *Piper melastomoides* Schlecht. & Cham. Linnaea 5: 74. 1830.

Veracruz; type from Jalapa.

Shrub, 3 to 4.5 meters high; branchlets villous; petioles 1 cm. long; leaf blades oblong-ovate or lance-elliptic, about 17 cm. long and 7.5 cm. wide, rounded or acute at the base; spikes 3 cm. long.

51. *Piper smilacifolium* H. B. K. Nov. Gen. & Sp. 1: 56. 1815.

Veracruz. Central America and Venezuela (type locality).

Shrub, 3 to 4.5 meters high; branchlets glabrous; petioles 1.5 cm. long; leaf blades ovate, 14 to 19 cm. long, 11 to 16 cm. wide, cordate to acutish at the base; spikes 11 cm. long.

52. *Piper marginatum* Jacq. Icon. Pl. Rar. 2: 2. pl. 215. 1786.

Michoacán and Guerrero. Central America, West Indies, and South America.

Shrub, up to 5 meters high; branchlets glabrous; leaf blades ovate-rounded, 12 to 16 cm. long and wide, acuminate at the apex. "Anisillo" (Santo Domingo, Nicaragua); "higuillo oloroso" (Porto Rico).

53. *Piper decrescens* (Miquel) C. DC. in DC. Prodr. 16¹: 251. 1869.

Enckea decrescens Miquel, Lond. Journ. Bot. 4: 440. 1845.

Hacienda de los Naranjos. Central America.

Branchlets glabrous; leaf blades ovate or broadly ovate, 8 cm. long, 5 cm. wide, short-acuminate; spikes 8 cm. long.

54. *Piper kunthii* (Miquel) C. DC. in DC. Prodr. 16¹: 250. 1869.

Enckea kunthii Miquel, Syst. Piper. 363. 1844.

Veracruz to Oaxaca and Chiapas; type from Cordillera of Oaxaca.

Branchlets pubescent; leaf blades elliptic-lanceolate, 5 to 7.5 cm. long, 1.5 to 4 cm. wide, long-acuminate.

55. *Piper jaliscanum* S. Wats. Proc. Amer. Acad. 26: 145. 1891.

Jalisco, Sinaloa, and Tepic; type from Guadalajara, Jalisco.

Shrub, 2.5 to 4.5 meters high, glabrous; petioles 6 to 14 mm. long; leaf blades 3.5 to 7.5 cm. long, acute or short-acuminate; spikes 6 cm. long.

56. *Piper lindenbergii* (Miquel) C. DC. in DC. Prodr. 16¹: 248. 1869.

Enckea lindenbergii Miquel, Syst. Piper. 368. 1844.

Known only from the type locality, Teapa, Tabasco.

Branchlets puberulent; leaf blades elliptic-lanceolate, 7 to 10 cm. long, 2 to 4 cm. wide, acuminate.

57. *Piper unguiculatum* Ruiz & Pav. Fl. Peruv. Chil. 1: 34. 1798.

Piper terminale H. B. K. Nov. Gen. & Sp. 1: 57. 1815.

Veracruz and probably elsewhere. Central America, West Indies, and South America; type from Peru.

Shrub, 2 to 5 meters high; branchlets glabrous; leaf blades oblong-ovate, 6 to 9 cm. long, 2.5 to 4 cm. wide, attenuate-acuminate.

58. *Piper medium* Jacq. Icon. Pl. Rar. 1: 2. pl. 8. 1781.

Piper ceanothifolium H. B. K. Nov. Gen. & Sp. 1: 26. 1815.

Veracruz to Yucatán and Oaxaca. Central America, West Indies, and South America.

Shrub, 1 to 4.5 meters high; branchlets puberulent; leaf blades elliptic or ovate-elliptic, acuminate; spikes about 6 cm. long. "Cordoncillo" (Veracruz); "yaxtehc-ché" (Yucatán, Maya); "alcotán" (Costa Rica); "higuillo de limón" (Porto Rico).

In Costa Rica the plant is reputed to be a cure for snake bites.

59. *Piper uhdei*¹ C. DC. in DC. Prodr. 16¹: 248. 1869.

Mexico, the locality not known.

Branchlets glabrous; petioles 7 mm. long; leaf blades elliptic-lanceolate or lanceolate, acuminate.

DOUBTFUL SPECIES.

PIPER ACUTIUSCULUM C. DC. Ann. Cons. Jard. Genève 2: 259. 1898. Type from Valley of Córdoba, Veracruz.

¹ Named for C. A. Uhde, who was Prussian consul at Matamoros about 1845. He made large collections of fruits, seeds, and living orchids, as well as of herbarium specimens, which were sent to the Botanical Garden at Berlin.

PIPER BEGONIAEFOLIUM Hook. & Arn. Bot. Beechey Voy. 310. 1839-40. Described from somewhere in Mexico.

PIPER BREDEMAYERI Jacq. Eclog. Pl. Rar. 1: 125. pl. 84. 1811-16. Reported from Jalisco.

PIPER CARDIOPHYLLUM C. DC. in DC. Prodr. 16¹: 374. 1869. *Piper populifolium* Opiz in Presl, Rel. Haenk. 1: 160. 1830. Described from some unknown locality in Mexico.

PIPER CHINANTLENSE Mart. & Gal. Bull. Acad. Brux. 10²: 1843. Type from Chinantla, Oaxaca.

PIPER KERBERI C. DC. Ann. Cons. Jard. Genève 2: 258. 1898. Type from Córdoba, Veracruz.

PIPER LEDEBOURII C. DC. in DC. Prodr. 16¹: 281. 1869. Native of Brazil; reported from Mexico by De Candolle.

PIPER MIRADORENSE C. DC. in DC. Prodr. 16¹: 380. 1869. *Piper patulum* Mart. & Gal. Bull. Acad. Brux. 10²: 128. 1843. Type from Mirador, Veracruz.

PIPER MULTINERVIUM Mart. & Gal. Bull. Acad. Brux. 10²: 130. 1843. Type from Jalapa and Mirador, Veracruz.

PIPER NERVOSUM C. DC. in DC. Prodr. 16¹: 374. 1869. *Piper patens* Hook. & Arn. Bot. Beechey Voy. 310. 1839-40. Described from somewhere in Mexico.

PIPER NITIDULUM Opiz in Presl, Rel. Haenk. 1: 154. 1830. Type from somewhere in Mexico.

PIPER ORIZABANUM C. DC. Ann. Cons. Jard. Genève 2: 258. 1898. Type from the region of Orizaba.

PIPER PLATYPHYLLUM (Benth.) C. DC. in DC. Prodr. 16¹: 375. 1869. *Enckea platyphylla* Benth. Bot. Voy. Sulph. 167. 1844. Type from Manzanillo, Colima.

PIPER RETICULOSUM Opiz in Presl, Rel. Haenk. 1: 155. 1830. Type said to be from Mexico.

PIPER TRIQUETRUM Opiz in Presl, Rel. Haenk. 1: 160. 1830. Described from somewhere in Mexico.

PIPER TRICHOPHYLLUM C. DC. Ann. Cons. Jard. Genève 2: 261. 1898. Type from Mexico.

16. LACISTEMACEAE.

1. **LACISTEMA** Swartz, Prodr. Veg. Ind. Occ. 12. 1788.

1. *Lacistema myricoides* Swartz, Prodr. Veg. Ind. Occ. 12. 1788.

Veracruz. Central America, West Indies, and tropical America; type from Jamaica.

Shrub or small tree; leaves elliptic-oblong, 10 to 15 cm. long, entire, glabrous; flowers in axillary spikes, apetalous; fruit baccate, ovoid, about 8 mm. long.

17. CHLORANTHACEAE.

1. **HEDYOSMUM** Swartz, Prodr. Fl. Ind. Occ. 847. 1788.

1. *Hedyosmum artocarpus* Solms in DC. Prodr. 16¹: 485. 1869.

Veracruz, Morelos, and Oaxaca; type from Jalapa, Veracruz.

Shrub, 3 to 4.5 meters high, aromatic and resinous; leaves mostly 12 to 20 cm. long, ovate or oblong-ovate, serrate; flowers dioecious, the staminate spicate, the pistillate capitate; pistillate inflorescence at maturity fleshy, composed of numerous 3-angled drupes, 2 to 3 cm. in diameter.

18. SALICACEAE. Willow Family.

Trees or shrubs; leaves alternate, stipulate, entire, dentate, or lobate, deciduous; flowers dioecious, in catkins; fruit a small capsule, the seeds bearing long white hairs.

The following genera are the only ones of the family:

Stamens numerous; bracts incised; disk cup-shaped; winter buds with several scales.....1. **POPULUS**.
 Stamens usually less than 5; bracts entire; disk represented by one or two small glands; winter buds with a single scale.....2. **SALIX**.

1. **POPULUS** L. Sp. Pl. 1034. 1753.

The species of *Populus* are generally distinguished from those of *Salix* by their broad leaves, but one Mexican representative, *P. angustifolia*, has leaves as narrow as those of some willows.

The native species are widely used in Mexico as shade trees, for which purpose they are very satisfactory, since they start readily from cuttings or from large branches placed in the ground, and grow rapidly. They are not very long-lived and the trees are frequently killed by mistletoe (*Phoradendron*). The pistillate trees are not desirable as shade trees, for in the spring when the fruit is ripe the seeds fly everywhere through the air, filling people's eyes and nostrils and becoming a general nuisance. This trouble may be avoided by planting only cuttings taken from staminate trees.

Besides the native species, the white poplar, *P. alba* L., of the Old World, and its various forms ("álamo blanco") is cultivated in central and southern Mexico. It is distinguished by having the lower surface of the leaves covered with a dense white tomentum. *P. nigra* L., the black poplar, another Old World species, is said to be cultivated in Mexico.¹

The most common name for the species of the genus is "álamo."

Petioles rounded, not flattened laterally; leaves with very minute teeth.

Leaf blades ovate, dark green above, very pale beneath, rounded at the base.

1. **P. trichocarpa.**

Leaf blades lanceolate, pale green on both sides, obtuse or acute at the base.

2. **P. angustifolia.**

Petioles laterally compressed; leaves usually with large teeth.

Leaf blades not deltoid in outline, orbicular, oval, oblong, or broadly ovate, pale beneath.

Petioles densely tomentose; leaf blades tomentose beneath when young, the teeth large.....3. **P. monticola.**

Petioles and leaves glabrous; leaf blades with small teeth.

4. **P. tremuloides.**

Leaf blades more or less deltoid, not pale beneath.

Pedicels as long as the capsules or longer.

Leaf blades mostly broader than long, the tip short, entire; capsules 10 to 13 mm. long.....5. **P. wislizeni.**

Leaf blades much longer than broad, the tip very long, crenate-serrulate; capsules 7 to 8 mm. long.....6. **P. dimorpha.**

¹Apparently this name has been applied by some Mexican writers to the native *P. mexicana*.

Pedicels much shorter than the capsules.

Capsules 5 mm. long or shorter-----7. *P. arizonica*.

Capsules 6 to 10 mm. long.

Leaf blades usually broadly cuneate or rounded at the base, long-pointed, glabrous or nearly so-----8. *P. mexicana*.

Leaf blades mostly truncate or subcordate at the base, short-pointed.

Petioles and leaves glabrous or nearly so-----9. *P. fremontii*.

Petioles and lower surface of the leaves densely short-pilose or tomentose-----10. *P. macdougalii*.

1. *Populus trichocarpa* Torr. & Gray; Hook. Icon. Pl. 9: pl. 878. 1852.

San Pedro Mártir Mountains of Baja California at an altitude of about 1,350 meters. Northward to Alaska; type from Santa Clara River, California.

Tree, sometimes 60 meters high, but in Baja California much smaller, with a narrow crown; bark light gray, deeply fissured in age; wood soft, weak, brown, its specific gravity about 0.38.

In the United States the wood is used for barrel staves, tubs, bowls, etc. Among the Indians it was a favorite tree for making canoes, and the roots were used in basketry. The sterile Mexican specimens seen by the writer have very small leaves. This species is known in the United States as black cottonwood.

2. *Populus angustifolia* James in Long, Exped. 1: 497. 1823.

Along streams, mountains of northern Chihuahua. Northward to Canada; type from the Rocky Mountains.

In Chihuahua said to be a tree 4.5 to 7.5 meters high, but farther north often much larger, sometimes attaining a height of 20 meters and a trunk diameter of 40 to 50 cm.; bark rough or fissured; leaves 5 to 12 cm. long; catkins 2 to 6 cm. long; wood weak, soft, light brown, its specific gravity about 0.39.

3. *Populus monticola* T. S. Brandeg. Zoe 1: 274. 1890.

Sierra de la Laguna of Baja California at altitudes of 660 to 1,550 meters.

Tree, 15 to 22 meters high, the trunk 60 to 90 cm. in diameter, the bark often smooth and white; branchlets at first densely tomentose; leaf blades coarsely dentate; wood light reddish. "Huirigo."

The wood is used locally for making furniture and other objects. It has been stated by Bailey¹ that this is a form of the Old World *P. alba* which has become naturalized in Baja California, but the writer is convinced from study of specimens that this is not the case.

4. *Populus tremuloides* Michx. Fl. Bor. Amer. 2: 243. 1803.

Mountains of Chihuahua, Sonora, San Luis Potosí, and Durango. Widely distributed in the United States and in Canada (type locality).

Usually a small slender graceful tree, but sometimes 12 meters high or even up to 18 meters, the trunk sometimes 60 cm. in diameter; bark thin, smooth, pale green or grayish; wood soft, weak, light brown, its specific gravity about 0.40. "Alamillo" (Durango, *Patoni*).

Large amounts of aspen wood are used in the United States for paper pulp. The tree is one of the first to spring up in lumbered or burned-over regions, and it often covers large areas. The Mexican specimens seen are all sterile. Probably they should be referred to *P. aurea* Tidestrom,² but the status of that species is still uncertain.

¹ Stand. Cycl. Hort. 2756. 1916.

² Amer. Mid. Nat. 2: 35. 1911.

5. *Populus wislizeni*¹ (S. Wats.) Sarg. Man. Trees N. Amer. 165. 1905.

Populus fremontii wislizeni S. Wats. Amer. Journ. Sci. III. 15: 3. 1878.

Along streams at low altitudes, northern Chihuahua and Sonora. Western Texas to Colorado.

Often 15 meters high, with a very thick trunk and large crown; bark pale gray, fissured; leaves 5 to 10 cm. long; wood soft, brownish, its specific gravity about 0.46. Commonly known as "álamo"; "güérigo" (Chihuahua).

In the Rio Grande Valley the wood is much used for firewood, fence posts, and rafters of houses. It is not very good for fuel, since it burns almost like paper. The fallen leaves are eaten by cattle. This cottonwood is the most common shade tree of New Mexico. It was reported from Mexico by Hemsley as *Populus balsamifera* L., a species of more eastern and northern distribution.

6. *Populus dimorpha* T. S. Brandeg. Zoe 5: 197. 1905.

Along arroyos and streams at low altitudes, Sonora and Sinaloa; type from Culiacán.

A large tree, often planted in parks; remarkable for the dimorphism of its leaves, those on the older branches ovate-deltoid, very long-acuminate, those on young shoots linear-lanceolate to ovate-lanceolate.

7. *Populus arizonica* Sarg. Bot. Gaz. 57: 210. 1919.

Populus arizonica jonesii Sarg. Bot. Gaz. 57: 211. 1919.

Baja California to Chihuahua, Tamaulipas, and Puebla, chiefly in river bottoms; Chiapas (?). Southern California to New Mexico; type from Arizona.

Large tree, sometimes 25 meters high, with a trunk diameter of 1.5 meters; crown rounded, with spreading branches; bark light gray, ridged, or on young trees smooth. Generally known as "álamo," but also as "chopo" (Chihuahua, San Luis Potosí) and "olmo" (Tamaulipas).

The wood is used for fuel, carts and cart wheels, fence posts, water troughs, etc. *P. arizonica jonesii* (type from Valley of Palms, Baja California), to which most of the Mexican material belongs, is a form with longer pubescence than the type.

8. *Populus mexicana* Wesm. in DC. Prodr. 16²: 328. 1864.

Type collected between Tampico, Tamaulipas, and Real del Monte, Hidalgo.

Leaves broadly ovate, 4.5 to 7 cm. long, long-petiolate, abruptly long-acuminate at the apex.

The writer has seen no material agreeing satisfactorily with the collection.

9. *Populus fremontii* S. Wats. Proc. Amer. Acad. 10: 350. 1875.

Baja California; Sonora(?). California and Nevada; type from Deer Creek, California.

Large tree, sometimes 35 meters high, with a trunk 2 meters in diameter, the branches spreading and drooping; bark light gray and smooth on young trees, brown and ridged in old trees; wood soft, light brown, weak, its specific gravity about 0.48. "Alamo" (Baja California).

¹The species was named for Adolf Wislizenus (1810–1889), who came to the United States from Germany in 1835. He was one of the first of United States botanists to visit Mexico, having gone, by way of the Santa Fe trail, to Chihuahua in 1846. He obtained in that State a large collection of plants, which were reported upon by Dr. George Engelmann in a book published by Wislizenus detailing his travels.

10. *Populus macdougalii*¹ Rose, Smiths. Misc. Coll. 61¹²: 1. 1913.

Northern Sonora and Baja California; type from the delta region of the Colorado River.

Large tree; differing from *P. fremontii* only in the more copious pubescence, and probably not specifically distinct.

2. *SALIX* L. Sp. Pl. 1015. 1753.

REFERENCE: C. Schneider, Bot. Gaz. 65: 1-41. 1918.

The various species of willows are found in nearly all parts of Mexico, usually growing at the edge of water. They are often planted as shade trees. *Salix babylonica* L. ("sauz llorón," the weeping willow), an Old World species, with very long, slender, drooping branches, is sometimes cultivated also.

The wood is used chiefly for firewood, but also for construction to a limited extent. In the United States it is burned for charcoal, which is of excellent quality, being used in medicine and as black crayon by artists. The bark is sometimes used for tanning, and the leaves as forage for stock. The flexible tough branches are employed for making baskets, and they were so used by many tribes of North American Indians. They are used also in Mexico as well as elsewhere in the manufacture of wicker furniture. The bark and leaves contain tannin and salicin. The latter principle is a useful febrifuge, and was widely used before quinine came into general use. A willow decoction is still employed for treating fevers in Mexico in domestic practice, and other medicinal properties are attributed to the plants.

The usual names for species of *Salix* are "sauz" and "sauce." The following ones are said to be applied to species which have not been determined by the writer: "Ahuejote" (Jalisco, Valley of Mexico); "huejocote," "huexotl" (Nahuatl); "tepehuexote" (Valley of Mexico); "yaga-gueza" (Zapotec); "yutnu-nuu" (Oaxaca, Mixtec, *Reko*).

Stamens 3 or more.

Leaves glaucous or glaucescent beneath.

Branchlets yellow or yellowish, glabrous-----4. *S. wrightii*.

Branchlets reddish or purplish or tomentulose.

Branchlets densely tomentose; leaves densely villous-tomentulose beneath when young; petioles 8 mm. long or less; staminate aments 0.8 to 3 cm. long-----5. *S. jaliscana*.

Branchlets glabrous or sparsely pilose; leaves glabrous beneath or nearly so; petioles mostly over 10 mm. long; staminate aments 4 to 6 cm. long-----6. *S. bonplandiana*.

Leaves green beneath.

Branchlets yellowish or yellowish cinereous; ovary often pilose.

3. *S. gooddingii*.

Branchlets reddish or purplish; ovary glabrous.

Capsule ovoid to elliptic, scarcely attenuate or short-attenuate at the apex; leaf blades linear or linear-lanceolate; stipules eglandular.

1. *S. humboldtiana*.

Capsule ovoid-lanceolate, attenuate at the apex; leaf blades linear-lanceolate to broadly lanceolate; stipules glandular on the inner surface.

2. *S. nigra*.

¹ Named in honor of Dr. D. T. MacDougal (1865-), director of the department of botanical research of the Carnegie Institution, distinguished for his contributions to the knowledge of plant physiology. Dr. MacDougal has made limited collections of plants in Mexico, some of which are in the U. S. National Herbarium.

Stamens 2.

Leaves small or very small, linear or lanceolate, with stomata equally distributed on both surfaces.

Aments short, the staminate ones 5 to 13 mm. long, the pistillate ones in fruit 1.2 to 2 cm. long; anthers globose or short-elliptic, about as broad as long-----7. *S. taxifolia*.

Aments longer, or the anthers elliptic and much longer than broad.

Ovary glabrous or sparsely pilose; staminate flowers with 2 glands.

8. *S. exigua*.

Ovary densely sericeous-villous; staminate flowers with a single gland.

9. *S. thurberi*.

Leaves large or broad, without stomata on the upper surface; leaves rarely small, the ovary then long-stipitate.

Aments appearing in the axils of full-grown leaves, 2 cm. long or shorter.

Ovary glabrous or sparsely pilose.

Branchlets glabrous; leaves glabrous-----11. *S. mexicana*.

Branchlets tomentose; leaves more or less tomentulose beneath.

Leaf buds rostrate, glabrous or sparsely pilose at the apex; pedicels not longer than the bracts-----10. *S. hartwegii*.

Leaf buds merely acute, villous-tomentulose; pedicels longer than the bracts-----12. *S. schaffnerii*.

Aments appearing before or with the leaves.

Aments scarcely 1 cm. long; leaves usually 2 cm. long or less.

17. *S. cana*.

Aments more than 2.5 cm. long; leaves mostly much more than 2.5 cm. long.

Ovary glabrous; stigmas short; filaments glabrous.

Leaf blades lanceolate, oblanceolate, or narrowly elliptic; staminate aments about 12 mm. thick; bracts obovate, very obtuse or truncate-----13. *S. lasiolepis*.

Leaf blades elliptic or elliptic-lanceolate; staminate aments 15 to 20 mm. thick; bracts oblong, acute-----14. *S. rowleei*.

Ovary villous; stigmas lanceolate; filaments pilose at the base.

Bracts narrowly lanceolate, acute or short-acuminate.

15. *S. oxylepis*.

Bracts oblong, obtuse or subtruncate, rarely acutish.

16. *S. paradoxa*.

1. *Salix humboldtiana* Willd. Sp. Pl. 4: 657. 1805.

? *Salix oxyphylla* H. B. K. Nov. Gen. & Sp. 2: 19. 1817.

Salix stipulacea Mart. & Gal. Bull. Acad. Brux. 10¹: 343. 1843.

Salix humboldtiana stipulacea C. Schneid. Bot. Gaz. 65: 7. 1918.

Veracruz to Colima, Chiapas; and Tabasco. Central America and South America; type from Peru.

Large or small tree, sometimes 10 meters high, with a trunk 15 to 30 cm. in diameter. "Sauce," "sauz," "sauz blanco" (Tabasco).

The Mexican specimens, as well as those from Central America, belong to *S. humboldtiana stipulacea*. This differs only slightly from the typical form, which ranges from Colombia to Argentina. A form which is possibly a hybrid between this and *S. bonplandiana* is reported from Oaxaca.

2. *Salix nigra* Marsh. Arb. Amer. 139. 1875.

Salix nigra lindheimerii C. Schneid. Bot. Gaz. 65: 9. 1918.

Coahuila to Tamaulipas, Sinaloa, and Tepic. Widely distributed in eastern North America.

Tree, sometimes 20 or even 40 meters high, with a trunk diameter of a meter, but usually smaller; branches slender, spreading or somewhat drooping; bark rough, blackish, coming off in narrow strips; leaves 6 to 15 cm. long; wood light reddish brown, soft, weak, its specific gravity about 0.44. "Sauz" (Tamaulipas).

The bark is sometimes used in domestic medicine for its reputed tonic, febrifuge, anaphrodisiac, carminative, and stimulant properties. Palmer states that in Tamaulipas a decoction of the bark is used as a lotion for erysipelas. All the Mexican material is referred by Schneider to *S. nigra lindheimeri*, which occurs also in western Texas.

3. *Salix gooddingii* Ball, Bot. Gaz. 40: 376. 1905.

Chihuahua to Baja California and Sinaloa. California to New Mexico; type from Clark County, Nevada.

Shrub or tree, sometimes 12 meters high; bark rough, dark; leaves narrowly lanceolate, 5 to 12 cm. long; capsules glabrous. "Sauz" (Chihuahua).

Palmer reports that a decoction is used in Chihuahua for fevers. A form which may represent a hybrid between this and *S. bonplandiana* is reported from Baja California by Schneider.

4. *Salix wrightii*¹ Anderss. Öfv. Svensk. Vet. Akad. Förh. 15: 115. 1858.

Northern Chihuahua. Western Texas and New Mexico. Type from Texas or Chihuahua.

Shrub or small tree.

5. *Salix jaliscana* Jones, Contr. West. Bot. 12: 77. 1908.

Jalisco, the type from Ferreria; Michoacán (?).

Shrub or small tree; leaves elliptic or elliptic-lanceolate.

6. *Salix bonplandiana* H. B. K. Nov. Gen. & Sp. 2: 20. pl. 101, 102. 1817.

Salix pallida H. B. K. Nov. Gen. & Sp. 2: 20. 1817.

Nearly throughout Mexico; type from Hidalgo. Guatemala; southern New Mexico and Arizona.

Small or large tree, sometimes 12 meters high or more, with a trunk 40 cm. in diameter, the branches slender, somewhat drooping; bark brown, thick, irregularly fissured; leaves lanceolate or linear-lanceolate, 12 cm. long or shorter, 1 to 2 cm. wide. "Sauz" (Jalisco, Baja California); "sauce" (*Urbina*).

7. *Salix taxifolia* H. B. K. Nov. Gen. & Sp. 2: 18. 1817.

Salix microphylla Schlecht. & Cham. Linnaea 6: 354. 1831.

Nearly throughout Mexico; type from Querétaro. Western Texas to Arizona; Guatemala; Porto Rico (?).

Shrub or tree, sometimes 18 meters high, with a trunk 50 cm. in diameter; leaves linear or lanceolate, 3 cm. long or shorter, silvery-silky; capsules pubescent. "Taray," "taray de río" (Durango, *Patoni*); "tarais" (Chihuahua).

8. *Salix exigua* Nutt. N. Amer. Sylv. 1: 75. 1842.

Chihuahua to Baja California. Northward to Canada; type from Oregon.

Shrub, 2 to 4 meters high, or sometimes a tree 7 meters high.

¹ Named for Charles Wright (1811-1885), one of the most famous of American botanical collectors. From 1847 to 1851 he made very large collections in western Texas, southern New Mexico and Arizona, and Chihuahua and Sonora. These were studied by Gray, and many species of northeastern Mexico were first described from Wright's collections. Later Wright obtained an extensive series of plants in Cuba, and also in Nicaragua and other regions. Sets of his plants are in the U. S. National Herbarium.

9. *Salix thurberi*¹ Rowlee, Bull. Torrey Club 27: 252. 1900.
Salix longifolia angustissima Anderss. Öfv. Svensk. Vet. Akad. Förh. 15: 116. 1858.
 Coahuila and Nuevo León; Durango (?). Western Texas (type locality) and southern New Mexico.
 Medium-sized tree.
10. *Salix hartwegii* Benth. Pl. Hartw. 52. 1840.
 Mexico and Michoacán; type from Agangulo, Michoacán.
 Leaves elongate-lanceolate or narrowly elliptic-lanceolate, 3.5 to 9.5 cm. long.
11. *Salix mexicana* Seemen, Bot. Jahrb. Engler 21: Beibl. 52: 9. 1895.
 Hidalgo, Mexico, and Puebla; type from Zacualtipán, Hidalgo.
 Shrub, 3 to 4.5 meters high.
12. *Salix schaffnerii* C. Schneid. Bot. Gaz. 65: 30. 1918.
 San Luis Potosí and Veracruz; type from San Luis Potosí.
 Leaves elliptic-lanceolate, 6 to 9 cm. long.
13. *Salix lasiolepis* Benth. Pl. Hartw. 335. 1857.
 Chihuahua and Coahuila to Baja California. California, the type from Monterey.
 Tree or shrub, 3.5 to 9 or sometimes 16 meters high; bark brown, rather thin, fissured; leaves 6 to 10 cm. long; wood soft, weak, light brown, its specific gravity about 0.56. "Ahuejote" (Baja California).
14. *Salix rowleei* C. Schneid. Bot. Gaz. 65: 31. 1918.
Salix rowleei cana C. Schneid. Bot. Gaz. 65: 34. 1918.
 Mexico (State); type from Eslava.
 Shrub or tree, sometimes 6 meters high, the branchlets villosulous, the branches blackish; leaves elliptic or elliptic-lanceolate, about 7.5 cm. long.
15. *Salix oxylepis* C. Schneid. Bot. Gaz. 65: 34. 1918.
Salix latifolia Mart. & Gal. Bull. Acad. Brux. 10¹: 344. 1843. Not. *S. latifolia* Forbes, 1828.
 Puebla and Veracruz; type from Mount Orizaba.
 Leaves ovate-elliptic or obovate-oblong, 3.5 to 4.5 cm. long.
16. *Salix paradoxa* H. B. K. Nov. Gen. & Sp. 2: 20. 1817.
 ? *Salix pringlei* Rowlee, Bot. Gaz. 27: 136. 1899.
Salix paradoxa ajuscana C. Schneid. Bot. Gaz. 65: 37. 1918.
 Hidalgo to Oaxaca; type from Morán, Hidalgo.
 Shrub or small tree, up to 6.5 meters high; leaves oblong-elliptic, elliptic-lanceolate, or elliptic, 5 to 13 cm. long.
17. *Salix cana* Mart. & Gal. Bull. Acad. Bruz. 10¹: 344. 1843.
 Mount Orizaba, the type locality, and perhaps elsewhere.
 Leaves narrowly oblanceolate.

DOUBTFUL SPECIES.

SALIX ENDLICHII Seemen, Repert. Sp. Nov. Fedde 5: 19. 1908. Described from the Sierra Madre of Chihuahua. Closely related, according to Schneider, to *S. cana*.

¹ George Thurber (1821-1890), a native of Rhode Island, was appointed in 1850 botanist to the United States commission to establish the boundary between the United States and Mexico. He spent five years in making botanical collections, from the Gulf of Mexico to the Pacific Ocean, and discovered many interesting plants, which were described by Gray. He is well known also for his publications upon horticultural subjects.

19. MYRICACEAE. Bayberry Family.

1. MYRICA L. Sp. Pl. 1024. 1753.

REFERENCE: Chevalier, Mém. Soc. Sci. Nat. Cherbourg 32: 85-340. 1901.

Shrubs or small trees; leaves alternate, estipulate, covered with small glands; flowers very small, dioecious, in axillary spikes; fruit small, globose, covered with whitish wax.

Chevalier reports a specimen of *M. hartwegi* S. Wats., collected by Pavón, from Mexico. It is probable that the collection is incorrectly labeled, for that species is confined to California and Oregon, and its known area of distribution is far removed from the Mexican border. Several species of bayberry occur in the United States.

Leaf blades narrowly oblanceolate or oblong-oblanceolate, 5 to 9 cm. long, acute to attenuate-----1. *M. mexicana*.

Leaf blades obovate, 1.5 to 4 cm. long, rounded to acutish at the apex.

2. *M. pringlei*.

1. *Myrica mexicana* Willd. Enum. Pl. 2: 1011. 1809.

Myrica xalapensis H. B. K. Nov. Gen. & Sp. 2: 10. 1817.

Myrica lindeniana C. DC. in DC. Prodr. 16³: 150. 1864.

Jalisco to Tamaulipas, Veracruz, Yucatán, and Chiapas. Guatemala.

Shrub or small tree, 2 to 6 meters high; leaves entire or with a few coarse teeth. "Arbol de la cera" (Hidalgo, Oaxaca, Veracruz, etc.); "huancanalá" (Veracruz, Oaxaca, etc.); "chac olol" (Chiapas, *Seler*).

Myrica lindeniana is considered a distinct species by Chevalier. It is said to differ in having the leaves dentate above the middle, those of *M. mexicana* being entire or dentate only at the apex. The writer has seen no specimens that are certainly referable to *M. lindeniana*, but in view of the fact that the leaves of *M. mexicana* are sometimes coarsely dentate, it does not seem probable that the former is a valid species.

This is a well-known plant in Mexico because of the wax that is obtained from the fruit. The shrub often occurs in great abundance, forming extensive thickets, and the fruit can be gathered in quantity. It is boiled in water, whereupon the wax rises to the surface and is skimmed off. The crude wax is greenish, or often very dark from impurities, but it may be bleached or purified until it is nearly white. It is not uncommon in the markets of Mexico City. It is used for candles, which burn slowly, with very little smoke, emitting a pleasant balsamic odor. It is used also as a substitute for or adulterant of beeswax, and has been tested for making phonograph records. Small quantities have been exported. The aromatic leaves also contain wax, but only in small quantities.

The wax is a popular remedy, taken internally, for jaundice and diarrhœa. A decoction of the root bark is said to be acrid, astringent, and in large doses emetic.

2. *Myrica pringlei* Greenm. Proc. Amer. Acad. 41: 236. 1905.

Myrica parvifolia confusa Chevalier, Mém. Soc. Sci. Nat. Cherbourg 32: 285. 1901.

Hidalgo, Puebla, and Oaxaca; type from "Honey Station," Puebla, in pine forest, altitude 1,740 meters.

Shrub 0.3 to 1 meter high, similar to the preceding species. "Chilpanxohuilt" (Puebla, *Herrera*).

This species also produces wax.

20. JUGLANDACEAE. Walnut Family.

Large shrubs or usually trees, commonly strong-scented; leaves alternate, pinnate; flowers monoecious, small, greenish, arranged in long drooping catkins; fruit a very hard nut, inclosed in a thick dry husk; seeds deeply lobed, usually edible.

Husk of the fruit indehiscent; fruit very rough; staminate catkins solitary, sessile or nearly so.....1. **JUGLANS**.
Husk of the fruit splitting into valves; fruit smooth or nearly so; staminate catkins in 3's, long-pedunculate.....2. **HICORIA**.

1. **JUGLANS** L. Sp. Pl. 997. 1753.

The wood of the larger species of *Juglans* is highly valued because of its hardness, toughness, and durability. That of *J. nigra* L., the black walnut of the United States, is much used for furniture and gunstocks. The bark and fruit are sometimes used for tanning and dyeing. The seeds are edible and are often used in sweetmeats. *Juglans regia* L. ("nogal," "nuez grande," "nuez de Castilla"), the English walnut, native of Europe, is cultivated in Mexico.

Nuts large, 3 to 4 cm. broad.

Leaflets sparsely pilose beneath or glabrate, glabrate on the upper surface.

1. **J. pyriformis**.

Leaflets densely velvety-pilose beneath, stellate-pubescent on the upper surface.....2. **J. mollis**.

Nuts small, 1 to 2.5 cm. broad.

Nuts 1 to 1.5 cm. broad; leaflets narrow, minutely and obscurely serrulate, strongly falcate; shrub or small tree.....3. **J. rupestris**.

Nuts 2 to 2.5 cm. broad; leaflets broad, conspicuously serrate, scarcely falcate; large tree.....4. **J. major**.

1. **Juglans pyriformis** Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 79. 1850. Veracruz and Hidalgo to Jalisco; type from Veracruz.

Doubtless a large tree; leaflets 9 to 15, acute to attenuate. "Nogal."

The material at hand is not very satisfactory and it may be that more than one species is involved. A specimen from Durango (*Palmer* 104) has a conspicuously pyriform nut, but the leaflets are almost completely glabrous beneath. Possibly it represents an undescribed species, but it is referred here for the present. Of this collection Palmer gives the following note: "'Nogal'; 15 to 18 meters high, the trunk 0.6 to 1.2 meters in diameter, the crown wide-spreading; the leaves are thrown in water to stupefy fish."

2. **Juglans mollis** Engelm.; Hemsl. Biol. Centr. Amer. Bot. 3: 163. 1883.

Juglans mexicana S. Wats. Proc. Amer. Acad. 26: 152. 1891.

Nuevo León and San Luis Potosí; type from mountains east of San Luis Potosí.

Small or medium-sized tree, or sometimes 15 to 18 meters high, with a trunk diameter of a meter; bark thick, blackish, deeply furrowed; leaflets usually 9 to 15, acutish to attenuate; catkins 7 to 12.5 cm. long; nut reddish brown, with rounded ridges. "Nogal," "nuez meca" (San Luis Potosí).

The tree is said to be valued highly for its wood, which is sawed and is used for bowls, tubs, and other articles. The husks of the fruit are used to procure a coffee-colored dye. The leaves are heated and applied locally for rheumatism. It may be that *J. mexicana* is a distinct species, but no definite characters are observable in the material at hand.

3. *Juglans rupestris* Engelm. in Sitgreaves, Rep. Zúñi & Colo. 171. *pl.* 15. 1854.
Coahuila and probably in Chihuahua. Western Texas and southern New Mexico (type locality).

Shrub, usually less than 5 meters high, growing in clumps and branched almost to the base, or said to be sometimes a tree 9 meters high; bark smooth and yellowish on young stems, in age thick, furrowed, and broken into plates; leaflets 13 to 23; catkins 5 to 10 cm. long; nuts dark brown; wood hard, weak, close-grained, dark brown, its specific gravity about 0.70. "Nogal."

4. *Juglans major* (Torr.) Heller, *Muhlenbergia* 1: 50. 1900.

Juglans rupestris major Torr. in Sitgreaves, Rep. Zúñi & Colo. 171. *pl.* 16. 1854.

Chihuahua and Durango. Arizona (type locality) and New Mexico.

Tree, sometimes 15 meters high, with a trunk diameter of 1.5 meters, the trunk short, the branches spreading, the bark dark gray, rough; leaflets 9 to 19, 6 to 12 cm. long; wood hard, rather weak, coarse-grained, dark brown, its specific gravity about 0.67. "Nogal silvestre" (Chihuahua).

A decoction of the leaves is said to be taken as a tonic.

2. *HICORIA* Raf. Med. Repos. N. Y. II. 5: 352. 1808.

About a dozen other species of the genus (the hickory trees) occur in the United States. Their wood is very tough and is much used for articles in which strength and elasticity is needed, such as ax handles, wagon wheels, etc. The seeds of most species have an agreeable flavor and large quantities are eaten.

Leaflets 5; bud scales imbricate-----1. *H. mexicana*.
Leaflets 7 to 15; bud scales valvate.

Leaflets 7 or 9, not falcate; shell of the nut thick--2. *H. myristicaeformis*.

Leaflets usually 11 to 15, conspicuously falcate, shell of the nut thin.

3. *H. pecan*.

1. *Hicoria mexicana* (Engelm.) Britton, Bull. Torrey Club 15: 283. 1888.

Carya mexicana Engelm.; Hemsl. Biol. Centr. Amer. Bot. 3: 162. 1883.

San Luis Potosí and Querétaro; type from mountains near Álvarez, San Luis Potosí, at an altitude of 2,400 meters.

Tree, 15 to 18 meters high; leaflets obovate, sessile, about 15 cm. long, acuminate, with a pleasant odor; fruit with a thick husk, the nut somewhat angled. "Nogalillo" (San Luis Potosí).

The leaves are used for wrapping tamales. The wood is used locally.

2. *Hicoria myristicaeformis* (Michx. f.) Britton, Bull. Torrey Club 15: 284. 1888.

Juglans myristicaeformis Michx. f. Hist. Arb. Amér. Sept. 211. 1810.

Carya myristicaeformis Nutt. Gen. Pl. 2: 222. 1818.

Nuevo León. Southeastern United States; type from Charleston, South Carolina.

Large tree, sometimes 35 meters high, with a trunk diameter of a meter; bark dark reddish brown, shallowly fissured into close scales; leaflets 5 to 12 cm. long, acute or acuminate; fruit with a thin husk, the nut rounded, smooth, brown; wood hard, tough, strong, close-grained, light brown, its specific gravity about 0.80.

3. *Hicoria pecan* (Marsh.) Britton, Bull. Torrey Club 15: 282. 1888.

Juglans pecan Marsh. Arb. Amér. 69. 1785.

Carya olivaeformis Nutt. Gen. Pl. 2: 221. 1818.

Nuevo León, San Luis Potosí, and Hidalgo; reported from Oaxaca and probably in some other states. Eastern United States.

Large tree, sometimes reaching a height of 50 meters and a trunk diameter of 2 meters; bark light reddish brown, furrowed into narrow ridges; leaflets ovate or oblong-lanceolate, 8 to 15 cm. long; fruit with a thin husk, the nut rounded, reddish brown, thin-shelled; wood hard, rather brittle and weak, close-grained, light reddish brown, its specific gravity about 0.72. The following names are reported from various parts of Mexico: "Nuez encarcelada," "nuez chiquita," "nogal morado," "pacanero," "nogal de nuez chica," "nuez lisa."

The bark is said to have been used in Mexico in the treatment of intermittent fevers and for dyspepsia. The pecan is grown extensively in the southern United States, and the nuts are an important article of commerce. The kernels have a very agreeable flavor and are eaten alone or in candies and other sweetmeats. Most of the cultivated forms have much larger nuts, with thinner shells, than the wild trees.

21 BETULACEAE. Birch Family.

Shrubs or trees; leaves alternate, deciduous, dentate, the stipules usually deciduous; flowers small, dioecious, in catkins.

Pistillate catkins conelike in fruit, the scales woody; staminate flowers 2 or 3 to each bract; perianth none in the pistillate flowers-----1. **ALNUS**.

Pistillate catkins not conelike, the scales thin; staminate flowers solitary above the bract; perianth present in the pistillate flowers.

Fruit inclosed in a bladder-like closed sac-----2. **OSTRYA**.

Fruit merely subtended by a flat leaflike 3-lobed bract-----3. **CARPINUS**.

1. **ALNUS** Hill, Herb. Brit. 510. 1756.

REFERENCES: Fernald, Proc. Amer. Acad. 40: 24-28. 1904; Bartlett, Proc. Amer. Acad. 44: 609-612. 1909.

Numerous species of *Alnus* occur in the United States. The Mexican alders have often been determined as *A. acuminata* H. B. K., and there are many references in literature to the name, but that species, described from the Andes of Peru, does not occur in Mexico.

The bark of the alders is astringent and rich in tannin. It is used in Mexico for tanning skins, giving them a red color, and it is employed also for dyeing skins, blankets, etc., furnishing various colors according to the substances combined with it. The Nueva Farmacopea Mexicana states that the leaves are used as poultices for wounds, an infusion of the bark as a lotion in cutaneous diseases, a decoction of the bark internally for scrofula and venereal diseases, and a decoction of the fruit as an astringent lotion for inflammation of the throat.

The following vernacular names are reported, but it is impossible to determine the species to which they are applied: "Aile" or "ayle" (Jalisco, Morelos, Oaxaca; from the Nahuatl, "ailitl"); "abedul" (Veracruz, Oaxaca); "olmo del país" (Veracruz, Hidalgo, *Ramírez*); "palo de águila" (Oaxaca, *Reko*); "yaga-bizie" (Oaxaca, Zapotec, *Reko*); "palo de lama" (Guatemala, *Pittier*). The Spanish name "aliso" is used in New Mexico and in some parts of Mexico.

Leaves densely covered beneath with yellow wax glands--1. **A. jorullensis**.
Leaves without glands beneath or the glands remote and inconspicuous.

Mature strobiles 7 to 14 mm. long. Veins very coarse and prominent on the lower surface of the leaves-----2. **A. firmifolia**.

Mature strobiles 20 mm. long or longer.

Petioles pubescent.

Leaf blades broadly rounded at the base, broadly elliptic-ovate.

3. *A. pringlei*.

Leaf blades acute or acutish at the base, ovate or oblong-ovate.

4. *A. oblongifolia*.

Petioles glabrous.

Leaves conspicuously pilose beneath, at least on the nerves.

5. *A. arguta*.

Leaves glabrous beneath or nearly so-----6. *A. glabrata*.

1. *Alnus jorullensis* H. B. K. Nov. Gen. & Sp. 2: 27. 1817.

Along streams, Jalisco to Veracruz and Oaxaca; type from Volcán de Jorullo, Michoacán. Guatemala.

Shrub or tree, 3 to 6 meters high or larger, with smooth, reddish brown branches; leaves oblong or obovate, 7 to 13 cm. long; strobiles 1 to 2 cm. long.

2. *Alnus firmifolia* Fernald, Proc. Amer. Acad. 43: 61. 1907.

State of Mexico; type from Cima Station, at an altitude of 3,000 meters.

Tree, 6 to 12 meters high.

3. *Alnus pringlei* Fernald, Proc. Amer. Acad. 43: 62. 1907.

Type from Uruapam, Michoacán; perhaps also in Durango and Jalisco.

Small tree. "Aliso" (Durango).

Certain doubtful forms are intermediate between this and *A. oblongifolia*, but the type collection appears distinct from the latter species.

4. *Alnus oblongifolia* Torr. U. S. & Mex. Bound. Bot. 204. 1859.

Sonora; perhaps also in Durango and Tepic. Southern New Mexico (type locality) to southern California.

Small or medium-sized tree, sometimes 10 meters high, with a trunk 25 cm. in diameter, the branches reddish brown; bark thin, light brown; leaves 5 to 10 cm. long; catkins 9 cm. long or shorter; strobiles 1 to 1.5 cm. long.

5. *Alnus arguta* (Schlecht.) Spach, Ann. Sci. Nat. II. 15: 205. 1841.

Betula arguta Schlecht. Linnaea 7: 139. 1832.

Alnus arguta cuprea Bartlett, Proc. Amer. Acad. 44: 610. 1909.

Alnus arguta subsericea Bartlett, Proc. Amer. Acad. 44: 610. 1909.

Tamaulipas to Veracruz (type locality), Oaxaca, and Chiapas; apparently also in Chihuahua.

Tree, 6 to 7.5 meters high, the branches brown; leaves ovate or obovate, 4 to 10 cm. long; strobiles 2 to 3 cm. long.

The Chihuahua specimens were referred doubtfully to *A. glabrata* by Bartlett, but seem essentially the same as *A. arguta*. This species has been referred to *A. acuminata* H. B. K., *A. ferruginea* H. B. K., and *A. jorullensis castaneae-folia* (Mirb.) Regel, none of which is known to occur in Mexico.

6. *Alnus glabrata* Fernald, Proc. Amer. Acad. 40: 26. 1904.

Alnus glabrata durangensis Bartlett, Proc. Amer. Acad. 44: 611. 1909.

Hidalgo to Oaxaca; Durango; type from Monte San Nicolás, Guanajuato.

Large or medium-sized tree; leaves oblong-lanceolate or elliptic, coarsely dentate, acuminate. "Aliso" (Durango).

A. glabrata durangensis Bartlett is a form in which the lower surface of the leaves is glaucescent; it may be specifically distinct. Specimens of *A. glabrata* have been reported from Mexico as *A. rhombifolia* Nutt.

2. OSTRYA Scop. Fl. Carn. 414. 1760.

1. *Ostrya guatemalensis* (Winkl.) Rose, Contr. U. S. Nat. Herb. 8: 292. 1905.
Ostrya italica virginiana guatemalensis Winkl. in Engl. Pflanzenreich IV. 61: 22. 1904.

Ostrya mexicana Rose, Contr. U. S. Nat. Herb. 8: 292. 1905.

Veracruz to Tabasco and Chiapas. Guatemala (type locality) to Costa Rica.

Tree, 12 to 15 meters high or smaller, with thin, light brown bark; leaves ovate, doubly serrate; staminate flowers in slender catkins; fruits surrounded by bladder-like bracts, arranged in strobiles like those of common hops (*Humulus lupulus* L.). Commonly known as "guapaque."

This is very closely related to *O. virginiana* (Mill.) Koch, but seems fairly distinct. In the Guatemalan form the pubescence is slightly more copious than in the plants of Veracruz, but there appears to be no essential difference between the two.

The wood of the ironwood is very strong, tough, and durable. It is used for railroad ties and other purposes. The bark is used for dyeing and tanning.

3. CARPINUS L. Sp. Pl. 998. 1753.

1. *Carpinus caroliniana* Walt. Fl. Carol. 236. 1788.

Carpinus caroliniana tropicalis Donn. Smith, Bot. Gaz. 15: 28. 1890.

Veracruz to Jalisco and Chiapas. Guatemala; eastern United States and Canada, the type from Carolina.

Tree, sometimes 12 meters high, the trunk up to 60 cm. in diameter, usually compressed or fluted, the bark thin, smooth, grayish; leaves oblong-ovate, acuminate; staminate catkins 2 to 3 cm. long; wood hard, light brown, very difficult to work, its specific gravity about 0.73. "Lechillo," "palo silo," "palo barranco" (Michoacán, *Altamirano*).

Carpinus caroliniana tropicalis is a form with more copious pubescence than the type. Both forms of the American hornbeam occur in Mexico.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23, PART 2

TREES AND SHRUBS OF MEXICO (FAGACEAE-FABACEAE)

By PAUL C. STANDLEY



WASHINGTON
GOVERNMENT PRINTING OFFICE

1922

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM

II

PREFACE.

The present part of volume 23 of the Contributions is a second installment of the Trees and Shrubs of Mexico, by Mr. Paul C. Standley, assistant curator of the United States National Herbarium. This portion of the work extends from the oak family to the bean family, both inclusive. Some of the largest and most important groups of Mexican plants are included in the families here treated, which contain many species of economic value. The account of the oaks has been prepared by Dr. William Trelease, of the University of Illinois.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

TREES AND SHRUBS OF MEXICO.¹

By PAUL C. STANDLEY.

22. FAGACEAE. Beech Family.

The only representatives of this group native in Mexico are the oaks, which belong to the largest genus of the family. The Old World chestnut ("castaño," the tree; "castaña," the nut), *Castanea sativa* Mill., is said to be cultivated occasionally in Mexico, Oaxaca, and other states.

1. QUERCUS L. Sp. Pl. 994. 1753.

(Contributed by Dr. William Trelease.)

REFERENCE: A. De Candolle in DC. Prodr. 16²: 2-109. 1864.

Trees or shrubs; leaves alternate, deciduous or persistent, entire, toothed, or lobed, the teeth and lobes often bristle-tipped; flowers monoecious, the staminate ones in slender catkins; stamens 6 to 12; pistillate flowers solitary or in small clusters; ovules 6, but only one maturing; fruit an acorn, subtended by an enlarged cup (involucre).

The genus *Quercus* is very abundantly represented in Mexico; indeed, no other country has so large a number of species. In this region the oaks are found chiefly in the mountains. In northern Mexico the species grow at comparatively low altitudes, in the arid mountains, but they occur also at high altitudes in the larger ranges, such as the Sierra Madre. In southern Mexico oaks are almost confined to the high mountains, but a few species occur near sea level.

From an economic standpoint oaks are very important. The wood is of the highest quality, being very strong and durable, although these characters vary in different species. It is used for an infinite variety of purposes, especially where strength is desirable. It is highly valued for furniture and for the interior finish of buildings, for ship building, wagons, railroad ties, and many other purposes. As fuel, also, it is unsurpassed. No other group of hardwood trees furnishes wood which is so widely used, in Mexico as well as elsewhere. The bark, too, is important economically, being one of the most widely used tanbarks. Several species of southern Europe have very thick, corky bark, which furnishes the cork of commerce.

The leaves of oak trees are often punctured by insects, and as a result galls ("manzanitas de encina") are formed. These are frequently of the most beautiful and bizarre forms, and often brilliantly colored. They sometimes contain as much as 60 or 70 per cent of tannic acid, and consequently they are excellent for use in tanning leather. They are widely employed also for making ink.

Oaks are almost unsurpassed as shade trees in temperate regions. Because of their tough wood they are seldom broken by wind. Their broad tops give them a handsome appearance, and they are very long-lived.

The acorns ("bellotas"), too, are of considerable economic importance, although less so now than formerly.² In early times they were an important

¹ The first installment of the Trees and Shrubs of Mexico, comprising the families Gleicheniaceae to Betulaceae, was published as Part 1 of Volume 23, Contributions from the U. S. National Herbarium, pp. 1-170, October 11, 1920.

² See V. Havard, Bull. Torrey Club 22: 118-119. 1895.

food of the American Indians, especially those of California and certain parts of Mexico, and they are still employed to some extent. Acorns contain starch, fixed oil, citric acid, sugar, and astringent and bitter principles. Sometimes they are sweet enough to be eaten raw without preparation, but usually it is necessary to rid them of the bitter principle. This is done by shelling and skinning the seeds, then pounding them into meal. The meal is washed repeatedly in water and then boiled as a mush or baked as cake or bread. White oaks (subgenus *Leucobalanus*) have the sweetest and most palatable acorns and have been the most generally used. All the live oaks (such as *Quercus virginiana*, *Q. pungens*, and *Q. oblongifolia*) are said to have edible acorns, but the black oaks (subgenus *Erythrobalanus*) were not extensively employed. The Indians of the southeastern United States obtained from the acorns of *Q. virginiana* a sweet oil much used in cooking. In more recent times acorns have often been roasted and employed as a substitute for coffee, or as an adulterant of it.

Oaks are of little importance in medicine. In Mexico the staminate catkins are reputed anodine and antispasmodic, being used as remedies for vertigo and epilepsy. The bark and acorns are sometimes used as astringents.

One of the most interesting products of these trees is the lac, widely known in Mexico, which is produced by certain scale insects, or Coccidae. This, presumably, is produced on various species of oaks, and also upon trees and shrubs of other families. The following account, by Urbina,¹ of its production upon *Quercus reticulata*, may be quoted here:

"It seems worth while to mention here the manna which forms on *Quercus acuminata* H. B., an oak which grows at Medina, on the boundary between the States of Michoacán and Mexico, which was studied by Sr. D. Melchor Ocampo, who gave the tree the name of *Quercus mellifera*, its vernacular name being *encina de miel*. According to Dr. Oliva (Lecc. Farm. 2: 84), in May it produces an abundance of a globular rough substance, which turns black and resembles manna. Sr. Dr. D. Manuel M. Villada brought back from an excursion which he made to Medina a branch of this tree, black as if the bark were covered with rubber, due to a fungus which had formed in such quantity that it gave rise to a thick layer, in whose midst appeared very fine threads, long and transparent, like caramel, and which, in my opinion, are produced by a *Coccus* or aphid which feeds on this sugary substance. The excess is emitted in threads whose peculiar form is due to the abdominal tubes of the aphid. The explanation of this seems to me to be the following: In the month of May there is an abundant secretion of glucose produced by the bark of the oak, which is taken advantage of not only by the aphid which make these caramel-like threads, but also by the fungus which attacks the bark.

"Under the circumstances, I believe it desirable that a study be made of this product, which, in the opinion of Sr. Oliva, may be a manna, a presumption apparently justified by the existence of two organisms; the fungus and the *Coccus*, which develop simultaneously, using the same food—the glucose. And as this principle is the dominant one in manna, I believe with Sr. Oliva that this oak under favorable conditions produces this substance, which should be analyzed carefully, after visiting the place where the oak grows, and studying the manner of its formation, in order to confirm or correct this view."

The vernacular names applied to the species of oaks can be given in only a few instances. Many names are found in literature, but the species have been so confused that no confidence can be placed in the determinations. The usual Spanish names are "encina" (live oak) and "roble" (deciduous oak),

¹ Naturaleza 7: 105–106. 1900.

with various modifying adjectives. The following names also are reported for species not identified: "Alcornoque" (Oaxaca, Michoacán; this is properly the name for the Spanish cork oak); "cucharitas," "peñecillo" (Oaxaca, *Reko*); "encina memelita"; "charrasquillo" (Durango, *Patoni*; shrubby species); "encinilla" (Durango, *Patoni*; shrub. 40 cm. high or less).

The usual Nahuatl word for oak is written "ahuatl," "ahuatl," and "aoatl"; the following variants are reported: "Ahoaquahuitl," "ahuaquahuitl," or "aquaquaitl" (oak-tree); "ahuatetz," "auatetz," "ahuatetzmolli," "auatetzmulli" (live oak); "ahuacoztic" (yellow-oak); "ahuatzin pitzahuac" (narrow-leaf oak); "texmole" (Michoacán); "ahuatezon" (Morelos, Mexico); "ahuatomatl" (acorn, literally "oak-tomato"; sometimes corrupted as "aguatomate") Geographic names relating to oak trees are: Ahuatepec, "oak-hill"; Ahuachilpa, "in the red oaks"; Ahuatlán, "near the oaks."

Reko gives the following Zapotec names used in Oaxaca: "Yaga-yoo," "yaga-reche," "yaga-xoo," "yaga-cino," "yaga-zache." Belmar lists the following Mixe names: "Kook" (acorn); "sho"; "shokiup"; "shotiönit" (acorn). Otomí names, according to Buelna, are "mêttza" and "ndezâ" (acorn). González gives the Zoque name as "camay-cuy." A name reported by Ramírez from Michoacán, probably Tarascan, is "tarecuen."

I. Fruit (not known in nos. 6, 7, 11, 15, 21, 26, 28, 34, 39) maturing the first season; shell of acorn not woolly within, the abortive ovules at or near its base; stigmas short and broad, nearly sessile; leaves not aristate, but sometimes with tip and teeth pungently mucronate. *LEUCOBALANUS*.

A. Leaves, or many of them, serrate, never very small.

B. Acorn (so far as known) large or very large (20 to 70 mm. in diameter).

Leaves large.

Acorn depressed-globose-----1. *Q. insignis*.

Acorn short-conical-----2. *Q. strombocarpa*.

Acorn elongate. Teeth of leaf mostly larger.

Acorn very large (40 mm. broad and 60 mm. long). Scales short, in rings-----3. *Q. cyclobalanoides*.

Acorn distinctly smaller (30 mm. broad and 50 mm. long).

4. *Q. excelsa*.

Acorn ovoid-----5. *Q. galeottii*.

Acorn unknown. Leaves rather blunt-toothed.

Leaves distinctly short-petioled-----6. *Q. pinalensis*.

Leaves nearly sessile-----7. *Q. chinantlensis*.

Leaves moderate (scarcely 3 cm. wide and 10 cm. long), sharply serrate.

8. *Q. leiophylla*.

BB. Acorn unknown. Leaves polymorphous on the same twig.

41. *Q. diversifolia*.

BBB. Acorn moderate (scarcely 15 mm. in diameter). Leaves moderate, nearly all toothed.

Leaves finely venulose-reticulate on both faces-----9. *Q. lancifolia*.

Leaves heavily reticulate beneath, rugulose above. 10. *Q. glabrescens*.

AA. Leaves, or many of them, crenate or shallowly round-lobed, never very small. Fruit never very large.

Leaves blue-green, glabrous, somewhat glaucous, coriaceous, not rugose.

Leaves elliptic or oblong, low-crenate-----11. *Q. glaucoides*.

Leaves obovate, more deeply crenate-----12. *Q. glaucophylla*.

Leaves green, or else rugose or not coriaceous.

C. Leaves glabrate or somewhat thinly puberulent.

D. Leaves oblanceolate-ovate. Fruit unknown-----15. *Q. nudinervis*.

- DD. Leaves elliptic-obovate or obovate.
 Leaves subacute, scarcely rugose-----14. *Q. idonea*.
 Leaves very obtuse.
 Leaves somewhat rugose and puberulent-----38. *Q. arizonica*.
 Leaves not rugose, glabrate.
 Leaves finely low-venulose beneath-----15. *Q. nudinervis*.
 Leaves heavily veiny beneath-----16. *Q. standleyi*.
- DDD. Leaves elliptic-oblong, characteristically crenate only above.
 Fruit subsessile; acorn exserted-----19. *Q. sororia*.
 Fruit stout-peduncled; acorn nearly included-----20. *Q. germana*.
- DDDD. Leaves oblanceolate. Cup scales thickened.
 13. *Q. tuberculata*.
 Acorn oblong, rather slender (10 to 15 mm. in diameter, 15 to 25 mm. long.)
 Leaves slender-petioled, round-based-----17. *Q. polymorpha*.
 Leaves short-petioled, subcuneate at base-----18. *Q. juergensenii*.
 Acorn round-ovoid, thicker-----19. *Q. sororia*.
- CC. Leaves transiently silvery beneath, elliptic-oblong or obovate.
 52. *Q. breviloba*.
- CCC. Leaves pale-tomentulose beneath, broadly oblanceolate.
 21. *Q. glaucescens*.
- CCCC. Leaves dingy-puberulent or tomentulose beneath. Peduncle moderate or rather long.
 Leaves not extremely large, distinctly or slenderly petioled.
 Leaves scarcely more than undulate-----30. *Q. peduncularis*.
 Leaves crenate throughout, not very rugose.
 Leaves elliptic-oblanceolate-----22. *Q. martensiana*.
 Leaves subpandurate, becoming glabrate-----23. *Q. liebmannii*.
 Leaves crenate only toward the apex, rugose, pandurate.
 24. *Q. pandurata*.
- Leaves large (20 cm. long or more), very short-petioled or very thick-petioled, rugose.
 Leaves round-obovate, very obtuse. Peduncle thick.
 25. *Q. macrophylla*.
 Leaves more elliptic-obovate and pointed-----26. *Q. resinosa*.
 Leaves oblanceolate-elliptic. Peduncle relatively slender.
 Leaves not pandurate.
 Leaves rather acuminate, crisped-----27. *Q. circinata*.
 Leaves blunt or subacute-----28. *Q. magnoliaefolia*.
 Leaves subpandurately narrowed-----29. *Q. lutea*.
- CCCCC. Leaves tomentulose beneath, rugose. Peduncle long.
 Leaves often very large (15 cm. wide and 25 cm. long), obovate.
 37. *Q. decipiens*.
- Leaves never extremely large.
 Leaves elliptic-oblong.
 Leaves rather large (5 cm. wide and 10 cm. long); peduncle moderate-----30. *Q. peduncularis*.
 Leaves smaller (scarcely 3 cm. wide and 8 cm. long); peduncle filiform-----33. *Q. laeta*.
- Leaves obovate to broadly elliptic.
 Scales of the rather large (20 to 25 mm. broad) cup lax.
 31. *Q. hartwegi*.
 Scales of the smaller cup mostly appressed.
 Leaves broadly pandurate-obovate-----32. *Q. laxa*.

Leaves elongate-obovate, subglabrescent...34. *Q. bonplandiana*.
 Leaves round-obovate or subelliptic.

Leaves crenate.....35. *Q. rugosa*.
 Leaves repandly mucronate, whitened beneath.

36. *Q. reticulata*.

AAA. Leaves, or most of them, entire; fruit nearly sessile.

E. Leaves tomentose beneath and rugose above, or else blue-green or very small.

Leaves relatively large (fully 2 cm. wide and 4 cm. long), very rugose and revolute.

Leaves obovate-elliptic, subcordate.....39. *Q. greggii*.

Leaves broadly elliptic, round-based.....40. *Q. aculcingensis*.

Leaves usually very small (scarcely 2 cm. wide and 3 cm. long).

Leaves rugulose and revolute, rather blunt.

Leaves deciduous.....42. *Q. microphylla*.

Leaves evergreen or nearly so.....43. *Q. repanda*.

Leaves not rugose, commonly acute.....44. *Q. intricata*.

EE. Leaves glabrate (scurfy-puberulent in *Q. grisea*), deciduous.

Leaves neither rugose nor coarsely veiny.

Leaves elliptic or oblong, very obtuse, blue-green.

Leaves relatively narrow (1.5 cm. wide, 4 cm. long). Acorn striate.

45. *Q. engelmanni*.

Leaves characteristically broader (3 cm. wide, 4.5 cm. long).

46. *Q. oblongifolia*.

Leaves very broadly elliptic, more or less puberulent....47. *Q. grisea*.

Leaves lanceolate, acute, very small.....49. *Q. pringlei*.

Leaves not rugose, veiny beneath. Acorn short.....19. *Q. sororia*.

Leaves rugose, undulate, veiny beneath. Acorn elongate.

17. *Q. polymorpha*.

EEE. Leaves canescent beneath, evergreen.

Leaves broadly elliptic, relatively large and usually obtuse.

53. *Q. oleoides*.

Leaves lance-oblong, or elliptic-oblong and pungently acute.

Cup turbinate or rounded; acorn oblong-fusiform...54. *Q. fusiformis*.

Cup umbonate; acorn conical.....55. *Q. brandegei*.

AAAA. Leaves, or many of them, pungently dentate or low-serrate.

Leaves canescent beneath.

Cup turbinate or rounded; acorn subfusiform.....54. *Q. fusiformis*.

Cup umbonate; acorn conical.....55. *Q. brandegei*.

Leaves not canescent.

Leaves moderate, elliptic-obovate.

Peduncle elongate; leaves rugose.

Margin of leaves with crenate toothings.....35. *Q. rugosa*.

Margin of leaves with repand toothings.....36. *Q. reticulata*.

Margin variously entire to crenate-dentate.....41. *Q. diversifolia*.

Peduncle short; leaves only slightly rugose, puberulent.

38. *Q. arizonica*.

Leaves commonly very small; peduncle never very long.

Leaves ovate, the minute teeth near the apex, glabrous. 50. *Q. toumeyl*.

Leaves polymorphous in outline and margin.....51. *Q. dumosa*.

Leaves elliptic-ovate, toothed throughout, pubescent.

Teeth of leaves very short (1 mm.); pubescence rather woolly.

44. *Q. intricata*.

Teeth long (3 to 4 mm.); pubescence rather velvety. 48. *Q. pungens*.

II. Fruit maturing the second season; shell of acorn woolly within, the abortive ovules lateral; stigmas short and rounded, nearly sessile; leaves entire to pungently but not aristately toothed. *PROTOBALANUS*.

Leaves for a time tomentose, rather large; a tree-----56. *Q. tomentella*.

Leaves glabrate, rather small; a shrub-----57. *Q. palmeri*.

III. Fruit (not known in nos. 66, 70, 72, 75, 89, 92, 94, 95, 102, 103, 109, 112) often maturing the second season; shell of acorn woolly within, the abortive ovules characteristically apical; stigmas spatulate, on elongate styles; leaves entire or toothed or often incised, the tip and teeth often aristate. *ERYTHROBALANUS*.

A. Leaves small, coriaceous, not rugose, usually rather pungently few-toothed.

Leaves elliptic-ovate, more or less scurfy.

Toothing of leaves repand-----58. *Q. emoryi*.

Toothing of leaves serrate-----60. *Q. eduardi*.

Leaves lanceolate.

Leaves tomentulose beneath-----59. *Q. durifolia*.

Leaves glabrous, or in the first subtomentose.

Leaves veiny, rather elongate-----61. *Q. devia*.

Leaves not veiny-----91. *Q. depressa*.

Leaves broadly oblong or obovate-oblong-----93. *Q. sideroxyla*.

AA. Leaves usually moderately large, scarcely coriaceous, all, or most of them, entire.

B. Leaves firmly tomentulose beneath, rugose, lanceolate. 62. *Q. hypoleuca*.

BB. Leaves firmly woolly beneath, rugose, broad.

Leaves obovate.

Leaves not aristate. Tomentum rather straight-----68. *Q. fulva*.

Leaves aristate from the veins-----70. *Q. chicamolensis*.

Leaves ovate to oblong, not aristate from the veins---71. *Q. dysophylla*.

BBB. Leaves somewhat loosely fleecy beneath, rather large.

Leaves rugose-----66. *Q. floccosa*.

Leaves not rugose-----92. *Q. orizabae*.

BBBB. Leaves detachably woolly beneath, granular when denuded, rugose, narrow.

Cup rounded, not inrolled at margin-----96. *Q. mexicana*.

Cup turbinate, inrolled at margin-----97. *Q. crassipes*.

BBBBB. Leaves sparsely stellate-hairy beneath, moderate.

80. *Q. oajacana*.

BBBBBB. Leaves sparsely scurfy, rather small.

Leaves rugose, subcordate.

Leaves elliptic-ovate-----99. *Q. castanea*.

Leaves oblong-----100. *Q. rugulosa*.

Leaves coarsely bullate rather than rugose-----80. *Q. oajacana*.

BBBBBBB. Leaves glabrate, but sometimes with axillary tufts of hairs beneath.

Leaves very rugose, large, acute, cordate-----75. *Q. rysophylla*.

Leaves neither very rugose nor very large.

Leaves characteristically very blunt and rather broad.

Acorn thick-walled; leaves slightly rugose.

Leaves granular and glabrous beneath----76. *Q. nectandraefolia*.

Leaves not granular, somewhat persistently floccose.

77. *Q. lingvaefolia*.

Acorn thin-walled; leaves not rugose.

Leaves broadly elliptic or oblong.

- Leaves not aristate from the veins, round-based. Cup turbinate.
 Twigs glabrescent-----78. *Q. perseaeifolia*.
 Twigs tomentose-----79. *Q. pubinervis*.
 Leaves sometimes aristate, cordate-----73. *Q. aristata*.
 Leaves narrowly oblong-----81. *Q. totutlensis*.
 Leaves characteristically acute.
- C. Leaves narrowly lanceolate (five times as long as broad).
 82. *Q. salicifolia*.
- CC. Leaves broadly lanceolate (scarcely four times as long as broad).
 Leaves rather large (fully 6 cm. wide and 10 cm. long).
 74. *Q. uruapanensis*.
- Leaves moderately small.
 Cup turbinate saucer-shaped-----83. *Q. ghiesbreghtii*.
 Cup half-round, deeper.
 Cup rather large (15 mm. broad)-----84. *Q. tlapuxahuensis*.
 Cup smaller (scarcely 12 mm. broad).
 Petiole relatively long (10 mm.)-----85. *Q. lanceolata*.
 Petiole short (5 mm.)-----90. *Q. ocoteaeifolia*.
- CCC. Leaves ovate-elliptic.
 Leaves somewhat revolute-----77. *Q. linguaefolia*.
 Leaves not revolute-----92. *Q. orizabae*.
- CCCC. Leaves lanceolate-oblong-----86. *Q. laurina*.
- AAA. Leaves rather large, undulate or pungently dentate, rugose, tomentose.
 67. *Q. crassifolia*.
- AAAA. Leaves, or many of them, serrate, scarcely coriaceous.
- D. Leaves very rugose, or else densely tomentulose beneath.
- E. Leaves tomentulose beneath.
 Leaves very rugose.
 Leaves large, obovate, toothed above-----63. *Q. scytophylla*.
 Leaves rather small (scarcely 4 cm. wide and 6 cm. long), subcordate.
 Leaves obovate-----64. *Q. omissa*.
 Leaves oblong-----65. *Q. pulchella*.
- Leaves only slightly rugose, large.
 Leaves oblong-oblong-----111. *Q. calophylla*.
 Leaves obovate-----112. *Q. candicans*.
- EE. Leaves sparingly fleecy beneath, rather large. Teeth few.
 66. *Q. floccosa*.
- EEE. Leaves tomentose beneath.
 Leaves rather large.
 Leaves obovate-elliptic, the teeth few, toward the end--68. *Q. fulva*.
 Leaves ovate-elliptic, the teeth usually numerous and coarse.
 69. *Q. stipularis*.
- Leaves small (scarcely 3 cm. wide and 6 cm. long).
 Leaves rather ovate-----71. *Q. dysophylla*.
 Leaves elliptic-oblong-----72. *Q. splendens*.
- DD. Leaves only slightly rugose, scurfy or fleecy beneath.
 Leaves oblong-elliptic, the teeth toward the end, scurfy.
 Petiole moderate (often 10 mm. long)-----94. *Q. chrysophylla*.
 Petiole short (5 mm.). Leaves often lanceolate and entire.
 95. *Q. tridens*.
- Leaves lanceolate or oblong.
 Teeth toward the apex of the blade-----98. *Q. lanigera*.
 Teeth along the side of the blade-----99. *Q. castanea*.

DDD. Leaves not rugose.

Leaves furfuraceous beneath. Teeth small-----107. *Q. furfuracea*.

Leaves glabrate, but sometimes with axillary tufts beneath.

Leaves thick and small, scarcely venulose-----91. *Q. depressa*.

Leaves thin, or else veiny.

Leaves moderate in size (scarcely 4 cm. wide and 12 cm. long).

F. Leaves lanceolate or lance-oblong; teeth small.

Leaves rather broad, or rounded at base.

Leaves evergreen, subcoriaceous-----61. *Q. devia*.

Leaves deciduous.

Leaves not very veiny-----106. *Q. sartorii*.

Leaves very venulose-----108. *Q. grahami*.

Leaves narrower (four times as long as broad), and subacute at base.

Leaves neither revolute nor very prominently veiny.

89. *Q. affinis*.

Leaves somewhat revolute and more venulose.

102. *Q. cortesii*.

FF. Leaves ovate-lanceolate, venulose-----108. *Q. grahami*.

FFF. Leaves oblanceolate, with coarse teeth.

Twigs and petioles glabrous-----87. *Q. major*.

Twigs and petioles pubescent-----88. *Q. barbinervis*.

FFFF. Leaves oblong, rather pungently toothed. 93. *Q. sideroxylla*.

Leaves large, with rather coarse teeth.

Leaves lanceolate or oblanceolate.

Leaves elongate (four times as long as broad), much crisped.

103. *Q. huitamalcana*.

Leaves broader (three times as long as broad), scarcely crisped.

Acorn moderately small.

Acorn depressed, nearly included-----101. *Q. grandis*.

Acorn ovoid, scarcely half included.

Leaves evergreen-----109. *Q. acutifolia*.

Leaves deciduous-----110. *Q. xalapensis*.

Acorn very large (40 mm. long)-----104. *Q. chiapasensis*.

Leaves ovate. Acorn very large-----105. *Q. skinneri*.

1. *Quercus insignis* Mart. & Gal. Bull. Acad. Brux. 10³: 219. 1843.

Veracruz; type locality, on the flanks of Mount Orizaba.

Large deciduous tree with stout villous twigs; buds glabrous, 5 to 7 mm. in diameter, 10 to 15 mm. long; leaves large (4 to 7 cm. wide, 9 to 16 cm. long), rugose, somewhat hairy beneath, oblanceolate-obovate, obtuse or submucronate, short-petioled, usually short-serrate above; acorn depressed, blunt, 50 to 70 mm. in diameter, half-included, the saucer-shaped cup with thick squarrose scales. "Encina," "aoatl," "ahoaquahuitl" (*Ramírez*).

2. *Quercus strombocarpa* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 176. 1854.

Veracruz; type locality, San Bartolomé.

Resembling the preceding; leaves large (6 to 9 cm. wide, 14 to 17 cm. long), elliptic-obovate; acorn conical, pointed, 50 mm. in diameter, the lower third included in the very turbinate cup. "Encina," "aoatl," "ahoaquahuitl" (*Ramírez*.)

3. *Quercus cylobalanoides* Trel. Proc. Amer. Phil. Soc. 54: 11. 1915.

Chiapas; type locality, Finca Irlanda.

Large deciduous tree with stout glabrous twigs; leaves large (6 to 9 cm. wide, 15 to 25 cm. long), glabrous, oblanceolate, acute, short-petioled, coarsely and acutely mucronate-serrate; acorn elongate-ovoid, 40 to 50 mm. in diameter, 50 to 60 mm. long, one-third included, the turbinate goblet-shaped cup with abortive scales connate in rings.

4. *Quercus excelsa* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 174. 1854.

Veracruz; type locality, Matlaluga.

Twigs rather slender, glabrous; buds glabrous, small; leaves deciduous, large (5 to 11 cm. wide; 15 to 25 cm. long), glabrous, oblanceolate, acute or subacuminate, subsessile or short-petioled, mostly cuneate, subentire or typically coarsely but acutely serrate to below the middle; acorn ovoid or elongate-ovoid, characteristically 25 to 30 mm. in diameter, 40 to 50 mm. long, the very shallow saucer-shaped cup closely covered by rather small and blunt scales.

5. *Quercus galeottii*¹ Mart. Bull. Acad. Brux. 10²: 220. 1843.

Veracruz; type locality, Santiago de Huatusco.

Rather large (subevergreen?) tree with stout glabrescent twigs and small glabrous buds; leaves large (5 to 7 cm. wide, 12 to 17 cm. long), glabrous, oblanceolate, acute, subcuneately short-petioled, acutely low crenate-serrate; acorn broadly ovoid, 25 to 40 mm. in diameter, 30 to 40 mm. long, one-third included, the more or less flaring, rounded cup with subappressed pointed scales.

6. *Quercus pinalensis* Trel.

Quercus cuneifolia Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 189. 1854.

Not *Q. cuneifolia* Raf. 1838.

Type from Cerro de Pinal.

Twigs rather slender, glabrous; leaves (deciduous?) large (6 to 10 cm. wide, 15 to 25 cm. long), glabrous, broadly oblanceolate, acute, more or less cuneate, short-petioled, coarsely and bluntly serrate-lobed; fruit unknown.

7. *Quercus chinantlensis* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 179. 1854.

Veracruz; type locality, Lacoba.

Twigs rather slender, glabrous; leaves (deciduous?) large (5 to 6 cm. wide, 14 cm. long), glabrous, oblanceolate, long-acute or subacuminate, subsessile, cuneate and entire below, very coarsely and rather bluntly repand-serrate above; fruit unknown.

¹ Henri Galeotti was born in France in 1814. He sailed from Hamburg for Mexico in 1835, reaching Veracruz in December. He spent six months at Jalapa, collecting living plants, especially orchids. He passed on to Vigas and Perote, and finally Puebla and Mexico. He botanized at various times in the state of Mexico, part of the time in company with Ehrenberg. In 1835 he spent two or three months in Hidalgo. At the end of that year he visited Querétaro and later Jalisco and Tepic, and in 1837 Guanajuato. He ascended Popocatepetl in June, 1837; in July he visited Michoacán, and in December Aguascalientes and San Luis Potosí. In April, 1838, he returned to Veracruz and made his headquarters at the German colony at Mirador. In August of that year, in company with Funck, Linden, and Ghiesbreght, he ascended the Pico de Orizaba, remaining with his companions for 11 days in a cavern on the mountain. In 1839 he visited Puebla and Oaxaca. In 1840 he returned to Europe, where he became director of the Botanical Garden of Brussels. He died in 1858. Descriptions of some of the new species discovered were published by himself and Martens in the Bulletin de l'Académie Royale de Belgique.

8. *Quercus leiophylla* A. DC. in DC. Prodr. 16²: 71. 1864.

Veracruz; type locality, San Bartolomé.

Deciduous tree with rather slender glabrous twigs and small rounded glabrous buds; leaves rather small (2 to 3 cm. wide, 7 to 12 cm. long), glabrous, lanceolate or oblanceolate, acute at both ends, short-petioled, subentire to typically coarsely serrate above the middle; acorn ovoid, 20 mm. in diameter, 30 mm. long, one-third included, the half-round cup with acute appressed scales.

9. *Quercus lancifolia* Cham. & Schlecht. Linnaea 5: 78. 1830.

Veracruz; type locality, Jalapa.

Deciduous tree with slender glabrous twigs and small glabrous buds; leaves rather small (2 to 3 cm. wide, 8 to 12 cm. long), glabrous, venulose, flat, slightly paler beneath, lanceolate, acute at both ends, subentire or coarsely, serrate above; acorn elongate-ovoid, scarcely 15 mm. in diameter and 25 mm. long, the saucer-shaped cup with blunt appressed scales.

10. *Quercus glabrescens* Benth. Pl. Hartw. 56, 348. 1840.

Hidalgo and Veracruz; type from Real del Monte, Hidalgo.

Deciduous tree with slender, stellate-villous or glabrate twigs and small glabrous buds; leaves rather small (3 cm. wide, 6 to 10 cm. long), rugulose and glabrate above, often stellate-pubescent beneath, elliptic-oblong or lanceolate, acute, mostly rounded at base, short-petioled, coarsely serrate above with revolute notches; acorn ovoid, 10 mm. in diameter, 15 mm. long, less than one-third included, the shallow cup with acute, rather lax scales.

An entire-leaved form is f. *integrifolia* Liebm. in DC. Prodr. 16²: 35. 1864.

11. *Quercus glaucoides* Mart. & Gal. Bull. Acad. Brux. 10²: 209. 1843.

Quercus cordata Mart. & Gal. Bull. Acad. Brux. 10²: 211. 1843.

Oaxaca; type locality, in the Mixteca Alta.

Medium-sized deciduous tree with slender, glabrescent, and often lightly glaucous twigs, and small, at first hairy buds; leaves moderate (4 cm. wide, 8 cm. long), blue-green, glabrescent, slightly glaucous beneath, subelliptic, obtuse, cordate, short-petioled, rather crenately repand above; acorn unknown, the small half-round cup with acute appressed scales.

12. *Quercus glaucophylla* Seemen, Bot. Jahrb. Engler 29: 95. 1900.

Oaxaca; type locality, San Felipe.

Differing from the preceding in its obovate crenate leaves; acorn ovoid, half-included, 10 mm. in diameter and 15 mm. long.

13. *Quercus tuberculata* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 181. 1854.

Sinaloa (?); type locality somewhere in the western Sierra Madre.

Deciduous glabrous tree with rather slender twigs and small buds; leaves moderate (3 to 5 cm. wide, 8 to 10 cm. long), elliptic-oblanceolate, rather obtuse at both ends or the base very acute, short-petioled, crenate and often crisped; acorn round-ovoid, 12 mm. in diameter, 15 mm. long, scarcely one-third included, the suburceolate cup with keeled or tuberculate, acute, appressed scales.

14. *Quercus idonea* Goldman, Contr. U. S. Nat. Herb. 16: 321. 1916.

Baja California; type locality, Sierra de la Laguna.

Small deciduous tree with rather slender twigs and small buds; leaves moderate or rather large (4 to 6 cm. wide, 10 to 12 cm. long), puberulent or glabrate, elliptic to ovate or oblong, rather acute at both ends or the base subtruncate, short-petioled, crisped, somewhat coarsely subcrenate, especially above; acorn oblong-ovoid, 10 to 15 mm. in diameter, 20 to 25 mm. long, the deeply saucer-shaped cup with acute subappressed scales. "Encina roble."

15. *Quercus nudinervis* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 182. 1854.

Type locality, in the Cerro de Pinal.

Twigs moderate, glabrous; leaves large (5 to 9 cm. wide, 13 to 17 cm. long), glabrescent, obovate or oblanceolate, obtuse or bluntly acuminate, rather decurrent on the short moderate petiole, low-crenate; fruit unknown.

16. *Quercus standleyi* Trel., sp. nov.

Sonora; type in the U. S. National Herbarium, no. 635607, collected in the Sierra de Alamos, in 1910, by Rose, Standley, and Russell (no. 12789).

Deciduous glabrous tree with rather slender orange-brown twigs and small round buds with tomentulose-ciliate scales; leaves rather large (6 to 12 cm. wide, 15 to 24 cm. long), elliptic-obovate, obtuse at both ends, short-petioled, coarsely crenate, paler beneath, with white veins and margin; fruit unknown.

17. *Quercus polymorpha* Cham. & Schlecht. Linnaea 5: 78. 1830.

Quercus petiolaris Benth. Pl. Hartw. 55, 348. 1840.

Quercus varians Mart. & Gal. Bull. Acad. Brux. 10²: 214. 1843.

Veracruz, Nuevo León, and San Luis Potosí; type locality, near Jalapa, Veracruz. Said to be the chief component of the forest on the Uaxac Canal, Guatemala.

Medium-sized deciduous tree with rather slender glabrous twigs and somewhat hairy buds 4 mm. in diameter and 6 mm. long; leaves rather large (3 to 6 cm. wide, 7 to 13 cm. long), lightly glaucous and sometimes rusty-woolly beneath, ovate-lanceolate or elliptic, obtuse, often subcordate, slender-petioled, entire or crenately few-toothed at end; acorn oblong, about 10 mm. in diameter and 20 mm. long, half included, the rounded cup with acute appressed scales. "Encina" (*Ramírez*).

18. *Quercus juergensenii*¹ Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 188. 1854.

Quercus jurgensii A. DC. in DC. Prodr. 16²: 78. 1864.

Oaxaca; type locality, Chinantla.

Apparently closely related to the preceding, with short-petioled, cuneate, rather large leaves (4 cm. wide, 7 to 10 cm. long), and oblong acorns 15 mm. in diameter and 20 to 25 mm. long.

Not recently recognized.

19. *Quercus sororia* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 175. 1854.

Oaxaca; type locality, Chinantla.

Twigs rather slender, glabrescent; buds small, glabrous; leaves deciduous, moderate (4 cm. wide, 10 cm. long), slightly glaucous and exceptionally fleecy beneath, elliptic-oblong, obtuse, rounded at base or subcordate, short-petioled, entire; acorn round-ovoid, 15 mm. in diameter and 20 mm. long, one-third included, the rounded cup with thin, acute, rather loose scales.

20. *Quercus germana* Cham. & Schlecht. Linnaea 5: 78. 1830.

Veracruz and adjacent San Luis Potosí; type locality, Jalapa, Veracruz.

Deciduous tree with rather slender glabrous twigs; leaves oblong, medium-sized (4 cm. wide, 10 cm. long), rather obtuse, round-based, glabrous, slightly glaucous beneath, short-petioled, crenately few-toothed at end; acorn subglobose, 15 mm. in diameter, nearly included, the round cup with rather coarse keeled acute appressed scales.

¹ Little is known of Jürgensen, who collected in Mexico for Galeotti, after the latter left that country. His collections were obtained chiefly in the state of Oaxaca.

21. *Quercus glaucescens* Humb. & Bonpl. Pl. Aequin 2: 29. 1809.

Sinaloa; type locality, Caieguala.

Large deciduous tree with rather slender glabrous twigs and small glabrous buds; leaves large (5 to 8 cm. wide, 12 to 16 cm. long), densely pale-tomentulose beneath, broadly oblanceolate, obtuse or bluntly subacuminate, cuneate at base, short-petioled, repand or bluntly few-toothed toward the end; fruit unknown. "Encina memelito" (*Ramírez*).

22. *Quercus martensiana* Trel.

Quercus affinis Mart. & Gal. Bull. Acad. Brux. 10³: 222. 1843. Not *Q. affinis* Scheidw. 1837.

Veracruz; type locality, Zacuapam.

Deciduous tree with rather slender glabrescent twigs and small hairy buds; leaves rather large (3 to 5 cm. wide, 12 cm. long), glabrescent above, somewhat tomentulose and hairy beneath, elliptic-oblanceolate to ovate, obtuse at both ends or mucronate and somewhat cordate, short-petioled, subentire or undulate or repandly few-toothed; acorn subglobose, 10 to 15 mm. in diameter, half included, the rounded cup with thin blunt appressed scales.

23. *Quercus liebmannii* Oerst. in Liebm. Chênes Amér. Trop. 16. 1869, name only.

Oaxaca; type locality, Cuesta de San Juan del Estado.

Twigs rather slender, reddish, glabrescent; buds small, glabrescent; leaves (deciduous?) large (5 to 7 cm. wide, 13 to 17 cm. long), subpersistently pale-tomentulose beneath, oblanceolate-obovate, bluntly subacuminate, the narrowed base subcordate, short-petioled, crenate-sinuate; fruit unknown.

24. *Quercus pandurata* Humb. & Bonpl. Pl. Aequin. 2: 28. 1809.

Quercus obtusata pandurata A. DC. in DC. Prodr. 16³: 27. 1864.

Michoacán; type locality, Ario.

Small (deciduous?) tree with rather slender glabrescent twigs and small, transiently fleecy buds; leaves rather large (6 cm. wide, 14 cm. long), finely stellate-scurfy beneath, pandurately oblanceolate-oblong, rather acute, rounded or subtruncate at base, moderately petioled, crenate or somewhat shallowly and bluntly toothed above; mature fruit unknown, the young cups with acute, somewhat keeled, appressed scales.

With very obtuse, more elongate, and entire leaves it is *Q. obtusata* Humb. & Bonpl. (op. cit. 26. 1809).

25. *Quercus macrophylla* Née, Anal. Cienc. Nat. 3: 274. 1801.

Quercus magnoliaefolia macrophylla A. DC. in DC. Prodr. 16³: 27. 1864.

Coahuila to Jalisco, Guerrero, and San Luis Potosí; type locality, between Tixtla and Chilpancingo, Guerrero.

Rather small deciduous tree with stout, yellow-tomentulose but glabrescent twigs, and glabrescent buds 6 mm. in diameter and 10 mm. long; leaves very large (13 to 30 cm. wide and 25 cm. long or more), subglabrescent above, usually persistently tomentulose beneath, round-obovate, very obtuse, rounded or slightly auriculate-cordate at base, subsessile, crisped, undulate to coarsely crenate-toothed; acorn elongate-ovoid, 20 mm. in diameter, 35 mm. long, scarcely half included, the broad cup with subappressed acute scales.

26. *Quercus resinosa* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 182. 1854.

Sonora ?; type locality somewhere in the western Sierra Madre.

Deciduous tree with stout tomentulose twigs; leaves large (10 to 15 cm. wide, 20 to 30 cm. long), glabrescent above, gray-puberulent beneath and resinous-punctate along the veins, oblanceolate-obovate, obtuse or subacute, slightly cordate, crisply repand, on short thick petioles; fruit unknown.

27. *Quercus circinata* Née, Anal. Cienc. Nat. 3:272. 1801.

Type locality, between Tixtla and Chilpancingo, Guerrero.

Small deciduous tree, 8 to 10 meters high, with stout, tomentulose or glabrescent twigs and small canescent buds; leaves large (6 to 10 cm. wide, 15 to 25 cm. long), glabrate above, velvety beneath, oblanceolate, blunt-acuminate, rounded at base, short-petioled, crisped, crenate-toothed; acorn elongate-ovoid, 15 mm. in diameter, 20 to 30 mm. long, one-third included, the half-round cup with acute appressed scales. "Encina roble." (Micheacán, Guerrero).

28. *Quercus magnoliaefolia* Née, Anal. Cienc. Nat. 3:268. 1801.

Type locality, between Tixtla and Chilpancingo, Guerrero.

Like the preceding; differing little except in its more oblanceolate-obovate, less acuminate, and less crenate leaves.

29. *Quercus lutea* Née, Anal. Cienc. Nat. 3:268. 1801.

Type locality, between Tixtla and Chilpancingo, Guerrero.

Like the preceding; differing little except in its somewhat pandurate leaves.

30. *Quercus peduncularis* Née, Anal. Cienc. Nat. 3:270. 1801.

Quercus tomentosa Willd. Sp. Pl. 4:437. 1805.

Type locality, in the western Sierra Madre, above the Río Mescala, between Acapulco and Mexico City.

Small (deciduous?) tree, with moderate glabrescent twigs and small hairy buds; leaves rather large (5 cm. wide, 12 cm. long), scurfy along the midrib above and rather thinly woolly beneath, elongate-elliptic, subacute, somewhat cordate, short-petioled, sinuate; fruit stalked; acorn ovoid, 10 mm. in diameter, 15 mm. long, less than half included, the rather shallow cup with acute appressed scales. "Encina" (*Ramírez*).

31. *Quercus hartwegi* Benth. Pl. Hartw. 432. 1840.

Quercus obtusata hartwegi A. DC. in DC. Prodr. 16²:27. 1864, in part.

Quercus pandurata hartwegi Wenzig, Jahrb. Bot. Gart. Berlin 3:197. 1884.

Type locality, Tuxpan, near Angangueo, Michoacán.

Deciduous tree with moderate glabrescent twigs and small hairy buds; leaves moderate (4 to 5 cm. wide, 7 to 8 cm. long), characteristically velvety beneath and along the midrib above, broadly elliptic or sometimes pandurately obovate, obtuse, slightly cordate, short-petioled, repand to coarsely crenate or toothed; fruit often long-stalked; acorn round-ovoid, 15 mm. in diameter, half included, the flaring saucer-shaped cup 20 to 25 mm. in diameter, with acute, rather loose scales.

32. *Quercus laxa* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854:181. 1854.

Quercus xylinea Scheidw. Hort. Belg. 1837:321. 1837.

Quercus reticulata laxa Wenzig, Jahrb. Bot. Gart. Berlin 3:195. 1884.

Jalisco, Tepic, Colima, and Michoacán; type locality, somewhere in the western Sierra Madre.

Very like the preceding; fruiting cup smaller (15 mm. broad), with more keeled and appressed scales.

33. *Quercus laeta* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854:179. 1854.

Quercus pandurata laeta Wenzig, Jahrb. Bot. Gart. Berlin 3:197. 1884.

San Luis Potosí, Mexico, and Puebla; type locality, Grande.

Twigs rather slender, somewhat scurfy or glabrescent; buds small, glabrescent; leaves rather small (2 to 3 cm. wide, 7 to 8 cm. long), short-tomentose beneath and on the midrib above, lanceolate or oblong-elliptic, obtuse, rounded at base, very short-petioled, entire or crenate; fruit slender-peduncled; acorn ovoid, 10 mm. in diameter, 15 mm. long, the thin half-round cup with small subacute appressed scales.

34. *Quercus bonplandiana* Sweet, Hort. Brit. 370. 1826.

Quercus ambigua Humb. & Bonpl. Pl. Aequin. 2: 51. 1809. Not *Q. ambigua* Michx. 1901.

Hidalgo; type locality, Morán.

Very like the preceding; differing in its more narrowly obovate, low-crenate, longer-petioled leaves; fruit unknown.

35. *Quercus rugosa* Née, Anal. Cienc. Nat. 3: 275. 1801.

Quercus spicata Humb. & Bonpl. Pl. Aequin. 2: 46. 1809.

Quercus macrophylla rugosa Wenzig, Jahrb. Bot. Gart. Berlin 3: 198. 1884.

Hidalgo; type locality, in the Cerro de las Navajas, near Morán.

Twigs rather stout and tomentose; buds small, subpubescent; leaves deciduous, moderate (3 to 5 cm. wide, 8 to 10 cm. long), glabrate above, dingy-tomentose and reticulate-veiny beneath, elliptic-obovate, obtuse, cordate, rather short-petioled, callously crenate or coarsely and subpungently low-serrate above; fruit long-peduncled; acorn unknown, the rather small shallow cup with acute appressed scales.

36. *Quercus reticulata* Humb. & Bonpl. Pl. Aequin. 2: 40. 1809.

Chihuahua to Mexico and Oaxaca; type locality, Santa Rosa to Guajuato.

Rather large deciduous tree with moderate, somewhat tomentose twigs and small glabrescent buds; leaves rather small (3 to 4 cm. wide, 6 to 7 cm. long), rugose, stellate or brown-tomentose beneath, the midrib scurfy above, obovate, very obtuse, rounded at base or subcordate, short-petioled, repandly callous-dentate above; fruit peduncled; acorn ovoid, 10 mm. in diameter, 15 to 20 mm. long, scarcely half included, the rounded cup with acute, appressed or loose scales; wood hard, close-grained, brown, its specific gravity about 0.95. "Palo colorado" (San Luis Potosí, *Palmer*); "encina de miel" (San Luis Potosí, Mexico); "encina" (San Luis Potosí); "encina quiebra-hacha" (Hidalgo *Villada*); "aoatl," "ahoquahuitl" (Nahuatl, *Ramírez*); "chaparro," "encina prieta" (Oaxaca, *Seler*); "tnu-yaha," "tnu-yáa" (Oaxaca, Mixtec, *Seler*).

Palmer reports the use of the acorns as a substitute for coffee in San Luis Potosí.

37. *Quercus decipiens* Mart. & Gal. Bull. Acad. Brux. 10³: 214. 1843.

Veracruz; type locality, Mirador.

Moderately large deciduous tree with rather stout glabrescent twigs and medium-sized rusty-hairy buds; leaves unusually large (12 to 16 cm. wide, 18 to 25 cm. long), glabrate above, more or less puberulent and whitened beneath, obovate, bullate, short-petioled, very obtuse, repand or low-toothed above; fruit very long-peduncled (peduncle up to 25 cm. long); acorn oblong, 12 mm. in diameter, 20 mm. long, scarcely one-third included, the half-round cup with acute, rather loose scales.

38. *Quercus arizonica* Sarg. Gard. & For. 8: 92. 1895.

Sonora and Chihuahua. Arizona; type locality, Huachuca Mountains.

Deciduous shrub or small tree with slender tomentose twigs and glossy glabrate small buds; leaves small (scarcely 3 cm. wide and 6 cm. long), blue-green, somewhat crisped and revolute, glabrate above; more or less stellate and reticulate beneath, broadly elliptic or subovate, obtuse or acute, subcordate, short-petioled, entire or repand or distantly denticulate or serrulate; acorn ovoid, 10 mm. in diameter, 15 to 20 mm. long, nearly half included, the rounded cup with thickened acute appressed scales; wood hard and strong, close-grained, dark brown to nearly black, the specific gravity slightly over 1.00.

39. *Quercus greggii* (A. DC.) Trel.

Quercus reticulata greggii A. DC. in DC. Prodr. 16²: 34. 1864.

Coahuila; type locality, San Antonio, near Saltillo.

Rather small evergreen trees with moderate, tomentose or more or less glabrescent twigs and small hairy buds; leaves rather small (3 to 5 cm. wide, 4 to 7 cm. long), rugose, revolute, granular or puberulent on the midrib above, rusty stellate-fleecy beneath, shortly elliptic-obovate, mucronately very obtuse, cordate, short-petioled, entire or slightly repand above; acorn conic-ovoid, about 10 mm. in diameter and 20 mm. long, the shallow cup with acute appressed scales.

40. *Quercus aculcingensis* Trel.

Quercus reticulata crassifolia Oerst. in Liebm. Chênes Amér. Trop. 20. 1869.

Oaxaca; type locality, Puente Colorado on the Cuesta de Aculcingo.

Twigs moderate, dingy-woolly; buds small, glabrate; leaves deciduous, small (2 cm. wide, 4 cm. long), rugose, revolute, densely tomentose beneath, the midrib granular above, elliptic, rather obtuse at both ends, short-petioled, entire; fruit unknown.

41. *Quercus diversifolia* Née, Anal. Cienc. Nat. 3: 270. 1801.

Quercus tomentosa diversifolia A. DC. in DC. Prodr. 16²: 33. 1864.

Type locality, between Chalma and Santa Rosa, Veracruz.

A scarcely placeable shrub, said to be 3 to 5 meters high, with rather small leaves (2 cm. wide, 2.5 to 7 cm. long) tomentose beneath, ovate, oblong, or elliptic in outline, and subentire to crenate-dentate on the same branch; fruit on a peduncle 5 cm. long.

42. *Quercus microphylla* Née, Anal. Cienc. Nat. 3: 264. 1801.

Guanajuato, Hidalgo, and Mexico; type from Guanajuato.

Intricately branched deciduous low shrub with slender tomentose twigs and glabrescent ovoid buds 2 mm. in diameter and 4 to 5 mm. long; leaves small (1 to 2 cm. wide, 2 to 4 cm. long), rugose, revolute, and concave, scurfy above, woolly beneath, elliptic-oblong, mostly obtuse at both ends, very short-petioled; entire or undulate or crenately toothed above; acorn ovoid, 10 mm. in diameter, 15 mm. long, one-third or more included, the half-round cup with acute appressed scales. "Encina capulincillo" (Mexico, Ramírez).

43. *Quercus repanda* Humb. & Bonpl. Pl. Aequin. 2: 31. 1809.

Hidalgo and adjacent San Luis Potosí; type locality, El Jacal, between Real del Monte and Morán, Hidalgo.

Intricately branched subevergreen shrub with slender tomentose twigs and small glabrescent buds; leaves small (1 to 2 cm. wide, 3 to 4 cm. long), rugose, undulately revolute, sparingly scurfy above, woolly beneath, elliptic to ovate or obovate, commonly obtuse at both ends, very short-petioled, entire or sparingly low-toothed above; acorn round-ovoid, 10 mm. in diameter, 12 to 15 mm. long, nearly half included, the rounded cup with acute appressed scales. "Encina," "encina negra," "encina chaparro" (Hidalgo).

44. *Quercus intricata* Trel.

Quercus microphylla crispata A. DC. in DC. Prodr. 16²: 36. 1864. Not *Q. crispata* Steven. 1857.

Coahuila and adjoining Zacatecas; type locality, Buena Vista, near Saltillo, Coahuila.

Intricately branched deciduous shrub with slender tomentose twigs and small glabrescent buds; leaves small (scarcely 1 to 2 cm. wide and 3 to 5 cm. long), crisped and revolute, stellate-scurfy above, closely tomentose beneath, subellip-

tic, typically acute, subcordate and typically entire, very short-petioled; acorn round, subincluded, scarcely 10 mm. in diameter, the rounded cup with acute appressed scales.

45. *Quercus engelmanni* ¹ Greene in Greene & Kellogg, Ill. West Amer. Oaks 32. 1889.

Southeastern California; type locality, between San Diego and Los Angeles; said to reach adjoining Baja California.

A moderate-sized tree very like the following, except in its broader leaves, but of distinct geographic range; wood hard, strong but brittle, close-grained, brown, its specific gravity about 0.94.

The wood is said to check badly in drying and to be useful only for fuel.

46. *Quercus oblongifolia* Torr. in Sitgreaves, Rep. Zuñi & Col. 173. 1853.

Chihuahua and Sonora. Arizona; type from "western New Mexico."

Moderate-sized tree with slender, glabrescent, often pruinose twigs and small red buds with ciliate scales; leaves (deciduous?) small (usually 1 to 2 cm. wide and 3 to 4 cm. long), glabrous, paler beneath, elliptic or oblong, rounded at both ends or subcordate, entire or coarsely and crenately few-toothed, the usually pruinose petiole short; acorn elongate-ovoid, 10 to 15 mm. in diameter, one-third included, the half-round cup with rather broad and blunt, keeled, appressed scales; wood hard and strong but brittle, very dark brown, heavy.

47. *Quercus grisea* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 171. 1854.

Chihuahua, and apparently to Zacatecas. Western Texas, the type locality not specified.

Shrub or small tree with slender tomentose twigs and small round red buds with puberulent outer scales; leaves deciduous, small (scarcely 2 cm. wide and 4 cm. long), thin, blue-green, minutely puberulent above and dull, though glossy when abraded, stellate-scurfy beneath, elliptic or ovate, mucronately subacute, often cordate, short-petioled, entire; acorns paired on a short slender peduncle, ellipsoid, 8 mm. in diameter, 12 mm. long, scarcely one-third included, the half-round cup with rather acute appressed scales. "Encina prieta," "encina blanca" (Durango, *Palmer*).

The wood is useful only for fuel.

48. *Quercus pungens* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 171. 1854.

Quercus undulata pungens Engelm. Trans. Acad. Sci. St. Louis 3: 392. 1876. Chihuahua. New Mexico.

Shrub or small tree with slender tomentulose twigs; leaves deciduous, small (scarcely 2 cm. wide and 3 cm. long), from scurfy glabrescent, crisped, elliptic, pungently acute, rounded at base, very short-petioled, with about 4 large pungent deltoid teeth on each side; acorn ovoid, scarcely 8 mm. in diameter and 12 mm. long, half included, the rounded cup with small appressed scales.

49. *Quercus pringlei* Seemen, Bot. Jahrb. Engler 29: 96. 1900.

Coahuila; type locality, in the Carneros Pass below Saltillo.

Shrub with slender subglabrescent twigs and minute round glabrous buds; leaves (deciduous?) very small (scarcely 1 cm. wide and 2.5 cm. long), glabrous, lance-elliptic, subaristately acute, rounded at base, mostly entire, the

¹ George Engelmann (1809-1884), a native of Germany, lived most of his life at St. Louis, Missouri, where he was engaged in the practice of medicine. An enthusiastic botanist, Engelmann devoted most of his botanical labors to the study of the more difficult groups of plants, such as the *Cactaceae*, *Yucca*, *Agave*, *Quercus*, etc. He described many Mexican species of these and other groups.

very short petiole somewhat tomentose; acorn round-ovoid, scarcely 10 mm. in diameter, fully half included, the rounded cup with somewhat thickened and blunt appressed scales.

50. *Quercus toumeyii* Sarg. Gard. & For. 8: 92. 1895.

Sonora. Arizona; type locality, Bisbee.

Shrub or small tree with slender tomentulose twigs and small pubescent buds; leaves deciduous, very small (scarcely 1 cm. wide and 2 cm. long), smooth or papillate above, sparingly velvety beneath, elliptic, mucronately acute, subcordate, entire or pungently few-toothed above, with very short hairy petiole; acorn oblong, scarcely 8 mm. in diameter and 12 mm. long, less than half included, the rounded cup with rather blunt appressed scales; wood hard, close-grained, brown.

51. *Quercus dumosa* Nutt. N. Amer. Sylv. 1: 7. 1842.

California; type locality, Santa Barbara. Extending into Baja California, in several foliage forms, of which one, with very small, ovate-elliptic, pungently dentate leaves scarcely 15 mm. wide and 25 mm. long, is var. *turbinella* Jepson (Silva Calif. 218. 1910; *Q. turbinella* Greene in Greene & Kellogg, Ill. West. Amer. Oaks 37. 1889).

Deciduous shrub with slender, usually glabrescent twigs; leaves small (commonly less than 2 cm. wide and 5 cm. long), polymorphous, more or less persistently tomentulose beneath, short-petioled; fruit typically slender-peduncled, the moderate-sized or small oblong acorn scarcely half included in the finely scaly, half-round cup.

This species is said to be the one whose acorns were most used as food by the Indians of southern California.

52. *Quercus breviloba* (Torr.) Sarg. Gard. & For. 8: 93. 1895.

Quercus obtusifolia breviloba Torr. U. S. & Mex. Bound. Bot. 266. 1859.

Quercus annulata Buckl. Proc. Acad. Phila. 1860: 445. 1860. Not *Q. annulata* Smith, 1819.

Nuevo León. Texas; type locality in Howard County.

Large deciduous shrub or small tree with rather slender glabrous buff twigs; leaves rather small (3 to 6 cm. wide, 6 to 12 cm. long), glabrous and glossy green above, glabrate but pale or microscopically silvery-tomentulose beneath, elliptic-obovate, obtuse, mostly acute at base, short-petioled, usually undulate or with a few short round lobes; acorn ovoid, scarcely 8 mm. in diameter and 12 mm. long, half included, the rounded cup with acute, rather close scales; wood hard and strong, brittle, brown, close-grained.

53. *Quercus oleoides* Cham. & Schlecht. Linnaea 5: 79. 1830.

Veracruz, Chiapas, and Tabasco; type locality, Hacienda de la Laguna, near Jalapa, Veracruz. British Honduras, Guatemala, Honduras, and Costa Rica.

Rather large broad-topped evergreen tree with slender gray-tomentulose twigs and small reddish glabrate buds; leaves mostly rather small (3 to 6 cm. wide, 6 to 8 cm. long, but exceptionally twice as large), glabrous and green above, minutely pale-tomentulose beneath, revolute, obovate-elliptic, rather obtuse, subcuneate, rather short-petioled, typically entire; fruit mostly peduncled; acorn ovoid, 10 mm. in diameter, 15 to 20 mm. long, about half included, the turbinate cup with keeled acute appressed scales in vertical rows. "Roblecito" (Guatemala, Honduras).

A juvenile form with obovate toothed leaves is *Q. lutescens* Mart. & Gal. Bull. Acad. Brux. 10²: 219. 1843.

54. *Quercus fusiformis* Small, Bull. Torrey Club 28: 357. 1901.

Quercus virginiana fusiformis Sarg. Bot. Gaz. 65: 448. 1918.

Coahuila and Nuevo León. Texas; type locality, Kerrville.

Small evergreen tree with slender tomentulose twigs and minute round red velvety buds; leaves small (1 cm. wide, 3 to 5 cm. long), minutely canescent beneath, narrowly oblong-lanceolate, mucronately acute, rounded at base, entire or with 1 or 2 asymmetric teeth, the short petiole tomentulose; fruit long-peduncled; acorn fusiform-oblong, 10 mm. in diameter, 20 to 25 mm. long, less than one-third included, the turbinate cup with acute appressed scales in somewhat evident vertical rows.

This and *Q. oleoides* are probably the species which have been reported from Mexico as *Q. virginiana* Mill. (*Q. virens* Ait.). The following are some of the vernacular names reported: "Maculi" (Nuevo León, Veracruz); "maquili-huatl" (Veracruz); "texmole"; "roble"; "roble serrano"; "palo duro"; "tezmolli"; "encina."

55. *Quercus brandegei* Goldman, Contr. U. S. Nat. Herb. 16:321. 1916.

Baja California; type locality, Rancho El Paraíso, near El Triunfo.

Moderately large evergreen tree with slender tomentulose twigs and minute round brown velvety buds; leaves small (scarcely 2 cm. wide and 3 to 6 cm. long), densely hoary beneath, elliptic-oblong, mucronately acute, rounded or acute at base, entire or with a few irregular low pungent teeth, the short petiole canescent; fruit rather long-peduncled; acorn conical, about 8 mm. in diameter and 15 mm. long, fully half included, the goblet-shaped cup with acute appressed scales.

56. *Quercus tomentella* Engelm. Trans. Acad. St. Louis 3: 393. 1877.

Guadalupe Island, Baja California.

Moderate-sized evergreen tree with rather stout short-pilose twigs and tomentulose buds as much as 7 mm. in diameter and 12 mm. long; leaves moderate (4 to 7 cm. wide, 7 to 12 cm. long), coriaceous, granular on the midrib above, the whitened lower surface more or less persistently fleecy, elliptic-ovate, acute or subacuminate, subcordate, toothed, with short villous petiole; acorn ovoid or elongate, sometimes 30 mm. in diameter and 35 mm. long, scarcely ever half included, the thick half-round cup with its scales embedded in tomentum; wood hard, close-grained, yellowish brown, its specific gravity about 0.72.

57. *Quercus palmeri* Engelm. Trans. Acad. St. Louis 3: 393. 1877.

Quercus dunnii Kellogg, Pacif. Rural Press, June 7, 1879.

Quercus chrysolepis palmeri Engelm. in S. Wats. Bot. Calif. 2: 97. 1880.

Northern Baja California. Also in San Diego County, California, the type locality.

Evergreen shrub with slender, minutely scurfy twigs; leaves small (2 cm. wide, 3 cm. long), coriaceous, glabrate, rounded, acute, cordate, crisped or folded, typically coarsely and pungently dentate; acorn conic-oblong, 15 mm. in diameter, 25 to 30 mm. long, the subturbinate undulate-margined cup very fulvous-woolly.

58. *Quercus emoryi*¹ Torr. in Emory, Notes Mil. Recon. 151. 1848.

Quercus hastata Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 171. 1854.

Chihuahua and Sonora. Texas to Arizona; type from Texas.

Small deciduous tree with slender glabrescent red twigs and glossy brown glabrate buds sometimes 3 mm. in diameter and 8 mm. long; leaves small (1 to

¹ William H. Emory (1811-1887), was a member of the commission for establishing the boundary between the United States and Mexico. He was the author of "Notes of a military reconnoissance from Fort Leavenworth in Missouri to San Diego in California" (1848), and of the "Report of the United States and Mexican Boundary Commission" (1857).

2 cm. wide, 3 to 6 cm. long), thick and hard, from minutely scurfy glabrescent, elliptic or oblong to ovate, mucronately acute, truncate at base or subcordate, short-petioled, characteristically repandly few-toothed; acorn narrowly ellipsoid, 8 mm. in diameter, 15 to 20 mm. long, one-third included, the rounded cup with blunt appressed scales; wood rather soft, strong but brittle, close-grained, dark brown, its specific gravity about 0.93.

The acorns are said to be of good quality as food.

59. *Quercus durifolia* Seemen, Bot. Jahrb. Engler **29**: 95. 1900.

Durango; type locality, Durango.

Twigs slender, subglabrescent; buds glossy light brown, small; leaves (deciduous?) very small (1 cm. wide, 3 to 4 cm. long), firm, canescent beneath, short-lanceolate, mucronately acute, obliquely subtruncate at base, short-petioled, mostly with a few short teeth; acorn round-ovoid, under 10 mm. in diameter, fully half included, the rounded cup with blunt appressed scales.

60. *Quercus eduardi* Trel.

Quercus oligodonta Seemen, Bot. Jahrb. Engler **29**: 96. 1900. Not *Q. oligodonta* Saporta, 1879.

Durango, Jalisco, and Tepic; type from Durango.

Small deciduous tree with slender glabrescent twigs and glossy, light brown, small buds; leaves small (2 to 4 cm. wide, 3 to 6 cm. long), firm, rather persistently stellate-scurfy beneath, oblong-elliptic, mucronately subacute, slightly cordate, with short glabrescent petiole, entire or with several aristate teeth; acorn ovoid or oblong, scarcely 8 mm. in diameter and 10 mm. long, half included, the turbinate cup with rounded appressed scales.

"Encina colorada"; the dark red wood valuable.

61. *Quercus devia* Goldman, Contr. U. S. Nat. Herb. **16**: 322. 1916.

Baja California; type locality, between El Sauz and Chuparosa.

Moderately large evergreen tree, about 20 meters high, with slender glabrescent twigs and small, acutely ovoid, glabrescent buds; leaves rather small (1 to 3 cm. wide, 5 to 10 cm. long), often somewhat dingy-tomentose beneath, broadly lanceolate or oblong, very acute, subcordate, rather short-petioled, aristately toothed; acorn oblong, 8 mm. in diameter, 15 to 20 mm. long, the shallow cup with blunt appressed scales. "Encina negra."

62. *Quercus hypoleuca* Engelm. Trans. Acad. Sci. St. Louis **3**: 384. 1877.

Chihuahua and Sonora. New Mexico (type locality, Santa Rita) and Arizona.

Shrub or small to moderately large subevergreen tree with rather slender gray-tomentose twigs and small red buds with ciliate scales; leaves rather small (2 to 3 cm. wide, 5 to 10 cm. long), rugose, revolute, blue-green above, densely pale-tomentulose beneath, lanceolate, aristately very acute, rounded at base, moderately petioled, typically entire; acorn narrowly conic-oblong, 8 mm. in diameter, 10 to 15 mm. long, scarcely one-third included, the turbinate cup with blunt, appressed, at first very tomentose scales; wood hard and strong, close-grained, dark brown, the specific gravity about 0.80.

63. *Quercus scytophylla* Liebm. Overs. Dansk. Vid. Selsk. Forh. **1854**: 180. 1854.

Oaxaca and Michoacán; type locality, Yalala to Yabochi, Oaxaca.

Twigs rather slender, glabrescent; buds small, glossy brown, glabrescent; leaves (deciduous?) large (7 to 8 cm. wide, 13 to 15 cm. long), rugose, densely creamy-tomentulose beneath, typically obovate and acute, obliquely acute or rounded at base, moderately petioled, characteristically with several short aristate teeth above; acorn ovoid, 10 mm. in diameter, 15 to 20 mm. long, the rounded or saucer-shaped cup with blunt appressed scales. "Encina" (Michoacán).

64. *Quercus omissa* A. DC. in DC. Prodr. 16²: 28. 1864.

Type locality, somewhere in the western Sierra Madre.

Twigs moderate, somewhat puberulent; buds elongate, dull brown, hairy at tip, scarcely 3 mm. in diameter and 6 mm. long; leaves (deciduous?) rather small (3 to 4 cm. wide, 5 to 6 cm. long), rugose, slightly revolute, creamy-tomentulose beneath, typically obovate, obtuse, cordate, short-petioled, aristately somewhat coarsely stiff-serrate above; acorn subglobose, 8 mm. in diameter, the rather deep cup with very blunt appressed scales.

65. *Quercus pulchella* Humb. & Bonpl. Pl. Aequin. 2: 44. 1809.

Type locality, between Guanajuato and Santa Rosa.

Twigs slender, glabrescent; buds small, dark brown, glabrate; leaves deciduous, small (2 to 3 cm. wide, 4 to 6 cm. long), rugose, yellow-tomentulose beneath, oblong-obovate, obtuse, often subtruncately cordate, slender-petioled, aristately low-serrate; fruit annual (?), the rounded cup with glabrous blunt appressed scales.

66. *Quercus floccosa* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 178. 1854.

Veracruz?; type from the Pico de Orizaba, at 2,600 to 3,200 meters.

Twigs moderate, at first rusty-scurfy; leaves (deciduous?) rather large (6 to 9 cm. wide, 9 to 16 cm. long), rugose, typically fleecy beneath, elliptic-obovate, aristately subacute, rounded at base, entire or with a few short teeth above, the moderate petiole fleecy; fruit unknown.

67. *Quercus crassifolia* Humb. & Bonpl. Pl. Aequin. 2: 49. 1809.

Quercus spinulosa Mart. & Gal. Bull. Acad. Brux. 10²: 218. 1843.

Guerrero to Veracruz and San Luis Potosí; type locality, Chilpancingo, Guerrero.

Rather large deciduous tree with somewhat stout, more or less scurfy twigs and glossy glabrate buds 3 mm. in diameter and 5 mm. long; leaves large (6 to 9 cm. wide, 12 to 14 cm. long), rugose, scurfy on the nerve above, tawny-fleecy beneath with the denudable surface granular, elliptic, obovate, or rounded, variously obtuse or subacuminate, cordate, short-petioled, aristate-undulate or stiffly low-toothed; fruit annual; acorn ellipsoid, 12 mm. in diameter, 15 to 20 mm. long, one-third or more included, the deep saucer-shaped cup with rounded appressed scales.

68. *Quercus fulva* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 183. 1854.

Chihuahua, Durango, and Michoacán; the type from an unrecorded locality in the western Sierra Madre.

Twigs stout, densely tomentose; buds brownish, tomentose; leaves 4 to 9 cm. wide, 8 to 14 cm. long, densely tomentose beneath, petioled, aristately serrate. "Roble" (Durango).

69. *Quercus stipularis* Humb. & Bonpl. Pl. Aequin. 2: 47. 1809.

Type locality, near Actopan (Veracruz?).

Twigs rather stout, fleecy; buds brownish, somewhat pubescent, 3 mm. in diameter, 5 mm. long; leaves deciduous, moderate (4 to 5 cm. wide, 7 to 10 cm. long), rugose, puberulent above on the midrib, rusty-fleecy beneath, elliptic-ovate to obovate, subacuminate, cordate, moderately petioled, aristately serrate; fruit annual; acorn ovoid, 12 mm. in diameter, 15 mm. long, scarcely one-third included, the rounded cup with blunt, rather loose scales.

70. *Quercus chicamolensis* Trel.

Quercus mollis Mart. & Gal. Bull. Acad. Brux. 10²: 216. 1843. Not *Q. mollis* Raf. 1838.

Oaxaca; type locality, in the Mixteca Alta.

Rather small (deciduous?) tree with moderate, at first densely tomentose twigs; leaves rather small (4 cm. wide, 5 to 6 cm. long), rugose, yellow-tomentose beneath, rather obovate and acute, cordate, short-petioled, entire but ciliate above; acorn unknown, the rounded cup with blunt appressed scales.

71. *Quercus dysophylla* Benth. Pl. Hartw. 55. 1840.

San Luis Potosí, Veracruz, and Hidalgo; type locality, mountains near Huasca, Hidalgo.

Twigs moderate, subglabrescent; buds glossy red-brown, canescent, 3 mm. in diameter, 5 mm. long; leaves deciduous, rather small (2 to 3 cm. wide, 5 to 8 cm. long), revolute, subglabrescent above, rusty-tomentose beneath, oblong, ovate, or elliptic, subacute, cordate, moderately petioled, entire or less characteristically coarsely mucronate-toothed; acorn ovoid or elongate, 10 mm. in diameter, 15 to 18 mm. long, the shallow turbinate cup with obtuse appressed scales. "Manzanilla" (Hidalgo).

To be compared with no. 40, *Quercus diversifolia*, and with the following.

72. *Quercus splendens* Née, Anal. Cienc. Nat. 3: 275. 1801.

Type locality, Tixtla, Guerrero.

Small open-topped tree with moderate yellow-tomentose twigs; leaves (deciduous?) rather small (3 to 4 cm. wide, 8 cm. long), puberulent above, yellow-tomentose beneath, subelliptic, ranging to ovate or obovate, acute, rounded at base or subcordate, subsessile, irregularly and unequally toothed, but not aristate; fruit unknown.

Not known from recent collections.

73. *Quercus aristata* Hook. & Arn. Bot. Beechey Voy. 444. 1841.

Tepic and Sinaloa; type locality, between San Blas and Tepic.

Twigs rather slender, transiently fleecy; buds glabrate, small; leaves deciduous, moderate (3 to 4 cm. wide, 7 to 15 cm. long), glabrescent, somewhat crisped and narrowly revolute, elliptic-oblong, aristately obtuse or subacute, rounded to cordate at base, moderately petioled, entire or undulate, sometimes aristate from the veins; fruit annual; acorn round-ovoid, 10 mm. in diameter, the deep rounded cup with blunt appressed scales.

74. *Quercus uruapanensis* Trel.

Quercus nitida Mart. & Gal. Bull. Acad. Brux. 10²: 210. 1843. Not *Q. nitida* Raf. 1838.

Michoacán and Oaxaca (?); type locality, Uruapan, Michoacán.

Thick-trunked, moderately large, deciduous tree with rather slender, glabrous, dark red twigs and small, puberulent, glossy, deep brown buds; leaves rather large (4 to 7 cm. wide, 9 to 16 cm. long), glabrous, or with axillary tufts beneath, subelliptic, acuminate, acute to truncate at base, moderately petioled, entire or exceptionally somewhat aristate-toothed above; acorn ovoid, 12 mm. in diameter, 20 mm. long, one-third included, the rounded cup with blunt appressed scales. "Encina colorada."

Yielding excellent timber.

75. *Quercus rysophylla* Weatherby, Proc. Amer. Acad. 45: 423. 1910.

Nuevo León; type locality, in the Sierra Madre above Monterrey.

Rather small tree with stout glabrate twigs and glabrescent, glossy brown, acute buds 3 mm. in diameter and 6 mm. long; leaves supersistent, large (4 to 7 cm. wide, 14 to 20 cm. long), rugose and veiny, revolute, glabrous, lanceolate, aristately long-acute, auriculate or deeply cordate at base, short-petioled, undulate; acorn unknown, the young cup with obtuse appressed golden scales.

76. *Quercus nectandraefolia* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 175. 1854.

Veracruz; type locality, Totutla.

Twigs rather slender, dingy-tomentose; buds brown, glabrescent, small; leaves (deciduous?) moderate (3 to 5 cm. wide, 9 to 12 cm. long), revolute, glabrous, somewhat paler and granular beneath, elliptic, obtuse, acute to subcordate at base, subsessile, crisped but entire; fruit annual; acorn ovoid, 20 mm. in diameter, 25 mm. long, thick-walled, half included, the rounded cup with blunt thickened appressed scales.

77. *Quercus linguaefolia* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 180. 1854.

Oaxaca; type locality, Cuesta de Lachopa.

Twigs moderate, glabrescent; leaves (deciduous ?) moderate (3 to 4 cm. wide, 6 to 11 cm. long), slightly revolute, somewhat floccose or glabrate, elliptic, obtuse or acute, cordate, short-petioled, entire; acorn ovoid, 10 mm. in diameter, 15 mm. long, the saucer-shaped cup with blunt appressed scales.

78. *Quercus perseaeefolia* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 188. 1854.

Veracruz; type locality, Hacienda de Jovo.

Twigs rather slender, glabrescent; buds small, glabrate; leaves deciduous, moderate (3 to 5 cm. wide, 6 to 12 cm. long), slightly revolute, glabrate, oblanceolate-elliptic, obtuse at both ends, very short-petioled, entire; fruit annual; acorn oblong, 10 mm. in diameter, 15 mm. long, one-third included, the turbinate cup with blunt appressed scales.

79. *Quercus pubinervis* Mart. & Gal. Bull. Acad. Brux. 10²: 211. 1843.

Veracruz; type locality, about Huatusco.

Rather large deciduous tree with slender tomentose twigs and small red-brown glabrate buds; leaves moderate (4 to 5 cm. wide, 8 to 12 cm. long), somewhat revolute, the midrib puberulent above and the lower surface somewhat persistently fleecy, lance-ovate to elliptic-oblanceolate, rounded at both ends, very short-petioled, entire or low-undulate; fruit annual; acorn oblong, 10 mm. in diameter, 15 mm. long, one-third included, the turbinate cup with blunt appressed scales.

80. *Quercus oajacana* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 178. 1854.

Quercus salicifolia oajacana Wenzig, Jahrb. Bot. Gart. Berlin 3: 207. 1884.

Oaxaca; type locality, between Tanetze and Talea.

Twigs moderate, yellow-scurfy; buds red-brown, somewhat hairy, small; leaves evergreen, moderate (3 to 4 cm. wide, 8 to 10 cm. long), with puberulent midrib above, loosely stellate beneath, lance-elliptic to subovate, acute, rounded at base, short-petioled, entire or somewhat undulate; fruit annual; acorn ovoid, 12 mm. in diameter, 15 mm. long, the shallow cup with blunt appressed scales.

81. *Quercus totulensis* A. DC. in DC. Prodr. 16²: 62. 1864.

Veracruz; type locality, Totutla.

Twigs slender, quickly glabrous; buds glabrous, glossy light brown, 2 mm. in diameter, 5 mm. long; leaves deciduous, rather small (2 cm. wide, 6 to 8 cm. long), paler and sometimes with axillary tufts beneath, oblong, rounded at both ends or a little narrowed below, slender-petioled, entire; acorn rounded, fully half included, the rounded cup with rather acute appressed scales.

82. *Quercus salicifolia* Née, Anal. Cienc. Nat. 3: 265. 1801.

Quercus mexicana glabrata Seem. Bot. Voy. Herald 332. 1852-7.

Quercus castanea glabrata A. DC. in DC. Prodr. 16²: 72. 1864.

Guerrero; type locality apparently Acapulco.

Twigs slender, glabrous; buds small; leaves deciduous, moderate (2 to 4 cm. wide, 10 to 15 cm. long), glabrous, lanceolate, aristately long-acute, typically rounded at base, short-petioled, entire; fruit annual (?); acorn subglobose, 12 mm. in diameter, half included, the subturbinate cup with appressed scales. "*Encina saucillo*" (Durango).

83. *Quercus ghiesbreghtii* Mart. & Gal. Bull. Acad. Brux. 10²: 212. 1843.

Veracruz; type locality, on Mount Orizaba, at 3,300 meters.

Moderate-sized evergreen tree with rather slender, at first dingy-tomentose twigs and small, glabrate, glossy brown buds; leaves moderate (3 cm. wide, 8 to 10 cm. long), somewhat pubescent on the veins beneath, lanceolate, long-acute, very round-based, moderately petioled, entire; fruit annual; acorn short-ovoid, 10 mm. in diameter, 12 mm. long, the turbinate saucer-shaped cup with blunt appressed scales.

84. *Quercus tlapuxahuensis* A. DC. in DC. Prodr. 16²: 29. 1864.

Quercus salicifolia tlapuxahuensis Wenzig, Jahrb. Bot. Gart. Berlin 3: 207. 1884.

Michoacán; type locality, Tlalpuxahua.

Twigs moderate, glabrous; buds small, dull brown, loosely hairy above; leaves (deciduous?) moderate (3 cm. wide, 7 to 10 cm. long), glabrous or the midrib slightly puberulent above and the lower surface with axillary tufts, lanceolate, aristately acute, rounded at base, slender-petioled, entire; fruit annual; acorn short-ovoid, 12 cm. in diameter, 15 mm. long, fully half included, the rounded cup with obtuse, appressed, somewhat revolutely thickened scales.

85. *Quercus lanceolata* Humb. & Bonpl. Pl. Aequin. 2: 34. 1809.

Hidalgo; type locality, between Morán and Santa Rosa.

Rather small (subevergreen?) tree with slender, transiently scurfy twigs and small glabrescent brown buds; leaves rather small (3 cm. wide, 7 to 10 cm. long), glabrous, or slightly scurfy above or fleecy in the axils beneath, lanceolate, acute at both ends or rounded at base, slender-petioled, entire or occasionally with a few low aristate teeth; acorn ovoid, 10 mm. in diameter, 12 mm. long, scarcely half included, the rounded cup with glabrous blunt appressed scales somewhat thickened toward the base.

86. *Quercus laurina* Humb. & Bonpl. Pl. Aequin. 2: 32. 1809.

Hidalgo; type locality, Cerro de las Navajas, near Morán.

Very like the preceding, the deciduous leaves rather more broadly oblanceolate, the fruit apparently annual, and the cupule scales less commonly thickened.

87. *Quercus major* (A. DC.) Trel.

Quercus nitens major A. DC. in DC. Prodr. 16²: 69. 1864.

Quercus laurina major Wenzig, Jahrb. Bot. Gart. Berlin 3: 205. 1884.

Veracruz; type locality, Alpatlahua.

Twigs rather slender, glabrate; buds small, acute, glabrescent; leaves deciduous, moderate (2 to 4 cm. wide, 6 to 9 cm. long), glabrous, or puberulent along the midrib above and with axillary tufts beneath, lanceolate to oblanceolate-obovate, acute at both ends or rounded at base, slender-petioled, characteristically serrately incised with aristate teeth; acorn ovoid, 10 mm. in diameter, 15 mm. long, half included, the rounded cup with blunt appressed scales.

88. *Quercus barbinervis* Benth. Pl. Hartw. 56. 1840.

Quercus laurina barbinervis Wenzig, Jahrb. Bot. Gart. Berlin 3: 205. 1884.

Hidalgo; type locality, Real del Monte.

Twigs rather slender, sparsely tomentose; buds small, glabrescent; leaves deciduous, small (scarcely 3 cm. wide and 5 cm. long) or on shoots larger

(as much as 5 cm. wide and 13 cm. long), glabrate, or with fleecy axils beneath, slightly revolute, elliptic-obovate, acute, mostly rounded at base, the moderate petiole pubescent, coarsely few-toothed above; fruit annual (?); acorn ovoid, 10 to 12 mm. in diameter, 15 to 18 mm. long, half included, the rounded cup with blunt appressed scales.

89. *Quercus affinis* Scheidw. Hort. Belg. 4: 321. 1837.

Type locality, between Regla and Istula, Hidalgo.

Twigs slender, at first scurfy; buds small, glabrous, glossy brown; leaves evergreen, small (2 cm. wide, 7 to 9 cm. long), glossy, glabrous, oblong-lanceolate, acute at both ends, moderately petioled, sharply setaceous-serrate with short teeth; fruit biennial (?); acorn unknown, the immature cup with rather acute appressed scales.

90. *Quercus ocoteaefolia* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 176. 1854.

Quercus laurina ocoteaefolia Wenzig, Jahrb. Bot. Gart. Berlin 3: 205. 1884.

Oaxaca and Puebla; also in Michoacán(?); type locality, Talea and Laguna, Oaxaca.

Small deciduous tree with slender glabrescent twigs and small, glossy brown, glabrescent buds; leaves moderate (3 cm. wide, 8 to 10 cm. long), glossy, glabrous, or with axillary tufts beneath, lanceolate, acute at both ends or somewhat rounded at base, shortly slender-petioled, entire or less commonly with a few teeth; acorn ovoid, 8 mm. in diameter, 10 mm. long, half included, the rounded cup with blunt appressed scales.

91. *Quercus depressa* Humb. & Bonpl. Pl. Aequin. 2: 50. 1809.

Hidalgo; type locality, El Jacal, Morán.

Low evergreen shrub with slender stellate-scurfy twigs and small, dull brown, glabrate buds; leaves small (1 to 2 cm. wide, 3 to 4 cm. long), rather thick, slightly revolute, glabrate or the midrib puberulent above, lance-elliptic, acute or acuminate, rounded at base, short-petioled, usually with a few coarse teeth; acorn ovoid, acute, 8 mm. in diameter, 12 mm. long, half included, the rounded cup with blunt appressed scales.

92. *Quercus orizabae* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 189. 1854.

Veracruz (?); type locality, Pico de Orizaba, at 2,600 to 3,300 meters, with *Q. floccosa*.

Twigs moderate, at first rusty-fleecy; buds small, red-brown, somewhat hairy; leaves (deciduous?) rather large (3 to 7 cm. wide, 8 to 14 cm. long), glabrescent above, somewhat fleecy beneath, slightly revolute, elliptic-ovate, acute, obliquely rounded at base, slender-petioled, entire or artistately about 3-toothed at end; fruit unknown.

93. *Quercus sideroxyla* Humb. & Bonpl. Pl. Aequin. 2: 39. 1809.

Guanajuato; type locality, Santa Rosa.

Large evergreen tree with slender lanose twigs and small brown glabrescent buds; leaves small (2 cm. wide, 4 to 6 cm. long), the lower surface sometimes hairy-tufted, broadly oblong, subacute, cordate at base, short-petioled, sharply and rather incisely toothed; acorn ovoid, 10 mm. in diameter, 12 mm. long, half included, the rounded cup with blunt appressed scales.

94. *Quercus chrysophylla* Humb. & Bonpl. Pl. Aequin. 2: 42. 1809.

Hidalgo; type locality, between Pachuca and Morán.

Moderate-sized deciduous tree with slender glabrescent twigs and small reddish glabrous buds; leaves small (2 cm. wide, 4 to 6 cm. long), from scurfy glabrescent, oblanceolate-oblong, with straight margin, subacute, rounded at base, moderately petioled, setaceously several-toothed at end; fruit unknown.

95. *Quercus tridens* Humb. & Bonpl. Pl. Aequin. 2: 35. pl. 82. 1809.

Hidalgo; type locality, Morán.

Very like the preceding, the short-petioled leaves entire or aristately about 3-toothed at the end; mature foliage characters, even, unknown for both species.

96. *Quercus mexicana* Humb. & Bonpl. Pl. Aequin. 2: 35. 1809.

Quercus castanea mexicana A. DC. in DC. Prodr. 16²: 72. 1864.

Quercus castanea integra Oerst. Bidr. Kunds. Egefam. 362. 1871.

Veracruz and Guanajuato; type locality, Santa Rosa, Guanajuato.

Small or moderately large deciduous tree with slender glabrescent twigs and small brown glabrescent buds; leaves small or narrow (2 to 5 cm. wide, 10 cm. long), rugose, revolute, the midrib puberulent above and the granular lower surface detachably tomentose, elliptic-oblong, subacute, rounded at base or slightly cordate, short-petioled, entire; acorn ovoid, 10 mm. in diameter, 12 mm. long, half included, the thick-stalked rounded cup with glabrate blunt appressed scales, these sometimes thickened at base or with outcurved margin.

With still narrower leaves (1.5 cm. wide and 7 cm. long) it is *Q. crassipes angustifolia* Humb. & Bonpl. (op. cit. 37. 1809); and a form of this with crowded leaves is *Q. confertifolia* Humb. & Bonpl. (op. cit. 53. 1809).

97. *Quercus crassipes* Humb. & Bonpl. Pl. Aequin. 2: 37. 1809.

Mexico, Guanajuato, and Hidalgo; type locality, Santa Rosa, Guanajuato.

Similar to the preceding, but the turbinate cup inrolled at the margin.

98. *Quercus lanigera* Mart. & Gal. Bull. Acad. Brux. 10²: 215. 1843.

Oaxaca; type locality in the Mixteca Alta.

Twigs slender, glabrescent; buds small, brown, glabrescent; leaves deciduous, small (2 to 3 cm. wide, 5 to 6 cm. long), detachably fleecy beneath, elliptic-oblong, aristately obtuse or acute, rounded at base, moderately petioled, entire or with a few awned teeth above; fruit annual; acorn subglobose, scarcely 10 mm. in diameter, the somewhat turbinate cup with blunt appressed scales.

99. *Quercus castanea* Née, Anal. Cienc. Nat. 3: 276. 1801.

Quercus mucronata Willd. Sp. Pl. 4: 436. 1805.

Hidalgo; type locality, between Ixmiquilpan and Zimapán and Acámbaro.

Small (deciduous?) tree with rather slender glabrescent twigs and glabrous brown buds 2 mm. in diameter and 4 mm. long; leaves rather small (3 to 4 cm. wide, 7 to 9 cm. long), rugulose, minutely stellate beneath, lance-oblong, aristately acute, rounded at base or subcordate, short-petioled, typically aristately low-serrate above; fruit annual; acorn round-ovoid, 8 mm. in diameter, 10 mm. long, the rounded cup with blunt appressed scales.

A form with slightly obovate-elliptic, typically entire leaves, from the same region, is *Q. elliptica* Née (op. cit. 278. 1801).

100. *Quercus rugulosa* Mart. & Gal. Bull. Acad. Brux. 10²: 209. 1843.

Hidalgo; type locality, San Pedro y San Pablo, near Real del Monte.

Moderate-sized deciduous tree with rather slender glabrescent twigs and small, brown, at first fleecy buds; leaves rather small (2 to 4 cm. wide, 6 to 9 cm. long), minutely revolute, reticulately venulose, somewhat stellate, especially on the granular lower surface, elliptic-oblong, mucronately obtuse or subacute, rounded at base or somewhat cordate, moderately petioled, entire; acorn short, the somewhat turbinate small cup with blunt thin scales.

101. *Quercus grandis* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 183. 1854.

Oaxaca. Northern Guatemala, the type locality.

Large deciduous tree with rather slender glabrate twigs and small brown glabrescent buds; leaves large (5 to 10 cm. wide, 14 to 23 cm. long), glabrous,

somewhat paler beneath, oblanceolate, acute, commonly narrowed at base, slender-petioled, with rather distant aristate teeth; acorn depressed, 20 to 25 mm. in diameter, two-thirds or more included, the urceolate, slightly umbonate cup with thin blunt scales somewhat outcurved at margin.

102. *Quercus cortesii* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 175. 1854.

Veracruz; type locality, between Hacienda de Jovo and Huitamalco.

Twigs slender, glabrous; buds small, straw-colored, glabrescent; leaves (deciduous?) moderate (3 cm. wide, 12 cm. long), glabrous, or with axillary tufts beneath, narrowly lanceolate, acute at both ends, moderately petioled, rather distantly aristate-serrate; fruit unknown.

103. *Quercus huitamalcana* Trel.

Quercus serra Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 174. 1854. Not *Q. serra* Unger, 1845.

Veracruz and Puebla; type locality, between Huitamalco and Teziutlán, altitude 2,000 meters.

Twigs rather slender, glabrate; buds light brown, glabrescent, 2 mm. in diameter, 3 to 4 mm. long; leaves (deciduous?) large (4 to 7 cm. wide, 16 to 20 cm. long), glabrous and glossy, crisped, lanceolate, the base various, moderately petioled, coarsely deltoid-serrate; fruit unknown.

104. *Quercus chiapasensis* Trel. Proc. Amer. Phil. Soc. 54: 9. 1915.

Chiapas; type locality, Finca Irlanda.

Large evergreen tree with moderate glabrescent twigs and hairy buds; leaves large (4 to 8 cm. wide, 12 to 15 cm. long), glabrous, lanceolate, long-acute, the base various, the petiole moderate or long, coarsely serrate or incised with aristate teeth; acorn broadly ovoid, 30 to 40 mm. in diameter, the large saucer-shaped cup with thickened appressed scales.

Polymorphic in foliage details.

105. *Quercus skinneri* Benth. Pl. Hartw. 90. 1842.

Guatemala (type locality, in the mountains about Quezaltenango); possibly also in Chiapas.

Large (deciduous?) tree, similar to the preceding, but the equally long round-based leaves ovate, with longer slender petiole, and fruit even larger.

106. *Quercus sartorii* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 177. 1854.

Veracruz; type locality, Totutla.

Deciduous tree with rather slender glabrescent twigs and brown glabrescent buds 3 mm. in diameter and 6 mm. long; leaves moderate (3 to 5 cm. wide, 9 to 13 cm. long), glabrescent, or with axillary tufts beneath, lance-elliptic, acute, typically rounded at base, slender and often long-petioled, entire with aristate veins or very low-serrate; fruit annual; acorn round-ovoid, 10 mm. in diameter, 12 mm. long, the sometimes turbinate cup with obtuse appressed scales.

107. *Quercus furfuracea* Liebm. Overs. Dansk. Vid. Selsk. Forh. 1854: 189. 1854.

Oaxaca; type locality, Chinantla.

Twigs rather slender, scurfy or glabrescent; buds small, light brown, glabrescent; leaves deciduous, moderate (3 to 5 cm. wide, 8 to 12 cm. long), gray-stellate and tufted beneath, ovate to lanceolate, acute, mostly rounded at base, moderately petioled, entire or aristately low-crenate-serrate; acorn round-ovoid, 8 mm. in diameter, 10 mm. long, the somewhat turbinate deep cup with blunt appressed scales.

108. *Quercus grahami*¹ Benth. Pl. Hartw. 57. 1840.

Oaxaca; type locality not recorded.

Rather large deciduous tree with slender glabrous twigs and small, light brown, glabrescent buds; leaves moderate (2 to 4 cm. wide, 7 to 12 cm. long), glabrous, or sparsely scurfy and tufted in the axils beneath, very venulose, lanceolate, rather taper-pointed, typically rounded at base, slender-petioled, setaceously serrate or incised; acorn ovoid, 12 mm. in diameter, 15 to 20 mm. long, half included, the rounded cup with blunt appressed scales.

109. *Quercus acutifolia* Née, Anal. Cienc. Nat. 3: 267. 1801.

Type locality above the Río Mescala, on the road from Acapulco to the City of Mexico.

Rather small evergreen tree with rather slender glabrate twigs and brown glabrate buds 3 mm. in diameter and 6 mm. long; leaves large (5 to 7 cm. wide, 15 to 20 cm. long), glabrous, or the midrib puberulent above and the axils tufted beneath, lance-ovate, acute or attenuate, the base mostly rounded, rather long-petioled, aristately serrate or almost lobed, with rounded sinuses; fruit unknown. "Aguatle."

110. *Quercus xalapensis* Humb. & Bonpl. Pl. Aequin. 2: 24. 1809.

Veracruz; type locality, Jalapa.

Rather large deciduous tree with moderate glabrate twigs and brown glabrate acute buds 2 to 3 mm. in diameter and 5 mm. long; leaves large (4 to 8 cm. wide, 10 to 15 cm. long), glabrous, or with some axillary tufts beneath, broadly or ovately lanceolate, acute, typically acute at base or decurrent on the slender petiole, setaceously serrate with the margin little indented; acorn round-ovoid, 18 mm. in diameter, 20 mm. long, half included, the rounded cup with blunt, rather loose scales. "Roble de duela," "encina roble" (Veracruz, *Ramírez*).

111. *Quercus calophylla* Cham. & Schlecht. Linnaea 5: 79. 1830.

Veracruz; type locality, Jalapa.

Large (deciduous?) tree with moderate fleecy or glabrate twigs and dull brown glabrescent buds as much as 12 mm. long; leaves large (4 to 7 cm. wide, 11 to 13 cm. long), densely creamy-tomentulose beneath, ovate to obovate or elliptic, acute or acuminate, rounded or obliquely truncate at base, moderately petioled, somewhat bristly-serrate at the end; acorn ovoid, 18 mm. in diameter, 20 to 25 mm. long, one-third included, the half-round cup with blunt, rather loose scales.

With long-acuminate low-denticulate leaves as much as 12 cm. wide and 22 cm. long it is *Q. acuminata* Mart. & Gal. (Bull. Acad. Brux. 10²: 217. 1843). With blunt-pointed, rather deeply serrate and acute-based leaves 5 cm. wide and 13 cm. long, it is *Q. intermedia* Mart. & Gal. (op. cit. 223. 1843). A form with acute, sharply toothed leaves 5 cm. wide and 10 cm. long, or exceptionally 11 cm. wide and 18 cm. long. *Q. alamo* Benth. (Pl. Hartw. 55. 1842), is called "álamo" because of its soft poplar-like wood.

112. *Quercus candicans* Née, Anal. Cienc. Nat. 3: 277. 1801.

Type locality, Tixtla, Guerrero.

Moderate-sized deciduous tree with moderate, rather persistently tomentose twigs and ovoid glabrate buds 3 mm. in diameter and 5 to 7 mm. long; leaves typically large (10 to 15 cm. wide, 15 to 25 cm. long), densely creamy-tomentu-

¹G. J. Graham collected a series of about 400 specimens of plants about the City of Mexico, Tlalpuxahua, and Real del Monte. These were reported upon by Bentham in his "Plantae Hartwegianae."

lose beneath, elliptic-obovate, subacute, variously narrowed or rounded or truncate at base, moderately petioled, aristately repand to rather deeply lobed; fruit unknown. "Encina de asta."

Sapwood red, the heart dark, with still darker stripes.

23. ULMACEAE. Elm Family.

Trees or shrubs; leaves deciduous or persistent, alternate, entire or dentate, usually rough; flowers small, greenish, perfect or unisexual; fruit 1-seeded.

Fruit dry.

Fruit not winged 1. CHAETOPTELEA.

Fruit winged 2. ULMUS.

Fruit a drupe.

Leaves opposite 3. LOZANELLA.

Leaves alternate.

Pistillate flowers in lax many-flowered cymes; plants unarmed.

4. TREMA.

Pistillate flowers solitary or few; plants often armed with spines.

5. CELTIS.

1. CHAETOPTELEA Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 54. 1850.

1. Chaetoptelea mexicana Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 76. 1850.

Ulmus mexicana Planch. in DC. Prodr. 17: 156. 1873.

Veracruz, the type from Mirador; reported from Oaxaca. Costa Rica and Panama.

Large tree, 15 to 40 meters high, with open crown, the branches ascending; bark gray, somewhat scaly; leaves deciduous, oblong-ovate, acuminate, serrate; flowers yellow; wood hard, heavy, strong, very tough, rather fine-grained, light or dark brown, sometimes with darker lines. "Olmo" (Oaxaca, Veracruz); "papalote," "cempoalehuatl" (Veracruz); "ira" (Costa Rica); "ceniza," "cenizo" (Panama).

The wood is used in Mexico for lumber. The bark is astringent and is used for treating coughs.

Planchon¹ has stated that this plant differs in no way from *Ulmus*. All the species of the latter genus, however, have a broadly winged fruit, while in *Chaetoptelea* there is no vestige of a wing, and this is a probably a sufficient basis for the maintenance of Liebmann's genus.

2. ULMUS L. Sp. Pl. 225. 1753.

Sessé and Mociño reported² *Ulmus americana* from Mexico. The plant so named (if the report is based on an actual plant) probably belongs to some other genus.

The members of this genus (the elms) are perhaps the finest shade trees for temperate regions, although they are of slow growth. The wood of most species is extremely tough.

1. *Ulmus crassifolia* Nutt. Trans. Amer. Phil. Soc. 5: 169. 1837.

No Mexican specimens seen by the writer, but the species is common along the Rio Grande in Texas, and doubtless occurs in Nuevo León and Tamaulipas. Texas to Mississippi.

Tree, sometimes 30 meters high, with a trunk diameter of 1 meter, the branches drooping; bark thick, brown, deeply fissured; leaves oblong or ovate,

¹In DC. Prodr. 17: 156. 1873.

²Pl. Hisp. 45. 1887.

5 cm. long or smaller, short-petiolate, finely serrate; flowers small, clustered, appearing in autumn; fruit 8 to 10 mm. long, hairy; wood reddish brown, rather weak, its specific gravity about 0.70.

The wood is used locally for furniture and wheel hubs.

3. *LOZANELLA* Greenm. Proc. Amer. Acad. 41: 236. 1905.

The following is the only species of the genus, which was named in honor of Señor Don Filemón L. Lozano, who assisted Pringle in his Mexican collections.

1. *Lozanella trematoides* Greenm. Proc. Amer. Acad. 31: 236. 1905.

Known only from the type locality, "Honey Station," near Trinidad, Hidalgo.

Shrub or small tree, 2 to 6 meters high; leaves slender-petioled, ovate, 5 to 9 cm. long, acuminate, serrate, 3-nerved, thinly hairy beneath; flowers dioecious, small and green, the pistillate in axillary cymes; perianth 5 or 6-parted; fruit a sessile ovoid greenish drupe.

4. *TREMA* Lour. Fl. Cochinch. 562. 1790.

1. *Trema micrantha* (L.) Blume, Ann. Mus. Bot. Lugd. Bat. 2: 58. 1853.

Rhamnus micranthus L. Syst. Nat. ed. 10. 2: 937. 1759.

Celtis canescens H. B. K. Nov. Gen. & Sp. 2: 28. 1817.

Celtis schiedeana Schlecht. Linnaea 7: 140. 1832.

Sponia micrantha Decaisne, Nouv. Ann. Mus. Paris 3: 498. 1834.

Sinaloa to Veracruz and southward. Florida, West Indies, Central America, and tropical South America.

Shrub or small tree, 2 to 6 meters high or in some parts of its range still larger, the trunk occasionally 10 to 15 cm. in diameter; leaves ovate, finely serrate, 3-nerved, acute or acuminate, 5 to 12 cm. long, their pubescence variable in amount; flowers very small, greenish white, cymose; fruit small (about 1.5 mm. in diameter), globose, green or reddish; wood light, soft, close-grained, light brown. "Ixpepe" (Veracruz); "equipal" (Michoacán); "yaco de cuero" (Oaxaca, *Reko*); "jucó," "capulín," "vara blanca" (Costa Rica); "capulí" (Guatemala); "masaquila" (Venezuela); "memiso" (Santo Domingo); "palo de cabra," "guacimilla" (Porto Rico).

The bark contains very strong fiber. The species of this genus seem to be of little economic importance. *T. commersonii* Blume, of Madagascar, is highly esteemed for medicinal purposes by the natives, and stomachic, astringent, febrifuge, diuretic, and antisyphilitic properties are attributed to it.

5. *CELTIS* L. Sp. Pl. 1043. 1753.

Large or small trees or shrubs, sometimes scandent, armed or unarmed; leaves deciduous or somewhat persistent, entire or dentate, often unequal at base; flowers small, the pistillate usually solitary and long-pedicellate; fruit globose, with thin flesh and a large seed.

The fruit of all the species is sweet and edible, especially in the spineless species (hackberries or sugarberries), but the pulp is very scant. The Indians of some parts of the United States seem to have been very fond of it. They pounded the fruit fine, seeds and all, and ate it with fat or mixed with parched corn.¹

¹ See M. R. Gilmore, Uses of plants by the Indians of the Missouri River region. Ann. Rept. Bur. Amer. Ethnol. 33: 45-154. pl. 1-30. 1919.

Plants armed with spines.

Leaves mostly 3 to 5.5 cm. wide, with numerous small teeth, or sometimes entire; fruit short-pilose-----1. *C. iguanaea*.

Leaves mostly 1 to 2 cm. wide, with few coarse teeth; fruit glabrous or nearly so-----2. *C. pallida*.

Plants unarmed.

Leaves pinnately nerved, not at all 3-nerved, the lateral nerves very numerous-----3. *C. monoica*.

Leaves conspicuously 3-nerved at the base, the lateral nerves few, distant.

Leaves finely pilose beneath, usually dentate near the apex. Leaves usually scabrous on the upper surface-----4. *C. caudata*.

Leaves glabrate or sparsely puberulent beneath, entire.

Leaves very thick, scabrous on the upper surface and grayish green, the venation very prominently reticulate beneath-----5. *C. reticulata*.

Leaves thin, smooth on the upper surface and deep green, the venation not very prominently reticulate beneath-----6. *C. mississippiensis*.

1. *Celtis iguanaea* (Jacq.) Sarg. Silv. N. Amer. 7: 64. 1895.

Rhamnus iguanaeus Jacq. Enum. Pl. Carib. 16. 1760.

Mertensia laevigata H. B. K. Nov. Gen. & Sp. 2: 31. 1817.

Momisia ehrenbergiana Klotzsch, Linnaea 20: 538. 1847.

Celtis anfractuosa Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 338. 1851.

Celtis platycaulis Greenm. Proc. Amer. Acad. 39: 78. 1903.

Momisia iguanaea Rose & Standl. Contr. U. S. Nat. Herb. 16: 8. 1912.

Chihuahua to Baja California and southward. Central America, West Indies, and South America; southern Florida and western Texas.

Shrub or small tree, 3 to 12 meters high, the trunk often 25 to 30 cm. in diameter, the branches armed with stout, usually recurved spines, long and spreading or clambering; branchlets often compressed; leaves ovate or oval; flowers greenish yellow; fruit 8 to 12 mm. long, yellow, somewhat angled. "Granjeno" (Veracruz and elsewhere); "garabato blanco" (Sinaloa); "uña de gato," "zarza" (Cuba); "cagalera comestible" (Nicaragua); "gallito" (Santo Domingo).

The leaves are very variable in shape and tothing, but their variations seem to offer no basis for specific segregation. The leaves of this and the following species are conspicuously domatiate beneath—furnished with cuplike shelters (for parasites?) in the axils of the veins. The fruit is edible. The specific name is derived from the fact that the fruit is eaten by iguanas, the common and characteristic lizards of the tropics.

2. *Celtis pallida* Torr. U. S. & Mex. Bound. Bot. 203. 1859.

Momisia pallida Planch. in DC. Prodr. 17: 191. 1873.

Chihuahua to Baja California and Oaxaca. Arizona to western Texas (type locality).

Densely branched spiny shrub, 1 to 6 meters high, the branches often long and recurved; leaves oval to oblong, obtuse or acutish; cymes few-flowered; fruit 5 to 8 mm. long, yellow, orange, or red. "Granjeno" (Chihuahua, Durango, Nuevo León, Texas; often written "grangeno"); "granjeno huasteco" (Tamaulipas); "capul" (Durango, Texas); "garabato" (Sinaloa).

This shrub often forms dense impenetrable thickets of considerable extent. The wood is good for fuel and fence posts. The fruit is edible, but somewhat astringent. The flowers are said to furnish a good quality of honey.

The pubescence of the branchlets is usually appressed but sometimes spreading. The leaves are variable in outline, usually with a few large teeth, but

sometimes entire. The species has been reported from Mexico as *Celtis tala* Gill., a plant of South America. This is presumably the plant described from Mexico by Sessé and Mociño¹ as *Rhamnus grangenos*, although it is doubtful whether that name is not referable rather to *Celtis iguanaea*.

3. *Celtis monoica* Hemsl. Biol. Centr. Amer. Bot. 3: 139. pl. 77. 1883.

Veracruz and Oaxaca; María Madre Island; type from Tantoyuca, Veracruz.

Leaves oblong-ovate, 6 to 9 cm. long, acuminate, lustrous, shallowly serrate, strigose beneath. "Palo de águila" (Oaxaca).

Very different in appearance from the other species of the genus, especially because of the pinnate-veined leaves. The fruit bears scattered sharp tubercles.

4. *Celtis caudata* Planch. Ann. Sci. Nat. III. 10: 294. 1848.

Celtis littoralis Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 337. 1851.

Querétaro and Hidalgo to Michoacán and Oaxaca; type from Zimapán, Hidalgo.

Tree, usually of small size; leaves ovate, asymmetric, long-acuminate, at least part of them usually dentate, rarely all entire.

This is doubtless the species reported from Cuernavaca by Sessé and Mociño² as *Celtis occidentalis* L.

5. *Celtis reticulata* Torr. Ann. Lyc. N. Y. 2: 247. 1824.

Coahuila to Baja California. Texas to Colorado and Arizona; type from the Rocky Mountains.

Small or large tree, sometimes 15 meters high, with a trunk 50 to 60 cm. in diameter, but in arid places frequently only a shrub 3 meters high, the crown dense, broad, the branches often very crooked; bark white or gray, smooth on young trees, very rough in age; leaves often rounded-ovate, obtuse or acute, 3 to 7 cm. long; fruit red or orange, about 8 mm. in diameter; wood with a specific gravity of about 0.72. "Palo blanco" (Durango, Tamaulipas, Texas); "palo mulato" (Durango); "acibuche" (Chihuahua); "cumbro" (Sinaloa); "palo duro" (New Mexico).

The tree is usually too small and crooked to be of economic importance, but the wood is used for posts and for axe and hoe handles, and for other similar purposes. The leaves are frequently covered with curious insect galls.

6. *Celtis mississippiensis* Bosc, Dict. Agr. 10: 541. 1847.

Celtis berlandieri Klotzsch, Linnaea 20: 541. 1847.

Coahuila to Tamaulipas and San Luis Potosí. Northeastward to Illinois and Florida.

Tree, in some parts of its range 39 meters high, with a trunk 1 meter in diameter; bark white and smooth on young trees, gray and rough in age, with corky projections; leaves ovate, 5 to 12 cm. long, acute to long-acuminate; fruit orange or red; wood yellow, soft, its specific gravity about 0.50. "Palo blanco" (Coahuila, Tamaulipas).

Often planted or left as a shade tree about dwellings; wood used in Mexico for carts and other objects, and in the United States, occasionally, for furniture and flooring; fruit edible, as in the other species, the pulp sweet but very scant.

The Mexican specimens always have entire leaves. They do not seem specifically separable from the eastern form, although the leaves are often broader.

¹ Pl. Nov. Hisp. 38. 1887.

² Pl. Nov. Hisp. 174. 1887.

24. MORACEAE. Mulberry Family.

Usually trees, with milky sap; leaves alternate, entire, dentate, or lobate, the stipules deciduous; flowers very small, monoecious or dioecious.

The only other Mexican genus is *Dorstenia*, whose species are low herbs. *Toxylon pomiferum* Raf., the Osage orange or bois d'arc (known in Chihuahua as "naranjo chino"), native of the southern United States, is sometimes cultivated. It is a very spiny tree or shrub, with globose yellowish fruits sometimes 15 cm. in diameter. *Artocarpus communis* Forst., the breadfruit tree of the Pacific islands ("árbol del pan"), with large, pinnately lobed leaves and large rough fruit, is in cultivation in tropical Mexico.

Leaves peltate, the blades radiately lobed. Flowers in dense spikes.

9. CECROPIA.

Leaves not peltate, the blades not radiately lobed.

Flowers borne on the inside of a globose receptacle, this fleshy, with a small opening at the top-----4. **FICUS.**

Flowers not borne inside a receptacle.

Flowers of one or both sexes in aments, spikes, or racemes.

Pistillate flowers in spikes or aments.

Pistillate perianth of distinct segments; fruit very juicy, with a small seed, naked-----2. **MORUS.**

Pistillate perianth tubular; fruit with only thin flesh, with a large seed, covered by the accrescent perianth-----3. **TROPHIS.**

Pistillate flowers in heads.

Staminate flowers with a 4-parted perianth-----1. **CHLOROPHORA.**

Staminate flowers without a perianth-----8. **SAHAGUNIA.**

Flowers of one or both sexes capitate, borne on a flat or rounded receptacle, or solitary.

Leaves very densely long-hairy; flowers borne on a flat receptacle.

7. CASTILLA.

Leaves never densely long-hairy; flowers not borne on a flat receptacle.

Pistillate flowers sessile and usually solitary in the axils.

6. PSEUDOLMEDIA.

Pistillate flowers in heads or on a receptacle.

Pistillate flowers one on each receptacle-----5. **BROSIMUM.**

Pistillate flowers more than one to each head or receptacle.

Inflorescence wholly of heads; leaves entire---10. **COUSSAPOA.**

Inflorescence partly of spikes (staminate); leaves usually toothed.

Staminate flowers with a 4-parted perianth.

1. CHLOROPHORA.

Staminate flowers without a perianth-----8. **SAHAGUNIA.**

1. CHLOROPHORA Gaud. in Freyc. Voy. Bot. 508. 1826.

Leaves glabrous or nearly so-----1. **C. tinctoria.**

Leaves densely pubescent on both surfaces-----2. **C. mollis.**

1. Chlorophora tinctoria (L.) Gaud. in Freyc. Voy. Bot. 508. 1826.

Morus tinctoria L. Sp. Pl. 986. 1753.

Chiefly on stream banks and seashores, San Luis Potosí to Yucatán and Tabasco; reported from Tamaulipas, Oaxaca, Michoacán, and Guerrero. Central America, West Indies, and tropical South America; type from Jamaica.

Shrub or tree, sometimes 20 meters high, with a trunk 10 to 80 cm. in diameter, the bark brownish gray or light brown, with few shallow furrows, the branches spreading, often armed with sharp axillary spines; leaves deciduous, ovate or oval, caudate-acuminate, bright dark green, entire or ser-

rate (both kinds often on the same branches); flowers dioecious, the staminate in slender dense catkins, the pistillate in globose heads, the receptacle fleshy in fruit; seeds brown; wood light yellow, becoming darker on exposure, hard, heavy, close-grained, strong, tough, taking an excellent polish, its specific gravity about 0.71 (reported as high as 0.98). "Moral liso," "moral de clavo" (Tabasco); "palo mora" (Colombia, Isthmus of Tehuantepec); "moral amarillo," "moradilla" (Veracruz); "yaga-huil" (Oaxaca, Zapotec, *Reko*); "moral" (Tabasco, Oaxaca, etc., Colombia); "palo moral" (Oaxaca); "palo amarillo" (Tabasco, etc., El Salvador); "mora" (Sinaloa, El Salvador, Guatemala, Honduras, Costa Rica, Santo Domingo, Porto Rico, Nicaragua); "palo de mora" (Costa Rica, Porto Rico); "dinde" (Colombia); "moral del país," "mora blanca," "mora de loma," "fustete," "mora de piedra" (Cuba); "brasil" (Costa Rica); "mora macho," "palo amarillo" (Santo Domingo).

The wood is very durable and is used for furniture, interior finish, wheels, etc. Its most important use, however, is as a dye-wood; it furnishes a yellow, brown, or green dye, the coloring properties being due to two principles, morin or morindon, and moritannic acid. It is the fustic of commerce,¹ long an important article of export to Europe and the United States from tropical America. Large quantities have been exported from Mexico, especially from Tabasco. It is usually prepared in the form of sticks 60 to 120 cm. long and 7.5 to 20 cm. in diameter. The bark is used sometimes for tanning.

Various medicinal properties are reported for this tree, in Central America and the West Indies. The bitter bark, with a disagreeable odor, is said to be astringent, tonic, and in large doses purgative; it has been used for venereal diseases. The ashes of the wood have been used in Jamaica for gout and rheumatism. The fruit is astringent and useful in the form of a gargle for sore throat and mouth. The root is reputed diuretic. In Nicaragua an infusion of the flowers is used for colds. When ripe the fruit is sweet and full of milky juice, and it is sometimes eaten.

2. *Chlorophora mollis* Fernald, Proc. Amer. Acad. 40: 52. 1904.

Known only from the type locality, Tomellín Canyon, Oaxaca.

Similar to the preceding species except for the copious pubescence on all parts.

2. *MORUS* L. Sp. Pl. 986. 1753.

REFERENCE: Bureau in DC. Prodr. 17: 237-249. 1873.

Trees; leaves thin, deciduous, 3-nerved, dentate or often lobed, especially on young branches; flowers green, monoecious, the two kinds of flowers in separate catkins; fruit a syncarp, composed of numerous small juicy 1-seeded drupes.

One other species, *M. rubra* L., the red mulberry, is native in the United States. With regard to it, Havard says,² "There is some ground for belief that our native Red Mulberry was cultivated [by the Indians], the fine quality and great quantity of the fruit being mentioned by De Soto and others." *Morus alba* L., native of Asia, the white mulberry ("moral blanco"), with sweet and insipid, white or violet fruit is cultivated in Mexico. It has become naturalized in the United States, where it was introduced at an early date as food for silkworms. It is said to have been introduced into Mexico for the same purpose about 1522. Mulberries of other species also have been used for feeding silkworms. *Morus nigra* L., the black mulberry ("moral negro"), of Asiatic origin, is cultivated in Mexico for its large, juicy, well-flavored, red or black fruit.

¹ *Rhus cotinus* L., of Europe, also is known as fustic.

² Bull. Torrey Club 22: 104. 1895.

The Spanish name for the mulberry fruit is "mora"; for the tree, "moral"; the name "morera" is applied to the white mulberry tree. Asiain gives the Huastec name for mulberry tree as "tzitzi." According to Belmar, the Mixe names are "hamdek" (fruit) and "hamdek-kiup" (tree).

Pistillate spikes elongate, lax, many-flowered; leaves thin, scarcely or not at all scabrous on the upper surface, glabrate beneath—1. *M. celtidifolia*.

Pistillate spikes short, dense, few-flowered; leaves thick, very scabrous on the upper surface, copiously pubescent beneath-----2. *M. microphylla*.

1. *Morus celtidifolia* H. B. K. Nov. Gen. & Sp. 2: 33. 1817.

Morus mexicana Benth. Pl. Hartw. 71. 1840.

Morus mollis Rusby, Bull. Torrey Club 38: 145. 1911.

Coahuila to Veracruz and Oaxaca; reported from Yucatán. Guatemala and Costa Rica; Colombia to Peru; type from Ecuador.

Tree, 5.5 to 9 meters high; leaves oval-ovate, 5 to 15 cm. long, bright green, cuspidate-acuminate; fruit at first red but finally black. The fruit is known generally as "mora," the tree as "moral"; "palo moral" (Oaxaca); "yaga-biyozaa" (Oaxaca, Zapotec, *Reko*); "brasil" (Costa Rica).

The species is somewhat variable in leaf form and in size of fruit, but with the material available it does not seem necessary to recognize either of the segregates. This is perhaps the species to which Sessé and Mocifio¹ apply the name "*Morus tartarica*," although it is not certain that they do not refer to one of the introduced species. It is probably to this tree that Sahagún refers: "In this country [New Spain] there are mulberry trees. They are called *amacapulin* [paper cherry]. This tree is smooth and branched. The branches are very numerous, and the leaves are crowded and green, a little paler beneath. It produces mulberries a little smaller than those of Castile." In Ecuador the wood of this species is said to be valued for building purposes.

2. *Morus microphylla* Buckl. Proc. Acad. Phila. 1862: 8. 1863.

Morus microphilyra Greene, Leaflets 2: 120. 1910.

Chihuahua to Durango. Southern Arizona to western Texas (type locality).

Small tree, 4.5 to 7.5 meters high, with a trunk 30 cm. in diameter, the crown dense and compact, or often a shrub in Mexico; bark gray, furrowed, covered with small scales; fruit 1 to 1.5 cm. long, red or finally black; wood hard, close-grained, elastic, light brown, its specific gravity about 0.77. "Mora," "moral."

The wood is used to a small extent in Mexico by carpenters, and was employed by the Indians of Texas for bows. The fruit is rather sour and varies in size according to the amount of water the tree receives. It is sometimes found in markets.

This species may not be distinct from the preceding one. The leaves are very variable and often deeply lobed, especially on young shoots.

3. *TROPHIS* L. Syst. Nat. ed. 10. 2: 1289. 1759.

REFERENCE: Bureau in DC. Prodr. 17: 251-254. 1873.

Trees, unarmed; leaves deciduous or persistent, entire or dentate; flowers dioecious, green, spicate, racemose, or paniculate; fruit small, subglobose, with thin flesh and a large seed.

Fruit smooth, sessile or short-pedicellate; leaves usually more than 3 cm. wide.

1. *T. racemosa*.

Fruit tuberculate, long-pedicellate; leaves 3 cm. wide or less---2. *T. mexicana*.

1. *Trophis racemosa* (L.) Urban, Symb. Antill. 4: 195. 1903.

Bucephalon racemosum L. Sp. Pl. 1190. 1753.

Trophis americana L. Syst. Nat. ed. 10. 2: 1289. 1759.

¹ Pl. Nov. Hisp. 160. 1887.

Trophis ramon Schlecht. *Linnaea* 6: 357. 1831.

Tamaulipas to Sinaloa, Oaxaca, Veracruz, and Tabasco. Central America, Colombia, and the West Indies.

Tree, 15 meters high or less, with brown bark, the trunk usually 35 to 40 cm. in diameter; leaves short-petiolate, oblong to oval, 8 to 15 cm. long, short-acuminate, coriaceous, often very rough, entire or inconspicuously dentate. "Ramón" (Veracruz, Tabasco, Cuba, Santo Domingo; a corruption of this name, "ramoon," used also in Jamaica); "confitura" (Oaxaca, *Reko*); "huanchal" (Oaxaca); "leche María" (Oaxaca); "ramoncillo" (Tabasco); "ramón de Castilla" (Veracruz, *Villada*); "cafecillo" (Nicaragua); "ramón de caballos" (Cuba).

The tree is much used in Mexico, as well as elsewhere, as fodder for domestic animals, the cut branches being often transported to some distance for the purpose. The fruit is said to be edible, although the flesh is certainly very scant. The bark contains tannin and has been used in medicine as an astringent.

It may be that more than one species is included in the material referred here. The leaves are somewhat variable in shape and texture. The pistillate inflorescence is usually simply spicate, but it is sometimes branched. *T. glabrata* Liebm.¹, from the description, does not seem to differ essentially.

2. *Trophis mexicana* (Liebm.) Bureau in DC. Prodr. 17: 253. 1873.

Sorocea mexicana Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 335. 1851.

Trophis chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 178. 1915.

Veracruz, Oaxaca, and Chiapas; type from Tlapacoyan, Veracruz.

Medium-sized tree; leaves narrowly elliptic-oblong, with a long, narrow, often curved tip, conspicuously serrate, smooth, bright green.

4. *FICUS* L. Sp. Pl. 10. 59. 1753.

REFERENCE: Standley, The Mexican and Central American species of *Ficus*, Contr. U. S. Nat. Herb. 20: 1-35. 1917; Urbina, Los Amates de Hernández, Naturaleza 7: 93-114. 1900; M. Urbina, Los Amates de Hernández ó higueras Mexicanas, Naturaleza III. 1: 32-53. 1912.

Large or small trees; leaves entire (in the native Mexican species); flowers minute, borne on the inner surface of a more or less globose receptacle, this succulent in age, with a very small opening at the apex, this closed by small scales, the receptacle subtended at the base by a lobed involucre.

Many if not most of the Mexican figs are of very peculiar growth. They are hemiparasites; that is, they often begin their growth upon other plants, usually palms, germinating and developing a stem from which aerial roots descend to the ground and take root.² In this way the plants in their young stages are often vinelike. With age, the aerial roots increase in size and form a trunk which gradually envelops completely the host plant. The stems at first are flat, broad, and thin, and as they increase in size several will unite, assuming irregular and fantastic forms. Ultimately the host plant dies but often it persists for a long time, and it is not unusual to see the fronds of a palm rising from the crown of a large fig tree. Figs of this habit of growth are known generally as "matapalo." Sometimes the plants begin their growth upon cliffs, developing their thin trunks against the rocks.

¹ Dansk. Vid. Selsk. Skrivt. V. 2: 314. 1851.

² See Trelease, Illustrations of a "strangling" fig tree. Rept. Mo. Bot. Gard. 16: 161-165. pl. 39-45. 1905.

Large fig trees, too, often send down from their branches aerial roots which take hold of the soil and finally develop into trunks. In this way trees of the banyan type are formed, some of them of enormous size.

Because of their broad, dense crowns and handsome foliage many of the Mexican figs make attractive shade trees. Some exotic species are cultivated for the same purpose. *F. nitida* Thunb., an Asiatic plant with small lustrous obovate leaves is seen frequently in parks, being known as "laurel de la India," "laurel," and "álamo extranjero." A specimen of *F. crassinervia* Willd., from Puebla, was probably taken from a cultivated tree; the species is a West Indian one. *F. religiosa* L., of the East Indies ("laurel de India," "álamo cubano"), with very long-acuminate leaves, also is cultivated. *F. elastica* Roxb., another Old World species, is frequent in parks and gardens, being one of the finest shade trees grown in the tropics. It is one of the sources of India rubber, and is the well-known rubber plant which is cultivated for ornament in the United States and elsewhere. Its leaves are larger than those of most Mexican species, and the fruit is of distinct shape, oblong rather than globose, as in most figs. The common edible fig, *F. carica* L. ("higuera," "higo"), is extensively cultivated in Mexico for its fruit, which under favorable conditions is produced at all times of the year. It differs from all the American species in having lobed leaves. It was doubtless brought to Mexico at a very early date by the Spaniards. The Jesuits introduced the fig tree into Baja California in the eighteenth century, and it is said to have been the only fruit, except grapes, which was thoroughly successful there.

The fruit of all the species is edible, but often the receptacles are so small and dry that they are not very palatable. They are a favorite food of many kinds of birds and of domestic animals.

The milky juice of the Mexican species yields a kind of rubber which might become of some commercial importance. This is said to have been used locally for treating fractured bones and for similar purposes. Some of the South American species are said to produce commercial rubber.

Few medicinal uses are reported for this genus in Mexico. The early inhabitants are said to have used the root, to which purgative properties are ascribed, in the treatment of fevers and chest affections, and the milky juice for ulcers. The juice is often applied to warts, but with what success is not stated. The juice of some of the South American species is reported to be extremely poisonous.

The wood of the fig trees is soft and light and of little value. The large trunks, however, are often made into canoes. In preconquest days the bark was of great importance, for it was one of the sources of the bark paper used by the Aztecs for their records and correspondence. Some of this paper is still preserved in the ancient manuscripts. It is generally stated that the species used for the purpose was *F. petiolaris*. This is, it is true, the species described by Hernández, but it is probable that other species were used indiscriminately. Plants of other families were used likewise for the same purpose, and it is now uncertain what one was most commonly employed.

It was believed that the manufacture of bark paper in Mexico had become obsolete, but Professor Starr, of the University of Chicago, found a few years ago that the method of preparation was still known to some of the Otomí Indians of Hidalgo. He secured specimens of the paper and has published an account of its manufacture.¹ He states that the trees used are "xalama" (*Ficus* sp.), "jonote" (*Heliocarpus*), "moral," and "dragón." The name

¹ Starr, In Indian Mexico, pp. 245-246, 259, 268.

"moral" probably refers to some plant of the family Moraceae, and "dragón" perhaps to a *Jatropha*. After being stripped from the trees, the bark is washed with lye water taken from the corn soaked for *tortillas*, washed in fresh water, thoroughly boiled, and split into thin strips. These the women arrange carefully upon a wooden plank and then beat with a stone until a sheet of paper results. The side of the sheet next to the board is smooth, the other somewhat rough. The paper is dried in the sun. The paper obtained from the "moral" is white; that from "xalama" purplish. It is said that the bark of the "ule" (*Castilla*) also is used.

Because of the purposes for which the paper is employed, its preparation is generally conducted with great secrecy. It is used for decorations in various ceremonies, especially those of pagan origin. More commonly, however, it is used for "brujería" (witchcraft), and for this it is cut into "muñecos," representing human beings, horses, and other animals, and these are employed to work injury to people and domestic animals, being buried in front of a house or in a corral. The *muñecos* are employed also for curing disease, applied directly to the affected part.

This ceremonial use of the bark paper is the last remnant of a common practice of ancient times. Before the conquest paper banners were employed as offerings to the gods at certain feasts, and crowns of paper also were offered, and were worn by those who took part in the ceremonies.

The vernacular names applied to the species of *Ficus* are very numerous, and many of them are listed under the species enumerated below. In Jalisco, according to Urbina, they are usually known as "camichín" or "zalate." The former name, which is used elsewhere also, is applied to the species having smaller fruits than those known by the name "zalate." The word *camichín*, he states, is written more properly *coamichin* (= *coatl*, snake + *michin*, fish = fish-snake = eel). This name was probably given because of the adventitious roots, which might be taken to resemble eels. A name widely used in Mexico for fig trees is *amate*; this is a modification of the Nahuatl word *amatl*, "paper," applied to the tree. It is interesting to note that the Tarascan word for paper, *siranda*, also is used as a name for the fig tree. The name "macahuite" (Nahuatl, *ama-cuahuitl* = fig-tree) is said to be used in central Mexico. The word *amatl* is preserved in such place names as Amatitlán, "among the fig trees"; Amatepec, "the hill of the figs"; Amecameca, "place where they wear fig shirts."

Peduncles solitary; involucre trilobate; stamens 2. (Subgenus PHARMACOSYCE.)

Leaves hirtellous or short-pilose beneath; receptacles pilose or hirtellous.....1. *F. glaucescens*.

Leaves glabrous or merely scabrous beneath; receptacles glabrate or scabrous.

Branchlets densely pilose-sericeous.....2. *F. radulina*.

Branchlets glabrous or puberulent.

Leaves rounded and apiculate at the apex.....5. *F. radula*.

Leaves gradually acute or acuminate at the apex.

Leaf blades about 4 times as long as broad, acute at the base, glabrous.....3. *F. segoviae*.

Leaf blades not more than two and a half times as long as broad, usually very obtuse or rounded at the base, commonly scabrous.

4. *F. mexicana*.

Peduncles geminate; involucre bilobate; stamen 1. (Subgenus UROSTIGMA.)

Involucre very asymmetric, attached excentrically to the peduncle.

6. *F. tecolutensis*.

Involucre symmetric, attached centrally to the peduncle.

Receptacles all or partly sessile.

Receptacles partly sessile and partly pedunculate on the same plant.

7. *F. cookii*.

Receptacles all sessile.

Leaves cuspidate at the apex, with a long acute acumens.

8. *F. panamensis*.

Leaves not cuspidate at the apex.

Involucre small, about 5 mm. in greatest diameter, inconspicuous; receptacles glabrous-----9. *F. kellermannii*.

Involucre large, conspicuous, inclosing the receptacle for half its length or more; receptacles finely pubescent or in age glabrate.

10. *F. cotinifolia*.

Receptacles all pedunculate.

Leaves conspicuously pubescent beneath.

Leaf blades suborbicular, as broad as long, deeply cordate at the base, white-barbate beneath along the costa-----11. *F. petiolaris*.

Leaf blades usually conspicuously longer than broad, the pubescence of short hairs scattered over the lower surface.

Stipules glabrous or nearly so; receptacles pyriform. Leaves cordate-ovate or ovate-deltoid-----12. *F. palmeri*.

Stipules densely sericeous; receptacles globose.

Receptacles 13 to 17 mm. in diameter; leaf blades 6 to 19 cm. long, broadest at or near the middle-----16. *F. lapathifolia*.

Receptacles 10 to 13 mm. in diameter; leaf blades 4.5 to 12 cm. long, usually broadest at or near the base.

Involucre 10 to 15 mm. in greatest diameter; receptacles with fine appressed pubescence or glabrate; peduncles 2 to 4 mm. long-----14. *F. pringlei*.

Involucre 4 to 6 mm. in diameter; receptacles short-villous; peduncles 5 to 7 mm. long-----15. *F. microchlamys*.

Leaves glabrous beneath or nearly so.

Receptacles 4 to 12 mm. in diameter.

Ostiole of the receptacle depressed; leaf blades 1.5 to 4.7 cm. wide-----17. *F. padifolia*.

Ostiole plane or elevated; leaf blades 5 to 9.5 cm. wide.

18. *F. lentiginosa*.

Receptacles 15 to 25 mm. in diameter.

Stipules ferruginous-sericeous-----19. *F. glyxicarpa*.

Stipules glabrous or minutely puberulent.

Leaf blades cuneate-obovate, rounded at the apex.

20. *F. involuta*.

Leaf blades oblong to oval or ovate-oval, broadest at or below the middle.

Leaf blades cordate or subcordate at the base, with 5 to 9 lateral veins on each side.

Petioles 3.5 to 7 cm. long; leaves bright green; receptacles pubescent-----21. *F. jonesii*.

Petioles 1.5 to 3.5 cm. long; leaves glaucescent beneath; receptacles glabrous-----13. *F. brandegei*.

Leaf blades rounded or emarginate at the base, with usually 8 to 13 lateral veins on each side.

Leaf blades emarginate at the base; receptacles densely puberulent.....22. *F. goldmanii*.

Leaf blades rounded at the base; receptacles glabrous or nearly so.....23. *F. yucatanensis*.

1. *Ficus glaucescens* (Liebm.) Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 300. 1867.
Pharmacosycea glaucescens Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 332. 1851.
Pharmacosycea hernandezii Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 332. 1851.
Ficus hernandezii Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 300. 1867.
Ficus guadalajarana S. Wats. Proc. Amer. Acad. 26: 151. 1891.
 Veracruz to Sinaloa and Oaxaca; type from Mecapalco, Veracruz. Central America.

Large or small tree; stipules 1 to 2 cm. long; leaves oval-oblong or obovate-oval, 8 to 23 cm. long, very obtuse or apiculate at the apex; receptacles 1.5 to 2.5 cm. in diameter. "Higo loxe grande" (Oaxaca).

2. *Ficus radulina* S. Wats. Proc. Amer. Acad. 26: 151. 1891.

Chihuahua and Sonora; type collected near Batopilas, Chihuahua.

Large tree with whitish or yellowish branches; stipules 6 to 8 cm. long; leaves oblong to oval-elliptic, 9 to 18 cm. long; receptacles 1.5 to 2 cm. in diameter, spotted with light and dark green. "Nacapuli," "higuera" (Sonora); "salate" (Chihuahua).

3. *Ficus segoviae* Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 300. 1867.

Pharmacosycea angustifolia Liebm. Dansk. Vid. Selsk. Skrivt. V. 3: 333. 1851.

Not *Ficus angustifolia* Roxb. 1814.

Veracruz to Guerrero and Oaxaca. Guatemala and Nicaragua (type locality).

Stipules 2 to 5.5 cm. long; leaf blades narrowly elliptic, 10 to 20 cm. long; receptacles 1.5 to 3 cm. in diameter. "Macahuite" (Oaxaca).

4. *Ficus mexicana* Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 299. 1867.

Pharmacosycea mexicana Miquel, Versl. Med. Kon. Akad. Amsterdam 13: 416. 1862.

San Luis Potosí to Sinaloa, Oaxaca, and Yucatán.

Large tree, sometimes 20 meters high, with a trunk nearly 2 meters in diameter, the bark pale brownish or yellowish; stipules 3.5 to 10 cm. long; leaves oval or elliptic-oblong, 8 to 20 cm. long; receptacles about 2 cm. in diameter, light green. "Copoy" (San Luis Potosí, Palmer); "sabali" (Sinaloa).

5. *Ficus radula* Willd. Sp. Pl. 4: 1144. 1806.

Veracruz to Yucatán and Oaxaca. Central America, Colombia, and Venezuela (type locality).

Large or small tree, with brownish gray branches; stipules 1 to 1.5 cm. long; leaves oblong to oval, 8 to 16 cm. long; receptacles 1.5 to 3 cm. in diameter. "Macahuite" (Oaxaca; from the Nahuatl, "ama-cuahuitl").

6. *Ficus tecolutensis* (Liebm.) Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 299. 1867.

Urostigma tecolutense Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 324. 1851.

Veracruz to Yucatán and Oaxaca; type from Tecolutla, Veracruz. Guatemala.

Stipules 1 to 1.5 cm. long; leaves oblong, oval, or oval-obovate, 6 to 10 cm. long, obtuse or acutish at the apex, obtuse or emarginate at the base, glabrous; receptacles 5 to 8 mm. in diameter. "Matapalo" "amate," "matapalo liso," "macahuite" (Oaxaca).

7. *Ficus cookii* Standl. Contr. U. S. Nat. Herb. 20: 15. 1917.

Chiapas; type from San Vicente. Guatemala.

Large tree; stipules 1 to 1.5 cm. long; leaves oval or orbicular-ovate, 6 to 11 cm. long, rounded at the apex, shallowly cordate at the base; receptacles about 1 cm. in diameter.

A very remarkable species because of the presence of both sessile and pedunculate receptacles upon the same tree.

8. *Ficus panamensis* Standl. Contr. U. S. Nat. Herb. 20: 15. 1917.

Tabasco. Central America and Colombia; type from Panama.

Stipules 2 cm. long; leaves oblong or obovate-oblong, 9 to 16 cm. long, glabrous; receptacles 1 cm. in diameter. "Amatillo" (Tabasco).

9. *Ficus kellermannii* Standl. Contr. U. S. Nat. Herb. 20: 18. 1917.

Oaxaca. Guatemala; type from El Rancho.

Stipules 1 to 2 cm. long; leaves oval-oblong, obovate-oval, or oval, 5 to 14 cm. long, short-hirtellous beneath, emarginate or subcordate at base; receptacles 8 to 10 mm. in diameter. "Higo loxe chico" (Oaxaca).

10. *Ficus cotinifolia* H. B. K. Nov. Gen. & Sp. 2: 49. 1817.

Ficus myxaefolia Kunth & Bouché, Ind. Sem. Hort. Berol. 18. 1846.

Urostigma longipes Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 321. 1851.

Urostigma glaucum Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 322. 1851.

Ficus subrotundifolia Greenm. Proc. Amer. Acad. 41: 237. 1905.

Chihuahua to Baja California, Oaxaca, and Yucatán; type collected on the Acapulco road near La Venta del Egido. Costa Rica.

Large or small tree, sometimes 15 meters high, with a trunk a meter in diameter, the branches few, large, spreading; stipules 5 to 13 mm. long; leaves oblong to orbicular, 5 to 13 cm. long, very variable; receptacles 6 to 11 mm. in diameter, whitish, often spotted. "Copó," "coobó," "álamo" (Yucatán); "higuerón" (Tamaulipas, San Luis Potosí); "amate prieto" (Morelos).

The milky juice mixed with the powdered bark is applied to wounds and bruises. This may be the "tlilamatl" ("black-fig") described by Hernández.

11. *Ficus petiolaris* H. B. K. Nov. Gen. & Sp. 2: 49. 1817.

Ficus jaliscana S. Wats. Proc. Amer. Acad. 26: 150. 1891.

Sonora to Guerrero and Morelos; reported from Oaxaca; type collected near Mazatlán, Guerrero.

Large or small tree with white trunk; leaves 6.5 to 15 cm. wide; receptacles 1 to 1.5 cm. in diameter. The following names are reported for this species, although it is probable that most of them are applied to others also: "Tepeamatl" or "tepeamate" (Guerrero; the former the Nahuatl term, meaning "hill-fig"); "tescalama," "tescalamate," or "texcalamate" (Morelos, Durango, Guanajuato, etc.; in Nahuatl, *texcalamatl*="lava-fig," this name, according to Robelo, given because the tree sometimes grows on lava rock); "palo chilamate" (Oaxaca, *Reko*; from the Nahuatl, *chil-amatl*); "higuera" (Durango, Sinaloa); "palo María," "higuerón" (Sinaloa, Mexico); "higuerote," "texcalama lechosa" (Sinaloa); "amate" (Oaxaca); "amacostic" (Morelos); "amate amarillo" (Morelos, Guerrero).

This species has frequently been reported¹ from Mexico as *F. nymphacifolia* L. That is a South American species, which is somewhat similar but nevertheless quite distinct.

This species is discussed by Hernández² in a chapter entitled "De Amacoztic, seu Papyro lutea, seu Tepematl, Sycomoro Saxatili Mexicana." His remarks are as follows: "The *Amacoztic*, which some call *Texcalamatl*, or rock-paper, and others *Tepeamatl*, is a large tree which has the leaves broad, almost round, thick and purplish like ivy, and nearly heart-shaped; the bark is on one side yellow inclining to green, and on the other red; it has the fruits on the same trunks, which are smooth like that of a fig tree; the fruit resembles small

¹ As by Sessé & Mocino, Pl. Nov. Hisp. 180. 1887.

² Thesaurus 81. 1651.

figs; it is purple and full of small red seeds; the tree is fastened to the rocks, and is a wonderful thing. The leaves have no perceptible odor or flavor; their temperament is moist and cold. The decoction of the roots allays the thirst of those who suffer from fever, alleviates pains of the chest, is purgative and vomitive, and it is prepared by boiling three ounces of the roots with three pounds of water until the half is consumed; its milk cures sores of the lips and chronic ulcers. The tree grows in mountainous and rough places about Chietla, embracing the rocks, as I have said, and as the name itself indicates. There is another kind that has the same name and temperament, which, they say, serves only for furnishing straight, smooth poles." Hernández also gives two easily recognizable figures of the plant (pp. 82, 409).

Dr. Fernando Altamirano, quoted by Urbina,¹ describes the gum or rubber obtained from this (and probably also from other) species of *Ficus* as follows: "The commercial *Texcalama* appears as rounded masses of variable dimensions. This substance is elastic and adhesive and very ductile, gray in color, and capable of being formed into membranes as delicate as soap bubbles, being in this state white and transparent; exposed to the air it hardens and assumes a yellow tint, for which reason it should be kept in vessels full of water. In boiling water it softens and becomes more sticky.

"Its density is greater than that of water; its odor is urine-like, and it has scarcely any taste.

"In its analysis I found 15 per cent of caoutchouc, 55 per cent of a resin soluble in alcohol, and 5 per cent of a resin soluble in ether."

This gum is used by surgeons and others in Mexico for treating broken bones, hernia, etc.

12. *Ficus palmeri* S. Wats. Proc. Amer. Acad. 24: 77. 1889.

Baja California, on rocky hillsides; type from San Martín Island.

Tree, 4.5 to 10 meters high, with white trunk; stipules 1.5 to 2 cm. long; leaves 6 to 14 cm. long; receptacles 12 to 15 mm. in diameter. "Salate."

This is presumably the tree described by Clavigero² as "anabá," in the following words: "*Anabá* is the name of a fruit similar to the fig, and of the tree on which it is borne. The latter is large, the bark of its trunk and branches whitish like that of the fig tree, and the fruit similar in color and shape to the early figs but smaller, less juicy, and without the sweet flavor of our figs. Nevertheless the Californians esteem it so highly that when they hear of an *anabá* with ripe fruit they go to hunt for it and gather a supply of the fruit, even though it may be four or five leagues distant. The wood of the *anabá* is absolutely useless, and the roots are usually broader than thick, for since the tree grows among rocks, it introduces its roots into the clefts, or, in default of these, extends them over the rocks themselves. In Mexico, where it is known by the name of *zalate*, it fruits better and attains a larger size."

13. *Ficus brandegei* Standl. Contr. U. S. Nat. Herb. 20: 22. 1917.

Known only from the type locality, San José del Cabo, Baja California.

Similar to the last species except for the complete absence of pubescence upon the leaves.

14. *Ficus pringlei* S. Wats. Proc. Amer. Acad. 26: 150. 1891.

Jalisco; type from the barranca near Guadalajara.

¹ Naturaleza 7: 98. 1900.

² Historia de la California, 1789. This is the first work in which Baja California plants were described. Clavigero's information was furnished by a brother of the Jesuit order, whose descriptions are remarkably vivid and accurate.

Small or medium-sized tree; stipules 1.5 cm. long; leaves ovate-oval or deltoid-ovate, 4.5 to 8 cm. long, very obtuse or rounded at the apex, subcordate or emarginate at the base.

15. *Ficus microchlamys* Standl. Contr. U. S. Nat. Herb. 20: 23. 1917.

Sinaloa, Tepic, Jalisco, and Veracruz; type from Guadalajara.

Large tree; stipules 7 mm. long; leaves oblong to rounded-ovate, 6 to 12 cm. long, rounded or obtuse at the apex, subcordate or emarginate at the base. "Salate bronco" (Sinaloa).

16. *Ficus lapathifolia* (Liebm.) Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 297. 1867.

Urostigma lapathifolium Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 319. 1851.

Tamaulipas to Veracruz, Chiapas, and Guerrero; type from Yecoatla and Colipa, Veracruz. Guatemala.

Stipules 1.5 to 1.8 cm. long; leaves oval to broadly oblong.

17. *Ficus padifolia* H. B. K. Nov. Gen. & Sp. 2: 47. 1817.

Ficus complicata H. B. K. Nov. Gen. & Sp. 2: 48. 1817.

Urostigma schiedeanum Miquel, Lond. Journ. Bot. 6: 539. 1847.

Urostigma complicatum Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 325. 1851.

Urostigma baccatum Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 327. 1851.

Urostigma turbinatum Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 328. 1851.

Urostigma sulcipes Miquel, Versl. Med. Kon. Akad. Amsterdam 13: 413. 1862.

Ficus fasciculata S. Wats. Proc. Amer. Acad. 24: 78. 1889.

Ficus sonorae S. Wats. Proc. Amer. Acad. 24: 78. 1889.

Tamaulipas to Sonora, Oaxaca, and Tabasco; type from Acapulco, Guerrero. Central America.

Small or often a very large tree, as much as 30 meters high, with broad, dense crown and numerous trunks and aerial roots; stipules 5 to 15 mm. long; leaves mostly ovate or elliptic, 4 to 12 cm. long, acute or acuminate. "Nacapuli" (Sonora); "camichín" (Colima, Sinaloa, Jalisco); "comuchín" (Michoacán, Guerrero); "palo de coco" (Oaxaca, *Liebmann*); "amatillo," "capulín grande" (Tabasco); "samatito" (Guerrero, Oaxaca, Morelos); "amesquite" (Morelos); "matapalo" (Oaxaca); "higuito" (Costa Rica); "cozahuique" (Oaxaca, *Villada*); "jalamate," "cabra-higo" (Morelos, *Urbina*).

One of the handsomest of Mexican trees, often with an immense crown of dark green leaves. It has been reported from Mexico as *F. ligustrina* Kunth & Bouché, a South American species. The fruit is usually tinged or spotted with red or purple; it is sweet and much eaten by children and birds, and sometimes it is sold in the markets.

*Urbina*¹ considers that this is the "amazquitl" of Hernández, who speaks of the value of the tree for shade, and states that a decoction of the root bark was given to fever patients. The "hoeiamatl" of Hernández is perhaps the same species; this was employed as a remedy for various skin diseases and for pains and sourness of the stomach. Another wild fig described by Hernández under the name "itzamatl" may also be *Ficus padifolia*. This, Hernández states, was called "higo de Indias" by the Spaniards.

18. *Ficus lentiginosa* Vahl, Enum. Pl. 2: 183. 1806.

Guerrero to Oaxaca and Yucatán. West Indies; type from Montserrat.

Stipules 1 to 1.5 cm. long; leaves oval or ovate-oval, 7.5 to 16 cm. long, obtuse or rounded and often short-pointed at the apex, bright green; receptacles 8 to 9 mm. in diameter. "Jagüey" (Porto Rico).

For an illustration of a flowering branch see Contr. U. S. Nat. Herb. 8: pl. 35.

¹ *Naturaleza* 7: 99. 1900.

19. *Ficus glydicarpa* Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 297. 1867.

Urostigma glydicarpum Miquel, Versl. Med. Kon. Akad. Amsterdam 13: 409. 1862.

Veracruz; type from Hacienda de la Laguna.

Stipules 1 cm. long; leaves elliptic-oblong or obovate, 7 to 20 cm. long, obtuse or rounded and short-pointed at the apex; receptacles 1.5 to 2 cm. in diameter.

20. *Ficus involuta* (Liebm.) Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 298. 1867.

Ficus obtusifolia H. B. K. Nov. Gen. & Sp. 2: 49. 1817. Not *F. obtusifolia* Roxb. 1814.

Urostigma involutum Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 323. 1851.

Urostigma bonplandianum Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 323. 1851.

Ficus bonplandiana Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 298. 1867.

Sinaloa to San Luis Potosí, Yucatán, and Oaxaca. Central America; type from Nicaragua.

Large tree, sometimes with a trunk 1.8 meters in diameter and a crown 19 meters broad; stipules 1.5 to 3 cm. long; leaves 11 to 21 cm. long; receptacles 1.5 to 2 cm. in diameter. "Amate" (Guererro); "amate blanco" (San Luis Potosí, Morelos); "matapalo" (Oaxaca); "palo de sal" (Costa Rica).

The fruit is edible. The milky juice of the branches is applied externally for pain in the stomach.

21. *Ficus jonesii* Standl. Contr. U. S. Nat. Herb. 20: 31. 1917.

Sinaloa and Jalisco; type from La Palma, Jalisco.

Large tree; leaves oval-oblong to broadly ovate-oblong; receptacles 2.5 cm. in diameter.

The writer is inclined to believe that the receptacles described for this may belong to a different tree from the one which furnished the leaves, and that the latter may be referable to *F. lentiginosa*.

22. *Ficus goldmanii* Standl. Contr. U. S. Nat. Herb. 20: 32. 1917.

Sonora and Sinaloa to Puebla and Oaxaca; type from Alamos, Sonora.

Large tree, with a short, very thick trunk supported by buttresses; leaves oblong or elliptic-oblong, 8 to 20 cm. long; receptacles 2 to 2.5 cm. in diameter. "Chalate" (Durango).

23. *Ficus yucatanensis* Standl. Contr. U. S. Nat. Herb. 20: 33. 1917.

Yucatán; type from Chichen Itzá.

Stipules 1 to 1.5 cm. long; leaves oval or oval-oblong, 8 to 20 cm. long; receptacles 2 cm. in diameter.

DOUBTFUL SPECIES.

FICUS CALYCVLATA Mill. Gard. Diet. ed. 8. *Ficus* no. 11. 1768. Described from Veracruz. The description does not agree with any species known from Mexico.

FICUS FUSCESCENS (Liebm.) Miquel, Ann. Mus. Bot. Lugd. Bat. 3: 298. 1867. *Urostigma fuscescens* Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 329. 1851. Described from Veracruz; perhaps not of this genus.

5. *BROSIMUM* Swartz, Prodr. Veg. Ind. Occ. 12. 1788.

Leaves oval or oblong-oval, 4.5 to 8.5 cm. wide, acute or acuminate.

1. *B. alicastrum*.

Leaves oblong or lance-oblong, 2 to 3 cm. wide, obtuse or acutish.

2. *B. konzattii*.**1. *Brosimum alicastrum* Swartz, Prodr. Veg. Ind. Occ. 12. 1788.**

Tamaulipas to Yucatán, Tabasco, Oaxaca, and Tepic. West Indies and Central America; type from Jamaica.

Tree, sometimes 30 meters high, with a trunk a meter in diameter, the crown broad and dense; bark gray; leaves bright green, glabrous, entire; flowers unisexual, in dense globose pedunculate heads; fruit subglobose, yellow or orange, containing a single large seed about 12 mm. broad. "Ramón" (Yucatán, Oaxaca); "ox" (Yucatán, Tabasco, Maya); "ojite" (Veracruz, Tamaulipas, Oaxaca; from the Nahuatl, "oxitl"); "nazareno" (Oaxaca, *Reko*); "oxotzin" (Veracruz, *Finck*); "capomo" (Tepic, Jalisco, Veracruz, Oaxaca); "apomo" (Sinaloa); "Juandiego" (Oaxaca, *Reko*); "ojoche" (Nicaragua); "maseco" (Guatemala, Honduras).

The wood is said to be white, or sometimes grayish or tinged with flesh color, compact, hard, and fine-grained; it is used in carpenter work. The tree is valued highly for forage, the branches being cut and fed to different kinds of stock, and the fallen leaves are eaten greedily by cattle. The tree is often planted for this purpose, and in some parts of Mexico it is a very important forage plant. The milky juice is reported to yield a kind of rubber, and is used as a calmant in asthma. It is reputed also to increase the flow of human milk, this probably a relic of the old medical theory of signatures. The seeds are said to be fattening for cattle, which are fond of them, and they are used also as human food. For the latter purpose they are boiled or roasted, and eaten alone or mixed with sugar, honey, or corn meal. They have a flavor resembling that of chestnuts and are very nutritious. The seeds are sometimes roasted and used as a substitute for coffee.

2. *Brosimum konzattii* Standl. Contr. U. S. Nat. Herb. 20: 211. 1919.

Known only from the type locality, Cafetal San Rafael, Distrito de Pochutla, Oaxaca.

Similar to the preceding, of which it may be only a form, but with much smaller, relatively narrower leaves, the embryo with an obtuse, rather than acute, radicle.

6. *PSEUDOLMEDIA* Trécul, Ann. Sci. Nat. III. 8: 129. 1847.

1. *Pseudolmedia oxyphyllaria* Donn. Smith, Bot. Gaz. 20: 294. 1895.

Veracruz. Guatemala; type from Volcán de Tecuamburro.

A tree; leaves elliptic-oblong, 11 to 23 cm. long, acuminate, entire, glabrous; flowers dioecious, the staminate ones in sessile heads, the pistillate solitary, sessile, axillary, surrounded by silky bracts.

Perhaps not sufficiently distinct from *P. spuria* (Swartz) Griseb., of the Greater Antilles and Panama.

7. *CASTILLA*¹ Cervantes, Gaceta de Literatura de México, Suppl. July 2, 1794.

REFERENCES: Pittier, Contr. U. S. Nat. Herb. 13: 247-279. 1910; Cook, The culture of the Central American rubber tree, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 49. 1903; Villada, El árbol del hule, Naturaleza 3: 316-330. 1876.

1. *Castilla elastica* Cervantes, Gac. Lit. Méx. Suppl. 1794.

Castilla lactiflua Cook, Science n. ser. 18: 438. 1903.

Veracruz to Sinaloa, Chiapas, and Yucatán; type from Veracruz.

¹ Sometimes written *Castilloa*. The genus was named in honor of Juan Diego del Castillo (1744-1793), pharmacist and economic explorer, who came to Mexico in 1787 as a member of the famous naturalists' expedition sent out by Charles III. As a result of the labors occasioned by his work, he fell ill and died in the City of Mexico. He left a legacy of \$4,000 to be used in publishing the Flora Mexicana. A manuscript by his hand, entitled "Plantas descritas en el viaje de Acapulco," is said to be preserved in the Botanical Garden at Madrid.

Tree, attaining a height of 20 meters or more, the trunk grayish, nearly smooth; leaves distichous, deciduous, short-petiolate, oblong or oval-oblong, 25 to 40 cm. long, cordate at the base, acuminate at the apex, copiously pubescent; flowers monoecious, the 2 kinds on separate receptacles, the staminate receptacles 2 to 2.5 cm. broad, bearing numerous flowers; fruiting receptacles 4 cm. or more in diameter, contorted, the fruits becoming fleshy and brick-red. "Arbol del hule"; "tarantaqua" (Michoacán, *Leon*); "hule" (the rubber; sometimes written "ule"; derived from the Nahuatl *olli* or *ollin*); "cuauchile." Robelo gives the Nahuatl names for the tree as "olcagülte," "ulcuagül," "olcuahuitl," and "ulcuahuitl."

This is one of the best-known trees of Mexico, being the principal source of commercial rubber in Mexico and Central America. The rubber is obtained from either wild or cultivated trees. The *Castilla* grows wild chiefly in the states of Chiapas, Tabasco, Yucatán, and Veracruz, usually at altitudes of 700 meters or less. It is reported also from Campeche, Oaxaca, Guerrero, Michoacán, Colima, Jalisco, Hidalgo, Sinaloa, and Tamaulipas. Cultivation of the rubber tree was begun in the State of Chiapas about 50 years ago, but only in an experimental way, and it is only in recent years that cultivation has been carried on upon an extensive scale. The details of rubber production are so numerous that they can not be treated here, but those interested in the subject should consult the paper by Cook, listed above.

Like other plants of the family Moraceae, the rubber tree has milky juice, and this is the source of the rubber. The juice is obtained by tapping the trees. It coagulates upon exposure to the air, but various substances are sometimes added to hasten coagulation. In British Honduras the pounded stems of morning-glory (*Calonyction*) are said to be used for this purpose. The early inhabitants of Mexico were well acquainted with the crude rubber, using it to make balls for games, for bottles, and for waterproofing coats, hats, shoes, and other objects.

The wood is white and moderately heavy. The bark is beaten out by some of the Indians of tropical America, and the fabric thus obtained is used for clothing and blankets. In Mexico the bark is said to have been one of the sources of paper.

Hernández was probably the first to give an account of the Mexican rubber tree. He gives a fairly accurate figure,¹ and the following account, in a chapter entitled "De Holquahuitl, seu Arbore Chilli²": "*Holquahuitl* is a tree of which there are two sorts. The one produces a large, smooth, yellow stem, full of soft pith; whitish flowers; very large leaves; and star-shaped disks, pale but becoming red, clinging to a stalk and crowded with fruits like Pontic nuts, which are covered with a whitish and yellow skin and have a bitter flavor. The other sort has leaves like *Malus Medicus*, but larger; the bark of both trees is bitter. The latter grows in Michoacán, where it is called *tarantaquam*. The first is called *Mecatiani* and *yhulapae*. The bark is warm in the third order and slightly lubricous; its infused decoction is good for dysentery. When cut it yields a gum, called *Holli* by the Indians, which is at first milky, but soon yellow, and finally black, if it is smeared on the bodies of those who gather it. It is so resilient that balls fashioned from it bounce like hand-balls, and it is useful for many other purposes. For it evokes the urine uncommonly, cleanses the womb, and corrects sterility. * * * Added to food it fattens, and compounded with those creatures which are called *Axin*, it is said to engender a certain agility to the body, and to soften the bones so that men are able to

¹ Thesaurus 50. 1651.

² The word "chilli" is probably a typographical error for "holli" or "hule."

turn and twist this way and that, and to handle the body like contortionists; and it excites venery, it allays colics, applied as a plaster it relieves the bowels, appeases thirst, and, burnt, it dissipates ulcers. This is that noble gum with which the Indians once were wont to play the game called *Bathei*, wonderful to see, which, by the agency of Cortés, the people of Spain also were enabled to witness years ago. The leaves of the tree, dried and bruised, are said to destroy lions and other animals."

According to Sahagún, "hoarseness is cured by rubbing the throat with *ulli*, drinking honey, and sniffing a few drops of honey up the nose. * * * The gum is very medicinal and is used for almost all diseases. It is a remedy for the eyes, for abscesses, and for suppuration. It is taken with cacao. It is useful for the stomach and intestines, internal putrefaction, and constipation." The rubber was employed also for holding broken bones in place, and for similar purposes.

Several other species of *Castilla* are found in Central America. Some Mexican specimens have been reported as *C. guatemalensis* Pittier,¹ but the present writer has no reason for believing that more than one species occurs in Mexico.

8. SAHAGUNIA² Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 316. 1851.

1. Sahagunia mexicana Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 316. 1851.

Mirador and Barranca de Santa María, Veracruz.

Tree; leaves oblong, acuminate, entire or nearly so; flowers dioecious, the staminate spicate, the pistillate capitate. "Arbol del pan" (Veracruz, *Villada*).

9. CECROPIA L. Amoen. Acad. 5: 410. 1760.

REFERENCE: Miquel in Mart. Fl. Bras. 4¹: 139-154. 1853.

Trees or shrubs, the stems simple or branched, the trunk whitish, hollow; leaves long-petiolate, the blades deeply lobed, usually white-tomentose beneath, the lobes 7 to 13, entire; stipules large, inclosing the young inflorescences; flowers dioecious, in very dense cylindric spikes, these clustered at the end of a stout peduncle.

All the species are much alike in general appearance, and they are not easily separated upon examination of herbarium material. The specimens available are

¹ Contr. U. S. Nat. Herb. 13: 272. 1910. The proper name for this species is *Castilla gummifera* (Bertol.) Pittier; see Contr. U. S. Nat. Herb. 20: 34. 1917.

² The genus is named in honor of Bernardo de Sahagún, a Franciscan friar of Spanish birth who came to Mexico as a missionary in 1529. Here, as Prescott states, "he distinguished himself by his zeal, the purity of his life, and his unwearied exertions to spread the great truths of religion among the natives." He wrote a "Historia Universal de Nueva España," the material for which he obtained directly from the native people with whom he was continually associated. This work he composed in the Nahuatl language, which he could both write and speak with great fluency. It was feared by the other members of the order that the publication of the work would keep alive in the natives too vivid an impression of the superstitions which it was the duty of the Christian church to eradicate, and consequently the permission to print the manuscript was refused. It was not until 1830 that Sahagún's history was actually printed. Besides the other matters of which it treats, the book contains much information regarding the plants of Mexico. Sahagún's work is one of the most important of those dealing with Mexican antiquities, and is unique in the method of its preparation. The author lived to an advanced age, and died in the capital in 1590.

not numerous or very satisfactory, and it is doubtful how many species occur in Mexico.

The trees grow very rapidly. Their hollow trunks are generally inhabited by pugnacious ants. The trunks are often cut in two and used as troughs to conduct water. Many of the native inhabitants of tropical America used them also for making a kind of trumpet, and the soft spongy wood was employed as tinder. In Brazil the wood has been used for making paper. The bark contains a tough, coarse fiber used for cordage and for mats and for a kind of coarse cloth by the Indians of Central and South America. The sap yields rubber, but the quantity obtained by tapping is too small to be of commercial importance. It is said that the Indians sometimes ate the pith and that cattle eat the leaves and fruit. The fruit is eaten also by birds.

Various medicinal properties are ascribed to the plants. In Mexico the juice is used as a caustic for the treatment of ulcers and the removal of warts. In South America and the West Indies it is used for dysentery and venereal diseases, and a decoction of the young leaves for dropsy, liver affections, and asthma. The ashes, according to Barham, were employed as a remedy for dropsy. It is said, in addition, that the plant possesses the properties of digitalis, although its toxicity is relatively low.

According to Cook¹ *Cecropia peltata* is known in Porto Rico as "yagrumo hembra," because of the fact that it is popularly believed to be the female plant of *Didymopanax morototoni*, which is known as "yagrumo macho."

The trees of the genus *Cecropia* are first described by Oviedo² (Lib. VIII, Cap. X), under the name "yaruma." He states that the Indians valued them highly as a remedy for wounds.

The following vernacular names are reported for the species: "Guarumbo" (Valley of Mexico, Oaxaca, Tabasco, Chiapas); "guarumo" (Tabasco, Chiapas, Veracruz, Costa Rica; the word, according to Pittier, is probably of Cuban or Haitian origin); "chancarro" (Veracruz, Oaxaca); "coilotópalo," "coilotá-palo" (Valley of Mexico); "saruma" (Michoacán, Valley of Mexico); "guarina" (Tabasco, Chiapas).

Pistillate spikes sessile-----1. *C. mexicana*.

Pistillate spikes pedunculate.

Staminate spikes few, 10 to 15 cm. long-----2. *C. schiedeana*.

Staminate spikes numerous (12 to 15), 3 to 6 cm. long-----3. *C. obtusa*.

1. *Cecropia mexicana* Hemsl. Biol. Centr. Amer. Bot. 3: 151. pl. 80. 1883.

Veracruz to Sinaloa and Oaxaca; type from Córdoba, Veracruz, Central America.

Sometimes as much as 12 to 15 meters high. "Guarumbo" (Oaxaca); "trompeta" (Sinaloa); "guarumo" (Costa Rica, El Salvador).

This is probably the species reported from Jorullo by Sessé and Mocino³ as *C. peltata* L. It has often been reported from Mexico under that name by other writers. One collection from Oaxaca, with leaves glabrate beneath, perhaps represents an undescribed species.

2. *Cecropia schiedeana* Klotzsch, Linnaea 20: 531. 1847.

Veracruz; type from Papantla.

¹ Contr. U. S. Nat. Herb. 8: 110. 1903.

² Primera parte de la historia natural y general de las Indias, yslas y tierra firme del mar oceano. Sevilla, 1535. An enlarged and improved edition was published in Madrid, 1851-55.

³ Pl. Nov. Hisp. 170. 1887.

3. *Cecropia obtusa* Trécul, Ann. Sci. Nat. III. 8: 79. 1849.

Veracruz and Yucatán. Cuba; South America.

"Xcoóchlé" (Yucatán, Maya); "yagrumo hembra" (Cuba).

DOUBTFUL SPECIES.

CECROPIA COMMUTATA Schott; Miquel in Mart. Fl. Bras. 4¹: 148. 1843. Described from a sterile cultivated plant said to be of Mexican origin.*CECROPIA PROPINQUA* Miquel in Mart. Fl. Bras. 4¹: 149. 1843. Described from sterile cultivated plants.**10. COUSSAPOA** Aubl. Pl. Guian. 2: 891. 1775.**1. *Coussapoa rekoi*** Standl. Contr. U. S. Nat. Herb. 20: 211. 1919.

Veracruz and Oaxaca; type locality, Cafetal Concordia, Cerro Espino, Oaxaca, at an altitude of 600 meters.

Large tree with spreading crown, the branchlets, stipules, and nerves prickly; leaves ovate-rounded, sometimes half a meter long, entire, short-pointed; flowers in globose pedunculate heads, the head becoming succulent and edible at maturity. "Chirimoya," "carnero" (Oaxaca); "ababábite" (Veracruz).

The ripe heads are edible; they are about 2.5 cm. in diameter and resemble miniature chirimoyas (*Annona cherimola*). Mr. Wilson Popenoe has found them recently offered for sale in markets of Veracruz.**25. URTICACEAE. Nettle Family.**

Large or small shrubs or small trees, sometimes covered with stinging hairs. Many herbaceous representatives of the family occur in Mexico. Most of the species of the Urticaceae have very tough stems, from which coarse, tough fiber may be obtained.

Plants with stinging hairs.

Stigma penicillate-capitate; perianth lobes fleshy in fruit-----1. **URERA.**Stigma filiform; perianth lobes unchanged in fruit-----2. **URTICASTRUM.**

Plants never with stinging hairs.

Perianth membranaceous in fruit, inclosing the achene.

Stigma persistent; leaves toothed-----3. **BOEHMERIA.**Stigma deciduous; leaves entire-----4. **POUZOLZIA.**

Perianth none.

Flowers in long slender spikes-----5. **MYRIOCARPA.**Flowers in axillary glomerules-----6. **PHENAX.****1. URERA** Gaud. in Freyc. Voy. Bot. 496. 1826.REFERENCE: Weddell in DC. Prodr. 16¹: 88-98. 1869.

Trees or shrubs, covered with stinging hairs; leaves alternate, stipulate, petioled; flowers small, green, in axillary panicles, usually dioecious; fruit a small achene, surrounded by the fleshy calyx and resembling a berry.

Inflorescence not dichotomous; leaves entire or sinuate. Achene exceeding the calyx-----1. **U. microcarpa.**

Inflorescence dichotomous or trichotomous; leaves crenate-dentate or coarsely dentate.

Achene exceeding the calyx; leaves coarsely dentate-----2. **U. baccifera.**

Achene not exceeding the calyx; leaves closely crenate-dentate.

3. **U. caracasana.**

1. *Urera microcarpa* Wedd. Arch. Mus. Paris 9: 156. 1856.

Yucatán and Tabasco. Panama; Jamaica (type locality).

Shrub or small tree; leaves elliptic-oblong, 7 to 10 cm. long. "Laol" (Yucatán, Maya).

2. *Urera baccifera* (L.) Gaud. in Freyc. Voy. Bot. 497. 1826.*Urtica baccifera* L. Sp. Pl. ed. 2. 1398. 1763.

Oaxaca; reported from Yucatán, and probably also in Tabasco or Chiapas. Central America, West Indies, and South America.

Shrub or small tree, 2 to 7 meters high, covered with stout stinging hairs; leaves oval or rounded-cordate, 10 to 30 cm. long or larger; flowers small, in cymes, whitish, the branches of the cymes red or purplish; fruit small, juicy, white. "Ortiga de caballo" (Yucatán); "chichicastle" (Oaxaca); "chichicazte" (Guatemala); "chichicazte nigua" (El Salvador); "ortiga" (Panama, Porto Rico); "ortiga brava" (Porto Rico); "pringamosa" or "pringamoza" (Colombia, Santo Domingo, Venezuela); "guaina" (Colombia); "chichicate," "chichicastre" (Cuba).

The fruit is said to be edible. In Yucatán the shrub is planted for hedges. The hairs sting the flesh severely and sometimes cause painful sores. The branches are said to be used sometimes in Colombia as a rubefacient, and the fiber separated from them is employed in Cuba and elsewhere for making rope and twine. According to Grosourdy,¹ the root has been used in Porto Rico as a popular remedy for gonorrhoea, and the juice of the leaves for chills in intermittent fevers, while diuretic properties are ascribed to the plant.

3. *Urera caracasana* (Jacq.) Griseb. Fl. Brit. W. Ind. 154. 1859.*Urtica caracasana* Jacq. Pl. Hort. Schönbr. 3: 71. pl. 386. 1798.*Urera caracasana tomentosa* Wedd. in DC. Prodr. 16¹: 90. 1869.*Urtica chichicaxtli* Sessé & Moc. Pl. Nov. Hisp. 160. 1887.

Veracruz to Sinaloa, Chiapas, and Tabasco. Central America, West Indies, and tropical South America; type from Caracas, Venezuela.

Shrub or small tree, 2 to 4 meters high, usually armed with slender stinging hairs; leaves very variable in shape, rounded-ovate to rhombic-elliptic, cordate to obtuse at base, acute or acuminate at apex, sparsely or densely pubescent; flowers very small, greenish; fruit bright red at maturity. "Ortiga" (Veracruz, Tabasco); "mal hombre" (Veracruz); "quemador" (Sinaloa); "chichicaxlillo" (Oaxaca); "chichicaxtli," "mala mujer" (Morelos, Sessé & Mociño); "tachinole" (Durango); "chichicaste" (Guatemala); "ortiga colorada" (Porto Rico).

According to Reko, the Nahuatl name is "xio-patli" (*xiotl*, syphilis; *patli*, remedy, medicine). He states that the plant is still used by the Indians of the Sierra de Juárez as a remedy for syphilis. Sessé and Mociño state that the shrub was sometimes planted for hedges. Palmer reports that in Durango it is employed to cure the effects of poison ivy (*Rhus toxicodendron* and related species).

2. **URTICASTRUM** Fabr. Pl. Hort. Helmst. 204. 1759.1. *Urticastrum mexicanum* (Liebm.) Kuntze, Rev. Gen. Pl. 1: 635. 1891.*Discocarpus mexicanus* Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 309. 1851.*Urera platycarpa* Wedd. Ann. Sci. Nat. III. 18: 202. 1852.*Laportea mexicana* Wedd. in DC. Prodr. 16¹: 84. 1879.

Veracruz and Oaxaca (type locality). Guatemala.

¹ René de Grosourdy, El médico botánico criollo. 1864.

Shrub, 1 to 3 meters high, covered with slender stinging hairs, the trunk thick, succulent, sparsely branched; leaves broadly ovate, crenate; flowers dioecious; fruit a small thin orbicular achene.

3. BOEHMERIA Jacq. Enum. Pl. Carib. 9. 1760.

REFERENCE: Weddell in DC. Prodr. 16¹: 195-218. 1869.

Shrubs or more commonly herbs; leaves opposite or alternate, 3-nerved; flowers green, unisexual, paniced, glomerate, or spicate in the leaf axils; fruit a small achene.

A few herbaceous species occur in Mexico besides those listed below. The best-known species of the genus is the ramie plant ("ramié," "seda vegetal"), *Boehmeria nivea* (L.) Gaud., a large herb or small shrub which has been cultivated in Mexico as well as elsewhere for its fiber. It differs from the native Mexican species in having the leaves densely white-tomentose beneath. The original home of the plant was probably China, but the species is now widely dispersed in tropical regions.

Flowers in dense axillary glomerules-----1. *B. ulmifolia*.
Flowers in long dense spikes.

Stipules lance-ovate; leaves copiously pubescent on the upper surface.

2. *B. caudata*.

Stipules lance-linear; leaves glabrate on the upper surface-----3. *B. palmeri*.

1. *Boehmeria ulmifolia* Wedd. Arch. Mus. Paris 9: 347. 1856.

Boehmeria fallax ulmifolia Wedd. in DC. Prodr. 16¹: 198. 1869.

Veracruz; type from Jalapa. Guatemala.

Shrub, 1.5 to 2.5 meters high; leaves broadly ovate, crenate.

2. *Boehmeria caudata* Swartz, Prodr. Veg. Ind. Occ. 34. 1788.

Boehmeria flagelliformis Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 310. 1851.

Veracruz to Oaxaca. Central America, West Indies, and tropical South America.

Shrub or small tree, 2 to 5 meters high; leaves ovate or lance-elliptic, closely crenate, densely pubescent beneath.

The plant is said to give a very strong fiber. This is probably the plant described by Sessé and Mociño¹ as *Urtica spicata*. That name belongs properly to an Old World species of *Boehmeria*.

3. *Boehmeria palmeri* S. Wats. Proc. Amer. Acad. 22: 453. 1887.

Known only from the type locality, Tequila, Jalisco.

Shrub, 2.5 meters high; leaves ovate, 7 to 13 cm. long; flower spikes often leafy at the apex.

4. POUZOLZIA Gaud. in Freyc. Voy. Bot. 503. 1826.

Shrubs; leaves usually alternate, 3-nerved, stipulate; flowers monoecious, clustered in the leaf axils, the glomerules unisexual; fruit a small achene.

Leaves densely short-pilose beneath, not tomentose-----1. *P. palmeri*.
Leaves densely white-tomentose beneath.

Leaves mostly 4 to 7 cm. long, abruptly acuminate-----2. *P. nivea*.

Leaves mostly 1.5 to 4 cm. long, rounded to acute at the apex--3. *P. pringlei*.

1. *Pouzolzia palmeri* S. Wats. Proc. Amer. Acad. 22: 453. 1887.

Rocky slopes of barrancas, Jalisco and Sinaloa to Morelos; type from Guadalajara.

Shrub, 1 to 1.5 meters high, with slender reddish brown branches; leaves bright green, ovate or oval, acuminate; flowers very small, in dense axillary clusters.

¹ Fl. Mex. 235. 1896.

2. Pouzolzia nivea S. Wats. Proc. Amer. Acad. **22**: 453. 1887.

Rocky slopes, Jalisco and Sinaloa to Veracruz; type from Guadalajara.

Shrub, 1 to 1.5 meters high; leaves ovate or oval, 3-nerved, very white beneath.

P. latifolia Wedd.¹ was based on specimens said to have come from Mexico. Its description suggests *P. nivea*.

3. Pouzolzia pringlei Greenm. Proc. Amer. Acad. **33**: 476. 1998.

Puebla and Oaxaca; type from Tomellín Canyon, Oaxaca.

Shrub similar to the last species but with much smaller leaves.

5. MYRIOCARPA Benth. Bot. Voy. Sulph. 168. 1844.

REFERENCE: Weddell in DC. Prodr. **16**¹: 235³³–235³⁴. 1869.

Trees or shrubs; leaves large, alternate, dentate, pinnately veined and somewhat 3-nerved; stipules connate; flowers green, dioecious, the long stalks axillary, solitary or clustered; fruit a small achene.

Leaf blades ovate-orbicular, cordate at the base-----1. *M. cordifolia*.

Leaf blades ovate or broadly ovate, obtuse or rounded or rarely subcordate at the base.

Leaves serrate; pistillate peduncles slender, glabrate-----2. *M. longipes*.

Leaves crenate; pistillate peduncles stout, densely pilose-----3. *M. brachystachys*.

1. Myriocarpa cordifolia Liebm. Dansk. Vid. Selsk. Skrivt. V. **2**: 306. 1851.

Veracruz and Puebla; type from forests near Colipa, Veracruz.

Tree, 4 to 5 meters high; leaves mostly 20 to 25 cm. long and nearly as wide; fruit a small achene. "Mal hombre" (Puebla).

2. Myriocarpa longipes Liebm. Dansk. Vid. Selsk. Skrivt. V. **2**: 306. 1851.

Myriocarpa colipensis Liebm. Dansk. Vid. Selsk. Skrivt. V. **2**: 306. 1851.

Veracruz to Colima and Chiapas. Central America; type from Costa Rica.

Shrub, 2.5 to 6 meters high; flowers in very long slender spikes. "Cholagogue Indio" (Oaxaca).

The plant is sometimes used for hedges. In Oaxaca it is employed as a remedy for malaria.

3. Myriocarpa brachystachys S. Wats. Proc. Amer. Acad. **26**: 152. 1891.

Jalisco; type from barranca near Guadalajara.

Shrub or small tree; leaves 7 to 17 cm. long, densely pubescent beneath.

Myriocarpa stipitata ambigua Wedd.,² described from Veracruz, is perhaps the same as *M. longipes*.

6. PHENAX Wedd. Ann. Sci. Nat. IV. **1**: 191. 1854.

Shrubs; leaves alternate, petiolate, toothed, 3 or 5-nerved; stipules free; flowers green, monoecious, in dense axillary clusters, the bracts brown, scarious; fruit a compressed achene.

Leaf blades broadly ovate, thin, coarsely crenate-----1. *P. hirtus*.

Leaf blades ovate to lance-oblong, thick, finely and closely crenate.

2. *P. mexicanus*.

1. Phenax hirtus (Swartz) Wedd. in DC. Prodr. **16**¹: 235³⁴. 1869.

Urtica hirta Swartz, Fl. Ind. Occ. **1**: 285. 1797.

Veracruz to Oaxaca. Central America, West Indies, and tropical South America.

Shrub, 1 to 2 meters high; leaves mostly 5 to 11 cm. long, green, glabrate, long-petiolate, coarsely crenate.

¹ In DC. Prodr. **16**¹: 234. 1869.

² In DC. Prodr. **16**¹: 235³⁴. 1879.

Specimens reported from Jalapa by Hemsley¹ as *P. sonneratii* Wedd. probably belong here.

2. *Phenax mexicanus* Wedd. Arch. Mus. Paris 9: 500. 1856.

Phenax gaudichaudianus Wedd. Ann. Sci. Nat. IV. 1: 193. 1854.

Phenax galeottianus Blume, Mus. Bot. Lugd. Bat. 2: 227. 1866.

Veracruz, Oaxaca, and Chiapas. Central America.

Shrub, 1 to 2.5 meters high; leaves bright green, 3-nerved; flowers small, in dense axillary clusters; fruit a small achene.

26. PROTEACEAE. Protea Family.

1. *ROUPALA* Aubl. Pl. Guian. 1: 83. 1775.

1. *Roupala borealis* Hemsl. Biol. Centr. Amer. Bot. 3: 78. pl. 76. 1882.

Veracruz and Oaxaca; type from San Cristóbal, Veracruz. Guatemala.

Shrub or small tree, nearly glabrous; leaves dimorphous, part of them pinnate, with coarsely serrate leaflets, part of them simple, long-petiolate, ovate or elliptic, long-acuminate, shallowly serrate; flowers small, in long slender spikes. "Palo de zorrillo" (Oaxaca).

27. LORANTHACEAE. Mistletoe Family.

Shrubs, sometimes very small, parasitic upon the branches of trees or shrubs, usually green but often red, brown, or yellowish and without chlorophyll; leaves mostly opposite, entire, thick and leathery, frequently reduced to scales, estipulate; flowers large or small, perfect or unisexual; fruit a 1-seeded berry.

The pulp of the fruit is extremely viscid, and if it comes in contact with any object it can not be separated from it without great difficulty. The fruit is eaten by birds and it is largely by their agency that the seeds are transported from one host to another. It is said that in Brazil a kind of rubber has been extracted from the fruit, and that the leaves are used for tanning.

When one of the plants of this family is removed from its host there is exposed upon the latter a curious structure which often assumes a flower-like form. These "wood flowers" or "flores de madera" are well known in some parts of tropical America, and various superstitions are associated with them. Flowers not calyculate, very small.

Flowers in one rank on the joints of the inflorescence. Leaves developed.

1. *DENDROPHTHORA*.

Flowers in 2 or more ranks.

Flowers solitary in the axils of the bracts; leaves reduced to scales.

2. *RAZOUMOFSKYA*.

Flowers borne above the bracts on the axis of the spike; leaves often well developed.

3. *PHORADENDRON*.

Flowers calyculate, often large and showy.

Flowers sunk in the axis of the inflorescence.

4. *ORYCTANTHUS*.

Flowers not sunk in the axis of the inflorescence, sessile or pedicellate.

Flowers small, less than 1 cm. long.

5. *STRUTHANTHUS*.

Flowers large, 2 cm. long or larger.

Seeds with endosperm.

6. *PHRYGILANTHUS*.

Seeds without endosperm.

7. *PSITTACANTHUS*.

¹ Biol. Centr. Amer. Bot. 3: 161. 1883.

1. **DENDROPTHORA** Eichl. in Mart. Fl. Bras. 5²: 102. 1868.1. **Dendrophthora pedicellata** Van Tiegh. Bull. Soc. Bot. France 43: 182. 1896.

Type from "Mesa Chica."

Stems terete; leaves oblong or oblong-lanceolate, 3.5 to 5 cm. long, obtuse or rounded at apex, glabrous; spikes 1 cm. long, 2 or 3-jointed, the flowers pedicellate.

2. **RAZOUMOFSKYA** Hoffm. Hort. Mosq. 1808.1. **Razoumofskya vaginata** (H. B. K.) Kuntze, Rev. Gen. Pl. 1: 587. 1891.

Viscum vaginatum H. B. K. Nov. Gen. & Sp. 3: 445. 1817.

Arceuthobium cryptopodum Engelm. Bost. Journ. Nat. Hist. 6: 214. 1850.

Arceuthobium vaginatum Eichl. in Mart. Fl. Bras. 5²: 105. 1868.

Sonora to Coahuila, Mexico, and Oaxaca; type from Cofre de Perote. Western United States. On pines; reported also on *Abies religiosa*.

Plants 6 to 20 cm. high, often forming dense tufts, much branched, brownish; leaves reduced to small scales; flowers spicate. "Ingerto" (Durango).

Hemsley¹ reports *A. campylopodum* Engelm. from Orizaba and *A. oxycedri* Bieb. from Veracruz and Oaxaca. It may be that more than one species is represented in the material examined by the writer, but there are no readily apparent characters for their separation.

3. **PHORADENDRON** Nutt. Journ. Acad. Phila. II. 1: 185. 1847.

REFERENCE: Trelease, The genus *Phoradendron*, pp. 1-124, pl. 1-245. 1916.

Branches terete, angulate, or compressed; leaves opposite, sometimes reduced to scales; flowers usually dioecious, sessile or immersed in the rachis of a spike.

Mistletoe plants are much used in the United States for Christmas decorations, and on this account are of some commercial importance. The American mistletoes are different from the true mistletoe of Europe, *Viscum album* L., but some of them are similar to it in general appearance. The Spanish names applied to the European mistletoe are "muérdago," "liga," and "visco," words adopted in Spanish America for the native plants of the same family. The species of *Phoradendron* often occur upon trees in such abundance as ultimately to kill them. The fruit of some species has been reported as poisonous, but that of other species is said to be edible. The species apparently are little used in domestic medicine. The Coahuilla Indians of southern California are said to use the dried and powdered stems of one species (growing on *Juniperus*) as a remedy for saddle sores on horses. Ramírez gives the names applied to various species of doubtful identification as "cabellera," "liga," "visco cuer-cino," and "chachahua."

Stems with scales near the base of the branches; leaves always developed.

Scales present on all the joints-----1. **P. piperoides.**

Scales present only on the basal joints of the branches.

Leaves pinnately nerved, oval or oblong-oval-----2. **P. oliverianum.**

Leaves palmately nerved.

Flowers mostly 2-ranked on each joint.

Stems quadrangular.

Fruit not tuberculate; leaves twice as long as broad_3. **P. townsendi.**

Fruit tuberculate; leaves nearly as broad as long_4. **P. yucatanum.**

Stems not quadrangular.

Spikes filiform; branchlets compressed-----5. **P. wawrae.**

Spikes stout; branchlets subterete-----6. **P. vernicosum.**

¹ Biol. Centr. Amer. Bot. 3: 83-4. 1882.

Leaves more or less spatulate.

Leaves spatulate-linear.....31. *P. bolleanum*.

Leaves oblanceolate-spatulate.

Spikes usually 2-jointed; staminate spikes mostly 6-flowered.

32. *P. guadalupense*.

Spikes usually 1-jointed; staminate spikes 8 to 12-flowered.

Staminate spikes about 12-flowered; on *Juniperus*.

33. *P. densum*.

Staminate spikes about 8-flowered; on *Abies* and *Cupressus*.

34. *P. pauciflorum*.

Pistillate flowers 6 or more on each joint.

Branches compressed at the joints.

Leaves 10 to 25 mm. wide.....35. *P. scaberrimum*.

Leaves 5 to 7 mm. wide.....36. *P. longifolium*.

Branches not compressed.

Leaves mostly acute or attenuate, large (mostly 7 to 10 cm. long), pubescent.....37. *P. velutinum*.

Leaves rounded or very obtuse at the apex, or if acute very small.

Leaves small, usually 1 cm. wide or less, if larger very long in proportion to their breadth.

Plants persistently tomentose.....38. *P. lanatum*.

Plants not persistently tomentose, the pubescence sparse or soon deciduous.

Fruit villous or hispid.

Leaves oval or elliptic.....39. *P. eduardi*.

Leaves linear-oblanceolate to narrowly oblong.

Fruit retrorsely hispid. Sepals closed.....40. *P. galeottii*.

Fruit sparsely villous.

Sepals closed.....41. *P. peninsulare*.

Sepals open.....42. *P. palmeri*.

Fruit glabrous or puberulent.

Leaves subacute, sessile.....43. *P. mazatlanum*.

Leaves very obtuse, usually petiolate.

Plants large, stout.

Leaves sessile.....44. *P. globuliferum*.

Leaves petiolate.

Plants glabrate.....45. *P. brachystachyum*.

Plants densely pubescent throughout.

46. *P. tlacolulense*.

Plants small (of Baja California).

Leaves oval or rounded.....47. *P. aureum*.

Leaves oblong or obovate-oblong.....48. *P. diguetii*.

Leaves large, most of them 2 cm. wide or larger, never much elongate.

Fruit pubescent.

Leaf blades mostly 5 to 8 cm. long.....49. *P. robinsoni*.

Leaf blades usually less than 4 cm. long.

Leaves orbicular or nearly so.....50. *P. coryae*.

Leaves elliptic or obovate.....51. *P. tomentosum*.

Fruit glabrous.

Spikes yellow-hispid.....52. *P. colipense*.

Spikes glabrous, tomentose, or sparsely villous.

Spikes glabrous or sparsely villous.

Leaves suborbicular.....53. *P. macrophyllum*.

Leaves rounded-obovate.....54. *P. cockerellii*.

Spikes canescent-tomentose.

Staminate spikes 4 to 6 cm. long-----55. *P. greggii*.

Staminate spikes 2 cm. long or shorter.

Staminate spikes (in flower) 1.5 to 2 cm. long.

56. *P. engelmanni*.

Staminate spikes 1 cm. long-----57. *P. thyrsoides*.

1. *Phoradendron piperoides* (H. B. K.) Trel. Gen. Phorad. 145. 1916.

Viscum latifolium Swartz, Fl. Ind. Occ. 1: 268. 1797. Not *V. latifolium* Lam. 1789.

Loranthus piperoides H. B. K. Nov. Gen. & Sp. 3: 443. 1818.

Viscum cornifolium Presl, Epim. Bot. 254. 1849.

Viscum ellipticum Presl, Epim. Bot. 254. 1849.

Viscum laurifolium Presl, Epim. Bot. 255. 1849.

Veracruz. Central America, West Indies, and South America; type from Popayán, Colombia. On various dicotyledonous hosts.

Leaves lanceolate to broadly ovate, 6 to 10 cm. long, acute or acuminate; fruit yellow or orange.

2. *Phoradendron oliverianum* Trel. Gen. Phorad. 136. pl. 201. 1916.

Veracruz; type from Mirador.

Leaves oval or elliptic, 4.5 to 6 cm. long, obtuse or rounded at the apex; spikes 2 to 3.5 cm. long.

3. *Phoradendron townsendi* Trel. Gen. Phorad. 112. pl. 162. 1916.

Known only from Socorro Island.

Leaves oblanceolate-oblong, 4 to 6 cm. long, very obtuse; spikes 1 cm. long.

4. *Phoradendron yucatanum* Trel. Gen. Phorad. 118. pl. 173. 1916.

Yucatán.

Leaves cuneately obovate or suborbicular, 1.5 to 2.5 cm. long, rounded or emarginate at the apex; spikes 5 to 10 mm. long.

5. *Phoradendron wawrae* Trel. Gen. Phorad. 94. pl. 128. 1916.

Veracruz; type from Tuxpan.

Leaves lanceolate or oblanceolate, 5 to 10 cm. long, very obtuse; spikes 1 to 1.5 cm. long.

6. *Phoradendron vernicosum* Greenm. Field Mus. Bot. 2: 250, 1897.

Yucatán, the type from Izamal; parasitic on *Bumelia buxifolia* and perhaps on other plants.

Leaves elliptic, obovate, or lanceolate, 2.5 to 4 cm. long, very obtuse; spikes 1 to 2 cm. long.

7. *Phoradendron amplifolium* Trel. Gen. Phorad. 59. pl. 68. 1916.

Veracruz, Puebla, and Oaxaca; type collected between Piaxtla and Amolac, Puebla.

Leaves oblanceolate-oblong to obovate-elliptic, very obtuse, 8 to 12 cm. long; spikes 3 cm. long; fruit reddish, 6 to 7 mm. in diameter.

8. *Phoradendron carneum* Urban, Bot. Jahrb. Engler 23: Beibl. 5: 1. 1897.

Jalisco to Querétaro and Oaxaca; type from Guadalajara; on *Ipomoea* and *Populus*.

Leaves linear-lanceolate, obtuse or acute, 5 to 15 cm. long; spikes 2 to 3 cm. long; fruit reddish orange, 4 to 5 mm. in diameter.

9. *Phoradendron tamaulipense* Trel. Gen. Phorad. 115. pl. 167. 1916.

Tamaulipas, Veracruz, and Oaxaca; type from Alvarado, Veracruz; on *Salix*, *Populus*, *Mimosa*, and *Parmentiera*.

Leaves elliptic-obovate, obtuse, 3.5 to 5 cm. long, subsessile; spikes 1.5 to 5 cm. long; fruit coral-red or deep orange. "Ingerto,"¹ "seca-palo" (Tamaulipas).

In Tamaulipas the plant is used with "chile color" (*Capsicum*) to make an ointment applied for the relief of pain.

10. *Phoradendron gaumeri* Trel. Gen. Phorad. 114. *pl.* 167. 1916.

Known only from the type locality, Izamal, Yucatán.

Leaves elliptic-obovate, obtuse, 2.5 to 3 cm. long; spikes 2 to 4 cm. long.

11. *Phoradendron guazumae* Trel. Gen. Phorad. 104. *pl.* 148. 1916.

Sinaloa; type from Mazatlán; on *Guazuma*.

Leaves oblanceolate or obovate, 4 to 5.5 cm. long, very obtuse; spikes 1 to 2 cm. long.

12. *Phoradendron commutatum* Trel. Gen. Phorad. 106. *pl.* 150, 151. 1916.

Sinaloa to San Luis Potosí and Tabasco; type collected between Guadalajara and Tepic. Honduras and Nicaragua.

Leaves obovate, 3.5 to 5 cm. long, obtuse or acute; spikes 1.5 to 3 cm. long; fruit red. "Cabellera" (Tabasco).

13. *Phoradendron brevifolium* Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 176. 1864.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Leaves narrowly elliptic or oblong, 3 mm. wide, very obtuse, sessile; spikes 5 cm. long or shorter.

14. *Phoradendron pachyarthron* Eichl. in Mart. Fl. Bras. 5²: 122. 1868.

Known only from Baños, Hidalgo, the type locality.

Leaves 5 to 9 cm. long, obtuse, petiolate; spikes 2 cm. long.

15. *Phoradendron schumannii* Trel. Gen. Phorad. 62. *pl.* 71, 72. 1916.

Chihuahua, Durango, and Guanajuato; type from Jaral, Guanajuato; on *Quercus*.

Leaves oblong-elliptic or elliptic-lanceolate, obtuse, 6 to 8 cm. long, petiolate; spikes 2 to 7 cm. long.

16. *Phoradendron purpusi* Trel. Gen. Phorad. 62. *pl.* 73. 1916.

Veracruz; type from Zacuapan; on *Quercus*.

Leaves falcate-lanceolate, acute or obtuse, 8 to 15 cm. long, petiolate; spikes 5 cm. long or shorter.

17. *Phoradendron nervosum* Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 175. 1864.

Phoradendron konzattii Trel. Gen. Phorad. 63. *pl.* 15. 1916.

Veracruz to Oaxaca; type from Colipa, Veracruz; reported on *Annona*, *Liquidambar styraciflua*, *Pyrus*, and *Quercus*.

Leaves lanceolate, obtuse to attenuate, 9 to 30 cm. long, petiolate; spikes 2 to 6 cm. long; fruit reddish.

18. *Phoradendron reichenbachianum* (Seem.) Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 175. 1864.

Viscum reichenbachianum Seem. Bot. Voy. Herald 296. *pl.* 62. 1856.

Jalisco to Mexico; type from the Sierra Madre; on *Quercus*.

Leaves obtuse, 8 to 10 cm. long; spikes 3 to 5 cm. long.

19. *Phoradendron lanceolatum* Engelm. Mem. Amer. Acad. n. ser. 4: 59. 1849.

Nuevo León; type from Rinconada; on *Quercus*.

Leaves 6 to 8 cm. long, 1 to 1.5 cm. wide, obtuse, subpetiolate; spikes 3 to 4 cm. long.

¹ "Ingerto" (often written "injerto") is the Spanish word for "graft," a term not inappropriate for mistletoe.

- 20. *Phoradendron falcatum*** (Schlecht. & Cham.) Trel. Gen. Phorad. 65. 1916.
Viscum falcatum Schlecht. & Cham. Linnaea 5: 172. 1830.
Viscum schiedeanum DC. Prodr. 4: 671. 1830.
 San Luis Potosí and Veracruz; type from Jalapa; on *Quercus*.
 Leaves 8 to 15 cm. long. 1.5 cm. wide, obtuse; spikes 1.5 to 2.5 cm. long.
- 21. *Phoradendron forestierae*** Robins. & Greenm. Proc. Amer. Acad. 32: 36. 1896.
Phoradendron pringlei Trel. Gen. Phorad. 60. pl. 70. 1916.
 Hidalgo and Puebla; type collected between Tehuacán and Esperanza Puebla; on *Forestiera* and *Fraaxinus*.
 Leaves linear-lanceolate, 5 to 16 cm. long, obtuse or acute; spikes 1 to 4 cm. long.
- 22. *Phoradendron calyculatum*** Trel. Gen. Phorad. 54. pl. 62, 63. 1916.
Viscum falcatum Hook. Icon. Pl. 4: pl. 368. 1841. Not *V. falcatum* Schlecht. & Cham. 1830.
 Veracruz and Oaxaca; type from Jalapa; on *Quercus*.
 Leaves narrowly falcate-lanceolate, obtuse, 15 to 25 cm. long; spikes 3 to 4 cm. long.
- 23. *Phoradendron californicum*** Nutt. Journ. Acad. Phila. II. 1: 185. 1848.
 Baja California, Sonora, and Sinaloa. California (type locality) to Utah. Reported on *Acacia*, *Prosopis*, *Zizyphus*, *Parkinsonia*, *Olneya*, *Covillea*, and *Microrhamnus*.
 Spikes 5 to 10 mm. long; fruit red, 3 mm. in diameter.
 Russell¹ reports that this plant is eaten by the Pima Indians of Arizona. The stems bearing the fruit are boiled, and the fruit is then stripped off into the mouth and eaten.
- 24. *Phoradendron ligatum*** Trel. Gen. Phorad. 24. pl. 15. 1916.
 Chihuahua and Durango; probably in Baja California. California, Oregon (type locality), and Nevada. On *Juniperus* and *Cupressus*.
 Spikes about 2 mm. long.
- 25. *Phoradendron juniperinum*** Engelm. Mem. Amer. Acad. n. ser. 4: 58. 1849.
 Chihuahua. Western Texas to Colorado, Utah, and Arizona; type from Santa Fe, New Mexico. On *Juniperus*.
 Spikes 3 mm. long; fruit yellowish or wine-colored.
 According to Hough, the Hopi Indians of Arizona use the plant as a substitute for coffee.
- 26. *Phoradendron libocedri*** (Engelm.) Howell, Fl. Northw. Amer. 1: 608. 1902.
Phoradendron juniperinum libocedri Engelm.; S. Wats. Bot. Calif. 2: 105. 1880.
 Baja California. California (type from Lassens Peak) and Oregon. On *Libocedrus decurrens*.
 Spikes 3 mm. long; fruit straw-colored.
- 27. *Phoradendron minutifolium*** Urban, Bot. Jahrb. Engler 23: Beibl. 5: 2. 1897.
 Veracruz; type from Llanos de Perote; on *Juniperus*.
 Leaves acute, 2 to 3 mm. long; spikes 3 mm. long.
- 28. *Phoradendron capitellatum*** Torr.; Trel. Gen. Phorad. 25. pl. 17. 1916.
 Sonora. Western Texas to Arizona; type from New Mexico. On *Juniperus*.
 Leaves 1 to 1.5 cm. long, acute; spikes 5 mm. long; fruit straw-colored.
- 29. *Phoradendron tequilense*** Trel. Gen. Phorad. 26. pl. 18. 1916.
 Known only from the type locality, Sierra de Tequila, Jalisco. Reported on "*Thuya*" (*Cupressus* or *Juniperus*?).

¹ Frank Russell, The Pima Indians, Ann. Rept. Bur. Amer. Ethnol. 26. 1908.

Leaves 1 to 1.5 cm. long, acute, sessile; spikes 4 to 7 mm. long; fruit straw-colored.

30. *Phoradendron saltillense* Trel. Gen. Phorad. 27. *pl.* 16. 1916.

Known only from the type locality, San Antonio de las Alazanes, near Saltillo, Coahuila; on *Juniperus*.

Leaves 2 to 3 cm. long, acute, sessile; spikes 5 to 6 mm. long.

31. *Phoradendron bolleanum* (Seem.) Eichl. in Mart. Fl. Bras. 5²: 134. 1868.

Viscum bolleanum Seem. Bot. Voy. Herald 295. *pl.* 63. 1856.

Chihuahua and Durango; type from the Sierra Madre; on *Juniperus*; one collection reported, perhaps erroneously, as on *Arbutus*.

Leaves 1 to 1.5 cm. long, acute, sessile; spikes 3 mm. long; fruit straw-colored. "Ingerto" (Durango).

32. *Phoradendron guadalupense* Trel. Gen. Phorad. 29. *pl.* 22, 23. 1916.

Known only from Guadalupe Island, Baja California.

Leaves 1.5 to 3 cm. long, very obtuse, sessile; spikes about 1 cm. long.

33. *Phoradendron densum* Torr.; Trel. Gen. Phorad. 27. *pl.* 20. 1916.

Sonora. California and Oregon; type from Mount Shasta. On *Juniperus*.

Leaves 1.2 to 2 cm. long very obtuse, sessile; spikes 3 mm. long; fruit straw-colored.

34. *Phoradendron pauciflorum* Torr. U. S. Rep. Expl. Miss. Pacif. 4⁴: 134. 1857.

Baja California. California (type locality) and Arizona. On *Abies* and perhaps on *Cupressus*.

Leaves 2 to 3 cm. long, obtuse, sessile; spikes 5 mm. long; fruit straw-colored.

35. *Phoradendron scaberrimum* Trel. Gen. Phorad. 52. *pl.* 59. 1916.

Sinaloa and Tepic; type from Santa Teresa, Tepic.

Leaves narrowly lanceolate, acutish to emarginate, 10 to 16 cm. long; spikes 2.5 cm. long.

36. *Phoradendron longifolium* Eichl. (in Mart. Fl. Bras. 5²: 107. 1868, nomen nudum); Trel. Gen. Phorad. 53. *pl.* 60. 1916.

Known only from the type locality, San Pedro Nolasco, Oaxaca.

Leaves linear-oblong, acutish, 10 to 14 cm. long; spikes 2.5 cm. long.

37. *Phoradendron velutinum* (DC.) Nutt. Journ. Acad. Phila. II. 1: 185. 1847.

Viscum velutinum DC. Prodr. 4: 281. 1830.

Querétaro to Oaxaca; type from Toluca, Mexico. Guatemala. On *Cornus*, *Crataegus*, *Quercus*, etc.

Leaves falcate-lanceolate, acute or acuminate, 1 to 2.5 cm. wide; spikes 1.5 to 2 cm. long.

38. *Phoradendron lanatum* Trel. Gen. Phorad. 45. *pl.* 46. 1916.

Querétaro to Oaxaca; type from Hacienda Ciervo y Cadereyta, Querétaro.

Leaves narrowly elliptic or obovate, 2 to 3 cm. long, acute or obtuse; spikes 1 cm. long.

39. *Phoradendron eduardi* Trel. Gen. Phorad. 46. *pl.* 47. 1916.

Baja California; type from Carmen Island.

Leaves 1.5 to 2 cm. long, sessile, very obtuse; spikes 2.5 to 4 cm. long; fruit creamy white, 4 mm. in diameter.

40. *Phoradendron galeottii* Trel. Gen. Phorad. 46, *pl.* 46. 1916.

Veracruz; type from Mirador; on *Quercus*.

Leaves 2 to 5 cm. long, obtuse; spikes 1.5 cm. long or shorter.

41. *Phoradendron peninsulare* Trel. Gen. Phorad. 50. *pl.* 55. 1916.
Baja California; type from Cape San Lucas.
Leaves 1.5 to 3 cm. long, very obtuse; spikes 1 to 2 cm. long.
According to Trelease, this may be the pistillate form of *P. diguetii*.
42. *Phoradendron palmeri* Greenm. Proc. Amer. Acad. 40: 28. 1904.
Known only from the type locality, Álvarez, San Luis Potosí; on *Quercus*.
Leaves 2 to 3.5 cm. long, obtuse; spikes 0.5 to 2 cm. long. "Ingerto de encina."
43. *Phoradendron mazatlanum* Trel. Gen. Phorad. 47. *pl.* 48. 1916.
Known only from the type locality, Mazatlán, Sinaloa.
Leaves spatulate-oblong, 3.5 to 4.5 cm. long; spikes 2 cm. long.
44. *Phoradendron globuliferum* Trel. Gen. Phorad. 48. *pl.* 51. 1916.
Vicinity of Guaymas, Sonora.
Leaves elliptic-obovate, very obtuse, 2 cm. long; spikes 0.5 to 2 cm. long.
Perhaps not distinct from the next species.
45. *Phoradendron brachystachyum* (DC.) Nutt. Journ. Acad. Phila. II. 1: 185. 1847.
Viscum brachystachyum DC. Prodr. 4: 280. 1830.
Sonora to Tamaulipas, Veracruz, and Oaxaca; type collected between Tampico and Real del Monte; on *Arbutus*, *Quercus*, *Jacquinia*, *Guaiacum*, etc.
Leaves oblong-lanceolate to orbicular, very variable, 1.5 to 5 cm. long; spikes 1 to 1.5 cm. long.
46. *Phoradendron tlacolulense* Loes. Bull. Herb. Boiss. 2: 536. *pl.* 20. 1894.
Oaxaca; type from Mitla.
Leaves orbicular or obovate, 1 to 2 cm. long; spikes 5 mm. long.
47. *Phoradendron aureum* Trel. Gen. Phorad. 49. *pl.* 52. 1916.
Known only from the type locality, Santa Cruz, Baja California.
Leaves 1 to 2 cm. long, short-petiolate; spikes 1 to 1.5 cm. long.
48. *Phoradendron diguetii* Van Tiegh. Bull. Mus. Hist. Nat. 1: 31. 1895.
Phoradendron brachyphyllum Trel. Gen. Phorad. 49. *pl.* 53. 1916.
Phoradendron tumidum Trel. Gen. Phorad. 49. *pl.* 53. 1916.
Phoradendron saccatum Trel. Gen. Phorad. 50. *pl.* 55. 1916.
Baja California; on *Quercus*, *Veatchia*, *Jatropha*, etc.
Leaves 3 cm. long, short-petiolate; spikes 1.5 cm. long.
49. *Phoradendron robinsoni* Urban, Bot. Jahrb. Engler 23: Beibl. 5: 4. 1897.
Puebla and Guerrero; type from Tehuacán, Puebla; on *Celtis*.
Leaves oblanceolate or obovate, very obtuse, petiolate; spikes 2 to 8.5 cm. long.
50. *Phoradendron coryae* Trel. Gen. Phorad. 43. *pl.* 44. 1916.
Phoradendron wilkinsoni Trel. Gen. Phorad. 44. *pl.* 45. 1916.
Chihuahua to Baja California. Western Texas to Arizona; type from Chiricahua Mountains, Arizona. On *Quercus*.
Leaves 1.5 to 3.5 cm. long, short-petiolate; spikes 1.5 to 2 cm. long; fruit white.
51. *Phoradendron tomentosum* (DC.) Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 176. 1864.
Viscum tomentosum DC. Prodr. 4: 670. 1830.
Viscum villosum Nutt.; Torr. & Gray, Fl. N. Amer. 1: 654. 1840.
Phoradendron villosum Nutt. Journ. Acad. Phila. II. 1: 185. 1848.
Phoradendron puberulum Trel. Gen. Phorad. 42. *pl.* 43. 1916.
Chihuahua to Baja California and Hidalgo; type from "Real de Catone." California and Oregon. On *Celtis*, *Prosopis*, *Quercus*, *Platanus*, *Acacia*, *Aesculus*, *Arctostaphylos*, *Populus*, *Rhus*, *Robinia*, *Salix*, etc.

Leaves 2 to 3.5 cm. long, very obtuse, short-petiolate; spikes 1 to 3.5 cm. long; fruit white. The following names are reported, but they may apply to other species: "Visco cuercino," "liga" (Mexico); "ingerto" (Durango); "silmo" (Sinaloa).

52. *Phoradendron colipense* Trel. Gen. Phorad. 37. pl. 33. 1916.

Known only from the type locality, Colipa, Veracruz.

Leaves oblanceolate-elliptic, very obtuse, 5 to 8 cm. long; spikes 3.5 cm. long.

It is doubtful whether this and the following species are sufficiently distinct from each other or from *P. flavescens* (Pursh) Nutt., of the eastern United States.

53. *Phoradendron macrophyllum* (Engelm.) Cockerell, Amer. Nat. 34: 293. 1900.

Phoradendron flavescens macrophyllum Engelm.; Rothr. in Wheeler, Rep.

U. S. Surv. 100th Merid. 6: 252. 1878.

Sonora. Arizona, the type from Camp Grant. On *Alnus*, *Celtis*, *Fraxinus*, *Juglans*, *Platanus*, *Populus*, *Salix*, etc.

Leaves 2.5 to 6 cm. long, short-petiolate; spikes 1.5 to 5 cm. long; fruit white, 4 to 5 mm. in diameter.

54. *Phoradendron cockerellii* Trel. Gen. Phorad. 38. pl. 36. 1916.

Chihuahua. New Mexico and western Texas; type from Silver City, New Mexico. On *Populus*, *Salix*, and *Fraxinus*.

Leaves 3.5 to 5.5 cm. long, petiolate; spikes 1.5 to 5 cm. long; fruit white.

55. *Phoradendron greggii* Trel. Gen. Phorad. 36. pl. 22. 1916.

Coahuila and Nuevo León; type from Rinconada, Nuevo León; on *Acacia* and *Prosopis*.

Leaves elliptic or broader, 2.5 to 4.5 cm. long, petiolate; fruit white.

56. *Phoradendron engelmanni* Trel. Gen. Phorad. 35 pl. 29-31. 1916.

Chihuahua. Western Texas; type from New Braunfels. On *Celtis*, *Quercus*, *Prosopis*, etc.

Leaves obovate, 3 to 5 cm. long, short-petiolate; fruit white.

57. *Phoradendron thyrsoideum* Trel. Gen. Phorad. 36. pl. 33. 1916.

Tamaulipas and San Luis Potosí; type from Victoria, Tamaulipas; on *Prosopis juliflora* and *Acacia farnesiana*.

Leaves obovate-spatulate, 3 to 5 cm. long, short-petiolate; fruit waxy white. "Ingerto blanco" (Tamaulipas).

4. ORYCTANTHUS Eichl. in Mart. Fl. Bras. 5²: 87. 1868.

1. *Oryctanthus glaberrimus* (Oliver) Eichl. in Mart. Fl. Bras. 5²: 89. 1868.

Loranthus glaberrimus Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 170. 1864.

Known only from Guatulco, the type locality.

Plants glabrous, the branches compressed; flowers very small, sunk in the axis of the spike.

5. STRUTHANTHUS Mart. Flora 13: 102. 1830.

Plants green, usually glabrous, parasitic upon dicotyledonous plants, the branches terete or compressed; leaves well developed, opposite; flowers small, spicate, racemose, or corymbose.

Leaves small, 16 mm. long or shorter.

Branches densely pubescent; flowers cymose-capitate.---1. *S. microphyllus*.

Branches glabrous; flowers mostly solitary.

Branchlets compressed; leaves very obtuse-----2. *S. inconspicuus*.

Branchlets terete; leaves acutish-----3. *S. inornus*.

Leaves large, 3 cm. long or often much longer.

Leaves abruptly acuminate at apex.

Flowers pedicellate; perianth 4.5 to 6 mm. long-----4. *S. deppeanus*.

Flowers sessile; perianth less than 4 mm. long.

Flower clusters sessile-----5. *S. densiflorus*.

Flower clusters pedunculate, the peduncles swollen and reflexed in fruit.
6. *S. quercicola*.

Leaves rounded to acute at apex, never abruptly acuminate.

Leaf blades orbicular to elliptic, glaucescent; inflorescence loose, elongate,
interrupted.

Style contorted; inflorescence usually shorter than the leaves.

7. *S. venetus*.

Style straight; inflorescence longer than the leaves-----8. *S. hartwegi*.

Leaf blades oblong, lanceolate, linear, or oblong-obovate.

Inflorescence pedunculate, usually 3-flowered; leaves mostly obovate-
oblong-----9. *S. diversifolius*.

Inflorescence sessile or nearly so; leaves mostly lanceolate to linear.

Leaves mostly 2.5 to 3.5 cm. wide-----10. *S. grahami*.

Leaves mostly 0.4 to 1.2 cm. wide-----11. *S. haenkeanus*.

1. *Struthanthus microphyllus* (H. B. K.) Don, Hist. Dichl. Pl. 3: 413. 1834.

Loranthus microphyllus H. B. K. Nov. Gen. & Sp. 3: 439. pl. 300. 1818.

Jalisco to Morelos; type from Cuernavaca; on *Quercus*, *Solanum*, etc.

Leaves lanceolate to ovate or almost linear, acute or acutish; flowers about
4 mm. long.

2. *Struthanthus inconspicuus* (Benth.) Standl. Contr. U. S. Nat. Herb. 20:
212. 1919.

Loranthus inconspicuus Benth. Bot. Voy. Sulph. 102. 1844.

Sinaloa to Guerrero; type from San Blas, Tepic; on *Randia*, etc.

Leaves oblanceolate or obovate; branches greenish; flowers minute.

3. *Struthanthus inornus* (Robins. & Greenm.) Standl. Contr. U. S. Nat. Herb.
20: 212. 1919.

Loranthus inornus Robins. & Greenm. Amer. Journ. Sci. 50: 163. 1895.

Known only from the type locality, Cuicatlán, Oaxaca.

Leaves oblanceolate or subulate.

4. *Struthanthus deppeanus* (Cham. & Schlecht.) Blume; Schult. Syst. Veg. 7:
1731. 1830.

Loranthus deppeanus Cham. & Schlecht. Linnaea 5: 172. 1830.

Loranthus liebmanni Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 172.
1864.

Veracruz; type from Jalapa.

Leaves ovate-lanceolate, about 7 cm. long, petiolate.

Loranthus liebmanni was described from Chinantla, Oaxaca, and may be
different.

5. *Struthanthus densiflorus* (Benth.) Standl. Contr. U. S. Nat. Herb. 20:
212. 1919.

Loranthus densiflorus Benth. Pl. Hartw. 62. 1840.

Veracruz to Oaxaca; type from Hacienda del Carmen. Central America.
On *Citrus*, etc.

Leaves lanceolate or ovate, 6 to 10 cm. long; flowers verticillate along the
axis of a short spike.

6. *Struthanthus quercicola* (Cham. & Schlecht.) Blume; Schult. Syst. Veg. 7: 1731. 1830.

Loranthus quercicola Cham. & Schlecht. Linnaea 5: 173. 1830.

Loranthus crassipes Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 173. 1864. San Luis Potosí and Veracruz; type from Jalapa; on *Quercus*, *Acacia farnesiana*, etc.

Leaves ovate or oval-ovate, 4 to 7.5 cm. long.

7. *Struthanthus venetus* (H. B. K.) Blume; Schult. Syst. Veg. 7: 1731. 1830.

Loranthus venetus H. B. K. Nov. Gen. & Sp. 3: 434. 1818.

Sinaloa to Guerrero and Tabasco; type from Cuernavaca, Morelos. Central America.

Stems elongate, trailing or scandent, brownish; leaves 3 to 11 cm. long, pale; flowers about 6 mm. long; fruit glaucous. "Cabellera" (Tabasco).

It is probable that this is the plant described by Sessé and Mociño¹ as *Loranthus volubilis*. This is based on plants from Cuernavaca, and the Nahuatl name is given as "teapizmictianiquauhiti."

8. *Struthanthus hartwegi* (Benth.) Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Loranthus hartwegi Benth. Pl. Hartw. 62. 1840.

Described from Talea, Oaxaca; parasitic on *Annona*. Reported from Costa Rica.

Leaves ovate-orbicular, 4 to 6.5 cm. long; flowers 6 mm. long.

9. *Struthanthus diversifolius* (Benth.) Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Loranthus diversifolius Benth. Pl. Hartw. 63. 1840.

Described from Mexico, the locality not known; specimens from Jalisco and Colima seem to be closely related, and perhaps belong to this species.

Flowers about 1 cm. long.

10. *Struthanthus grahami* (Benth.) Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Loranthus grahami Benth. Pl. Hartw. 62. 1840.

Morelos; perhaps also in Sonora and Sinaloa; reported from Veracruz and Oaxaca; on *Quercus*, etc.

Leaves 15 cm. long or smaller, short-petiolate, narrowed to an obtuse apex.

11. *Struthanthus haenkeanus*² (Presl) Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Spirostylis haenkeana Presl; Schult. Syst. Veg. 7: 163. 1829.

Loranthus spirostylis DC. Prodr. 4: 315. 1830.

Sonora to Oaxaca; type from Acapulco. On *Celtis*, *Quercus*, *Nerium*, etc.

Branches long and slender, drooping or sometimes twining; leaves linear to lanceolate; fruit red or orange. "Toji" (Sonora).

¹ Pl. Nov. Hisp. 51. 1887.

² Named in honor of Thaddeus Haenke (1761-1817), a Bohemian. He was to have accompanied the Malaspina expedition executed during the reign of Charles III, but he reached Cádiz the day after that organization had set sail. He took another ship and sailed for Buenos Aires, proceeding to Chile, where he joined Née, and with him journeyed to Mexico. Haenke's Mexican collections were made along the road from Acapulco to the City of Mexico. He died in Bolivia. His specimens are chiefly at Prague and Vienna. Presl published two volumes under the title "Reliquiae Haenkeanae," based upon his collections.

DOUBTFUL SPECIES.

LOBANTHUS INTERRUPTUS H. B. K. Nov. Gen. & Sp. 3: 440. 1817. Type from Ario, Michoacán.

LOBANTHUS TEHUACANENSIS Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 171. 1864. Described from Tehuacán, Puebla; reported from Oaxaca, Tabasco, and Guatemala. Perhaps of the genus *Oryctanthus*.

STRUTHANTHUS SELERORUM Loes. Bull. Herb. Boiss. 2: 536. 1894. Type from Matlatengo, Hidalgo.

6. *PHRYGILANTHUS* Eichl. in Mart. Fl. Bras. 5²: 45. 1868.

Plants glabrous, parasitic on dicotyledonous hosts, the branches terete; flowers large and showy, solitary or cymose.

Leaf blades linear or terete-----1. *P. sonorae*.

Leaf blades broadly spatulate-obovate-----2. *P. palmeri*.

1. *Phrygilanthus sonorae* (S. Wats.) Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Loranthus sonorae S. Wats. Proc. Amer. Acad. 24: 73. 1889.

Baja California and Sonora; parasitic on *Elaphrium microphyllum*; type from Guaymas.

Plants glaucous, much branched; leaves slender, 4 to 6 mm. long; flowers bright red, 4 cm. long. "Ingerto" (Baja California).

2. *Phrygilanthus palmeri* (S. Wats.) Engl. in Engl. & Prantl, Pflanzenfam. Nachtr. 1: 134. 1897.

Loranthus palmeri S. Wats. Proc. Amer. Acad. 21: 438. 1886.

Chihuahua to Jalisco and Puebla, on species of *Elaphrium*; type from Hacienda San Miguel, Chihuahua.

Plants green, with stout reddish brown branches; leaves 2 to 2.5 cm. long, petiolate, rounded at apex; flowers red, almost 4 cm. long.

7. *PSITTACANTHUS* Mart. Flora 13: 106. 1830.

Parasites, usually upon dicotyledonous plants, with green leaves; flowers large, cymose or corymbose.

A plant of the family Loranthaceae and probably of this genus, growing on the Pico de Orizaba, is said to be known locally as "planta quebradora." The species of *Psittacanthus* (Greek for "parrot-flower") have more showy flowers than the Mexican representatives of other genera of the family.

Perianth velutinous-----1. *P. mexicanus*.

Perianth glabrous.

Branches all terete, or nearly so.

Anthers 5 to 6 mm. long; leaves cordate-clasping, glaucous.

2. *P. auriculatus*.

Anthers about 18 mm. long; leaves obovate-elliptic----3. *P. macrantherus*.

Branches usually quadrangular, at least more or less angulate.

Flowers 6.5 to 8 cm. long; leaves attenuate-----4. *P. schiedeanus*.

Flowers 3 to 5 cm. long.

Buds terete; perianth lobes dilated; leaves ovate or broadly cordate, obtuse-----5. *P. karwinskyanus*.

Buds clavate; perianth lobes linear; leaves never cordate.

Leaves usually falcate or very oblique, attenuate to the apex.

6. *P. calyculatus*.

Leaves not falcate, rounded or very obtuse at the apex.

7. *P. americanus*.

1. *Psittacanthus mexicanus* (Presl) Blume; Schult. Syst. Veg. 7: 1730. 1830.
Loranthus mexicanus Presl; Schult. Syst. Veg. 7: 129. 1829.
 Described from Mexico, the locality not indicated.
2. *Psittacanthus auriculatus* (Oliver) Eichl. in Mart. Fl. Bras. 5²: 25. 1868.
Loranthus auriculatus Oliver, Nat. For. Kjöbenhavn Vid. Medd. 1864: 174. 1864.
 Oaxaca; type from Pochutla.
 Plants glaucous throughout, glabrous; leaves 3 to 4.5 cm. long, rounded at apex; flowers about 4 cm. long.
3. *Psittacanthus macrantherus* Eichl. in Mart. Fl. Bras. 5²: 26. 1868.
 Sierra San Pedro Nolasco; said to be parasitic on pines.
 Leaves 6 to 7.5 cm. long; flowers 5.5 to 6.5 cm. long.
4. *Psittacanthus schiedeanus* (Cham. & Schlecht.) Blume; Schult. Syst. Veg. 7: 1730. 1830.
Loranthus schiedeanus Cham. & Schlecht. Linnaea 5: 172. 1830.
Loranthus kerberi Fourn. Bull. Soc. Bot. France 30: 185. 1883.
 Veracruz to Michoacán and Oaxaca; type from Jalapa; on *Salix*, etc. Central America.
 Leaves lanceolate or ovate, 6 to 16 cm. long, asymmetric, short-petiolate, green; flowers numerous, corymbose. "Lirio," "muérdago," "sileno" (Oaxaca).
5. *Psittacanthus karwinskyanus* (Schult.) Eichl. in Mart. Fl. Bras. 5²: 26. 1868.
Loranthus karwinskyanus Schult. Syst. Veg. 7: 1641. 1830.
 Described from Sultepec, Mexico; parasitic on *Annona reticulata*.
 Leaves about 12.5 cm. long, 7.5 to 10 cm. wide; flowers almost 5 cm. long.
6. *Psittacanthus calyculatus* (DC.) Don, Hist. Dichl. Pl. 3: 415. 1834.
Loranthus calyculatus DC. Mém. Lorant. pl. 10. 1830.
 Tamaulipas to Jalisco, Chiapas, and Yucatán; type from "Cuarcavara" (Cuernavaca?). Central America. Parasitic on *Persea*, *Acacia*, *Prosopis*, *Quercus*, *Pithecollobium*, *Prunus persica*, *Citrus*, *Olea*, *Nerium*, *Salix*, etc.
 Plants often a meter high; leaves mostly lanceolate, green; flowers red or yellow, showy. "Chac-xciu" (Yucatán, Maya); "ingerto" (Jalisco, Guanajuato); "batuu-chá" (Oaxaca, *Seler*); "visco," "visco cuercino," "quauhtzictli," "mal de ojo," "muérdago" (Morelos, *Ramírez*); "malojo" (Jalisco); "ingerto de aguacate" (Tamaulipas); "liga" (Valley of Mexico, *Ramírez*); "quauhtzictli" (Mexico, Morelos, *Ramírez*); "yecapixtla" (*Cervantes*).
 A decoction of the leaves and flowers is said to be used for treating wounds, and the distilled water as a cosmetic.
7. *Psittacanthus americanus* (Jacq.) Mart. Flora 13: 108. 1830.
Loranthus americanus Jacq. Stirp. Amer. 97. pl. 67. 1763.
 Tepic to Chiapas and Veracruz; reported from Yucatán. Central America; West Indies.
 Leaves 6 to 10 cm. long, green, short-petiolate; flowers corymbose, bright red. "Ingerto" (Guerrero, Michoacán); "xken" (Yucatán, Maya, *Dondé*).

28. OPILIACEAE. *Opilia* Family.

This family is omitted in the key to families. In that, pistillate specimens would run to the family Urticaceae (p. 22), with which the present group would scarcely be confused; and staminate specimens would run to the family Olacaceae (p. 26). The only Mexican genus of the latter family with distinct petals

is *Ximenia*, in which they are densely hairy within, while in *Agonandra* the petals are glabrous within.

1. **AGONANDRA** Miers (Ann. Nat. Hist. II. 8: 172. 1851, nomen nudum);
Benth. & Hook. Gen. Pl. 1: 349. 1862.

REFERENCE: Standley, The North American species of *Agonandra*, Journ. Washington Acad. Sci. 10: 505-508. 1920.

Shrubs or small trees, glabrous or nearly so, with slender, often pendulous branches; leaves alternate, entire, petiolate, stipulate; flowers small, in bracteate axillary racemes, usually dioecious; calyx minute, 4 or 5-lobate; staminate flowers with 4 or 5 narrow petals, the stamens 4 or 5, exserted, 4 small scales present below the stamens; pistillate flowers apetalous, the disk urceolate, surrounding the ovary; fruit fleshy, drupaceous.

Only one other species of the genus is known, a native of Brazil and Colombia.

Leaves acute or acuminate; young branches glabrous-----1. *A. racemosa*.

Leaves rounded or obtuse at apex; young branches puberulent.

Fruit 8 mm. long-----2. *A. obtusifolia*.

Fruit 15 mm. long-----3. *A. konzattii*.

1. *Agonandra racemosa* (DC.) Standl. Journ. Washington Acad. Sci. 10: 506. 1920.

Schaefferia racemosa DC. Prodr. 2: 41. 1825.

Sonora to Guerrero; originally described from one of Sessé and Mociño's plates.

Shrub or small tree, 4 to 5 meters high, glabrous throughout; leaves lanceolate to broadly ovate-elliptic, 3 to 7.5 cm. long, acute to broadly rounded at base, acute or acuminate at apex or sometimes obtuse and abruptly short-pointed; staminate flowers 2.5 mm. long, greenish; fruit subglobose, about 8 mm. long. "Palo del golpe" (Michoacán, Guerrero).

2. *Agonandra obtusifolia* Standl. Journ. Washington Acad. Sci. 10: 507. 1920.

Tamaulipas and Veracruz; type from Victoria, Tamaulipas.

Shrub, 1 to 3 meters high, with spreading branches; leaves short-petiolate, narrowly oblong to ovate, 2 to 5 cm. long, cuneate at base, somewhat succulent; staminate flowers 2.5 mm. long; fruit yellow, not edible. "Granadillo," "revienta cabra" (Tamaulipas).

3. *Agonandra konzattii* Standl. Journ. Washington Acad. Sci. 10: 508. 1920.

Oaxaca and Puebla; type from Portillo de Coyula, Distrito de Cuicatlán, Oaxaca.

Leaves short-petiolate, oblong, lanceolate, or oblong-ovate, 2 to 2.5 cm. long, cuneate at base, succulent, the petioles minutely puberulent. "Maromero" (Oaxaca).

29. OLACACEAE. Olax Family.

Shrubs or small trees; leaves alternate, estipulate, entire; flowers small, perfect, in cymes or racemes; calyx 4 or 5-dentate; corolla 4 to 6-lobed; stamens inserted with the perianth; fruit a drupe.

Stamens twice as many as the perianth lobes; perianth cleft nearly to the base, the lobes densely barbate within-----1. **XIMENIA**.

Stamens as many as the perianth lobes; perianth lobed to the middle or less deeply, the lobes sparsely or not at all barbate-----2. **SCHOEPFIA**.

1. *XIMENIA*¹ L. Sp. Pl. 1193. 1793.

Shrubs or small trees, sometimes with spinose branchlets; leaves subcoriaceous; flowers whitish, solitary or in small axillary cymes; calyx 4 or 5-dentate; corolla 4 or 5-lobed.

Leaves and outer surface of the petals densely pubescent-----1. *X. pubescens*.
Leaves and outer surface of the petals glabrous.

Petioles 4 to 10 mm. long; leaves mostly 1.5 to 3.5 cm. wide; petals 7 to 10 mm. long, densely long-barbate within-----2. *X. americana*.

Petioles 3 mm. long or shorter; leaves 0.6 to 1.5 cm. wide; petals 5 to 6 mm. long, short barbate-----3. *X. parviflora*.

1. *Ximenia pubescens* Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Known only from the type locality, between Mixtepec and Colotepec, Oaxaca. Spiny shrub, the leaves small, mostly orbicular.

2. *Ximenia americana* L. Sp. Pl. 1193. 1753.

Veracruz to Colima, Chiapas, and Yucatán. Florida, West Indies, Central America, South America, and in the tropics of the Old World.

Spiny shrub or small tree, in some parts of its range 6 meters high; bark smooth, reddish, very astringent; leaves oblong or elliptic, 3 to 7 cm. long, pale beneath, rounded at apex; flowers yellowish white, fragrant; fruit yellow, subglobose, 1.5 to 2 cm. in diameter, with peculiar odor and acid flavor; wood hard, tough, close-grained, yellow, its specific gravity about 0.92. "Xkuk-ché" (Yucatán, Maya); "pepe nance" (El Salvador); "chocomico" (Nicaragua); "limoncillo" (Colombia); "yaná," "jía manzanilla," "ciruelo cimarrón," "ciruelillo" (Cuba); "manzanilla" (Guatemala, Honduras); "albarillo del campo" (Argentina).

The fruit, which resembles a plum in appearance, is edible, either raw or cooked. It is stated that oil has been extracted from the seeds in Brazil. The fruit is said to have purgative properties, and Grosourdy states that a sirup made from it is used in the West Indies for dropsy, rheumatism, etc. The plant is seldom large enough to furnish wood of importance, but the wood has sometimes been employed as a substitute for sandalwood (*Santalum*), which it somewhat resembles. In Florida and the British West Indies this species is known under various names, such as "hog plum," "tallow-wood," "mountain plum," "false sandalwood," and "wild olive."

3. *Ximenia parviflora* Benth. Pl. Hartw. 7. 1839.

San Luis Potosí to Sinaloa and Oaxaca; type from León, Guanajuato.

Spiny shrub, 1 to 2 meters high, with angled branches, the lower ones long and slender; leaves oblong or obovate; fruit globose, yellow. "Ciruelillo" (Guanajuato).

The fruit is edible.

¹The genus was named in honor of Francisco Ximénez, a native of Luna in the Kingdom of Aragón. In the early years of his life he was a soldier, and in 1605 he came to New Spain. He became a lay brother of the Convento de Santo Domingo de México February 25, 1612. The date of his death is not known. In 1615 there was published in the City of Mexico under his authorship a volume entitled "Quatro libros de la naturaleza y virtudes de las plantas, y animales que están receuidos en el uso de medicina en la Nueva España, y la método, y corrección, y preparación, que para administrarlas se requiere con lo que el Doctos Francisco Hernández escriuió en lengua Latina." This was reprinted at Morelia in 1888. Ximénez's work is not a mere translation of Hernández, but contains much original information upon Mexican plants.

2. SCHOEPFIA Schreb. Gen. Pl. 129. 1789.

Glabrous shrubs or small trees; leaves coriaceous; flowers in short axillary racemes, or solitary or fasciculate in the leaf axils; calyx small, cuplike, obscurely denticulate; corolla 4 to 6-lobed.

Leaf blades narrowly oblanceolate or rarely obovate-----1. *S. californica*.

Leaf blades lanceolate to broadly ovate.

Perianth about 3 mm. long, the lobes nearly as long as the tube.

2. *S. angulata*.

Perianth 4 to 6 mm. long, the lobes much shorter than the tube.

Perianth 5-parted-----3. *S. mexicana*.

Perianth 4-parted.

Perianth 4 to 5 mm. long, the lobes half as long as the tube or longer; leaves mostly 1.8 to 3.5 cm. wide-----4. *S. schreberi*.

Perianth 6 to 7 mm. long, the lobes one-third as long as the tube or shorter; leaves scarcely more than 1 cm. wide-----5. *S. parvifolia*.

1. *Schoepfia californica* T. S. Brandeg. Proc. Calif. Acad. II. 2: 139. 1889.

Southern Baja California; type from San Gregorio.

Shrub or small tree, 2 to 6 meters high, with stiff divaricate branches, the older branches whitish; leaves glaucous, puberulent; flowers reddish yellow; fruit oval, 6 mm. long.

2. *Schoepfia angulata* Planch.; Hemsl. Diag. Pl. Mex. 5. 1878.

Veracruz; type from Zacuapan.

Shrub, nearly glabrous; leaves lanceolate or ovate, 2.5 to 5 cm. long, bright green; flowers small, yellow.

3. *Schoepfia mexicana* A. DC. in DC. Prodr. 14: 622. 1856.

Known only from the type locality. Tlacolula, Oaxaca.

Leaves ovate or ovate-elliptic, 2.5 to 3 cm. long, obtuse.

4. *Schoepfia schreberi* Gmel. Syst. Veg. 2: 376. 1791.

San Luis Potosí and Veracruz to Colima and Yucatán. Central America, West Indies, and northern South America.

Shrub or tree, 1.3 to 6.5 meters high; leaves broadly ovate, obtuse or acute, bright green; flowers yellow or greenish.

5. *Schoepfia parvifolia* Planch.; Hemsl. Diag. Pl. Mex. 5. 1878.

Sinaloa to Oaxaca.

Glabrous shrub or tree, sometimes 7 meters high, with a trunk 40 cm. in diameter, the branches stiff, gray; leaves ovate or oval, 2 to 3 cm. long, obtuse, bright green. "Palo fierro," "tecolotillo" (Sinaloa).

The wood is said to be heavy and blackish, and to be valued for carpenter work.

30. ARISTOLOCHIACEAE. Birthwort Family.**1. ARISTOLOCHIA** L. Sp. Pl. 960. 1753.

REFERENCE: Duchartre in DC. Prodr. 15¹: 432-498. 1864.

Erect or usually scandent plants; leaves alternate, entire or lobate; inflorescence axillary (sometimes borne at the base of the plant), the peduncles 1-flowered and solitary, fasciculate, or racemose, the perianth very variable in form; fruit a capsule.

It is difficult to determine from herbarium specimens or descriptions which species are fruticose and which herbaceous; perhaps other species should be included and some of those in the present list excluded. A number of herbaceous species occur in Mexico.

The species are highly valued in tropical America as a remedy for snake bites. Whether they have any real value for this purpose is uncertain. The Nahuatl

name is "tlacopatl" (trumpet-medicine). In modern usage this has been modified to "tacopate," "tacopatle," "tacopaxtle," "tacopaste," etc.

Calyx limb with 3 long linear lobes.

Leaves glabrous on the upper surface; calyx lip about 10 cm. long.

1. *A. tricaudata*.

Leaves pubescent on the upper surface; lip about 5 cm. long.

2. *A. malacophylla*.

Calyx limb not 3-lobate.

Leaf blades rounded at the base; plants erect.....3. *A. arborea*.

Leaf blades cordate at the base; plants scandent or trailing.

Stems and margins of the leaves pilose with long brown hairs.

4. *A. pilosa*.

Stems and margins of the leaves without long brown hairs, often glabrous.

Leaves sessile, densely soft-pilose beneath.....5. *A. asclepiadifolia*.

Leaves long-petiolate, puberulent or glabrous beneath.

Calyx very large, the limb 18 to 35 cm. broad. Leaves deltoid-cordate, puberulent beneath.....6. *A. grandiflora*.

Calyx smaller, the limb less than 8 cm. broad, often much less.

Leaves puberulent beneath.

Leaf blades deltoid-cordate, deeply cordate at base.

7. *A. pavoniana*.

Leaf blades oval or oblong, shallowly cordate at base.

Leaf blades ovate, glabrous on the upper surface, subcordate at base; flowers solitary.....8. *A. ovalifolia*.

Leaf blades oblong, puberulent on the upper surface, cordate at base; flowers racemose.....9. *A. maxima*.

Leaves glabrous beneath.

Leaves acute or acutish, subcordate at base, green beneath; calyx limb 5 to 8 cm. wide.....10. *A. odoratissima*.

Leaves rounded or very obtuse at apex, deeply cordate at base, pale or glaucous beneath; calyx limb less than 2.5 cm. wide.

Calyx limb somewhat bilobate, the large lobe acute or acuminate.....11. *A. pardina*.

Calyx limb not bilobate, obtuse.....12. *A. taliscana*.

1. *Aristolochia tricaudata* Duchartre, Ill. Hort. Lem. 12: pl. 523. 1865.

Chiapas; the plant has been cultivated in European greenhouses.

Arborescent, with gray fissured bark; leaves oblong, 12.5 to 20 cm. long, acute or acuminate, pubescent beneath; flowers axillary, solitary, odorless, the calyx limb with 3 long narrow lobes, maroon outside, dark purple-brown within.

2. *Aristolochia malacophylla* Standl. Proc. Biol. Soc. Washington 33: 65. 1920.

Known only from the type locality, Salto de Zaráracua, Uruapam, Michoacán. Leaves oval, 12.5 cm. long, cordate at the base.

3. *Aristolochia arborea* Linden; Hook. in Curtis's Bot. Mag. pl. 5295. 1862.

Chiapas, the type locality. Guatemala.

Erect shrub, 2 meters high, the trunk with corky bark; leaves narrowly oblong, about 30 cm. long; flowers clustered near the base of the stem.

4. *Aristolochia pilosa* H. B. K. Nov. Gen. & Sp. 2: 116. pl. 113. 1817.

Aristolochia ferruginea T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 51. 1914.

Oaxaca and Chiapas. Central America to Ecuador (the type locality).

Stems slender, scandent; leaves cordate, obtuse or acutish; calyx limb 4 to 5 cm. long. "Sombrerito," "hediondilla" (Guatemala).

5. *Aristolochia asclepiadifolia* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 178. 1915.

Known only from the type locality, Consoquintla, Veracruz.

Leaves oval, 8 to 18 cm. long, deeply cordate at base, rounded and short-pointed at apex.

6. *Aristolochia grandiflora* Swartz, Fl. Ind. Occ. 3: 1566. 1806.

Chiapas and Yucatán; reported from Veracruz. Central America and the West Indies; type from Jamaica.

High-climbing vine; leaves large, cordate, acute, nearly glabrous; calyx very large, the limb sometimes 45 cm. long, with a linear tip a meter long, yellowish and purple-spotted inside, the flowers with a disagreeable odor. "Guaco" (Veracruz, *Ramírez*); "flor de pato" (Yucatán); "güegüecho," "chompipe" (Nicaragua); "moco de güegüecho" (El Salvador).

The roots are reputed to be an antidote for the bites of snakes and other poisonous animals, and to have sudorific, abortive, and emmenagogue properties. Descourtilz states that the plant is poisonous to pigs, and that it was sometimes employed in the West Indies to poison human beings. The young shoots are reported to be eaten as a vegetable in some localities.

7. *Aristolochia pavoniana* Duchartre, Ann. Sci. Nat. IV. 2: 55. 1854.

Described from Mexico, the locality not known.

Leaves about 6 cm. long, acute; flowers axillary, solitary, the calyx limb 1.4 cm. long.

8. *Aristolochia ovalifolia* Duchartre, Ann. Sci. Nat. IV. 2: 50. 1854.

Known only from Oaxaca, the type locality, at an altitude of 660 meters.

Leaves 15 cm. long, subacuminate; calyx limb 2.3 cm. long. "Flor de guaco."

9. *Aristolochia maxima* L. Sp. Pl. ed. 2. 1361. 1763.

Reported from Yucatán. Central America, Colombia, and Venezuela.

Leaves 9 to 15 cm. long, rounded or obtuse at apex and often short-pointed; flowers large, racemose; capsule about 9 cm. long. "Guaco del sur" (Yucatán); "guaco" (Guatemala, Colombia, Venezuela); "contracapitane" (Venezuela); "cuajilote" (Costa Rica).

This, like many of the other species, is considered an antidote for snake bites. A closely related plant, possibly the same species, occurs in Tabasco, where it is known as "canastilla" and "farolito." It is reported that the young fruits are eaten in Costa Rica.

10. *Aristolochia odoratissima* L. Sp. Pl. ed. 2. 1362. 1763.

Tabasco and perhaps elsewhere. Central America and northern South America.

Leaves deltoid-cordate, acute or acutish, sometimes 3-lobate; calyx limb broad, about 10 cm. long. "Cocobá," "cococoba" (Tabasco).

11. *Aristolochia pardina* Duchartre, Ann. Sci. Nat. IV. 2: 47. 1854.

Colima and Guerrero; type from Colima.

Stems scandent, with corky bark; flowers greenish yellow, with black markings. "Guaco" or "huaco" (Colima); "bejuco amargo" (Guerrero).

The stems are used as a substitute for cordage, and an infusion of the leaves for fevers.

12. *Aristolochia taliscana*¹ Hook. & Arn. Bot. Beechey Voy. 309. 1839-40.

Aristolochia galeottii Duchartre, Ann. Sci. Nat. IV. 2: 44. 1854.

Sinaloa, Tepic, and Jalisco (type locality).

¹The specific name is more properly, perhaps, written as "*jaliscana*," but "*taliscana*" is the original spelling.

Similar in general appearance to the last species; a slender vine with stems 2 to 3 meters long; capsules about 3 cm. long. "Huaco," "zapatito," "palito," "matanene del mar" (Sinaloa).

In Sinaloa the plant is highly esteemed as a remedy for the bites of snakes and other poisonous animals.

31. POLYGONACEAE. Buckwheat Family.

Shrubs or trees, sometimes scandent; leaves alternate or rarely opposite or verticillate, entire, stipulate, the stipules often united into a sheath; flowers mostly small, perfect or unisexual; corolla none; fruit a lenticular or 3-angled achene, usually surrounded by the persistent calyx.

Several other genera, all of whose species are herbaceous, occur in Mexico.

Plants with tendrils in the inflorescence, scandent.....7. **ANTIGONON**.
Plants without tendrils.

Flowers one or more inside an involucre.

Leaves alternate; involucre not accrescent in fruit, not colored; flowers perfect1. **ERIOGONUM**.

Leaves opposite; involucre accrescent in fruit, red or purplish; flowers unisexual.....2. **HARFORDIA**.

Flowers not involucrate.

Flowers normally 5-parted.

Perianth lobes not winged.

Flowers unisexual.....3. **MUHLENBECKIA**.

Flowers perfect.....4. **COCCOLOBA**.

Perianth lobes winged.

Leaves orbicular; pedicels not winged; filaments pubescent.

5. **NEOMILLSPAUGHIA**.

Leaves not orbicular; pedicels winged; filaments glabrous.

6. **PODOPTERUS**.

Flowers 6-parted or rarely 3-parted.

Flowers perfect; perianth segments broadly ovate...8. **GYMNOPODIUM**.

Flowers dioecious; perianth segments of the fertile flowers long and narrow.

Stamens numerous; fruit acutely trigonous.....9. **TRIPLARIS**.

Stamens 9; fruit 3 to 6-sulcate, the angles obtuse.

10. **RUPRECHTIA**.

1. **ERIOGONUM** Michx. Fl. Bor. Amer. 1:246. 1803.

Low shrubs, often tomentose; flowers surrounded by an involucre, the involucre spicate, umbellate, capitate, or cymose, the flowers small but often rather showy.

Numerous herbaceous species occur in northern Mexico. Most of the species of the genus grow in arid places.

Leaves not at all tomentose.....1. **E. orcuttianum**.

Leaves tomentose on one or both surfaces.

Perianth densely pubescent.

Perianth narrowed to a stipelike base; plants low, with depressed stems.

2. **E. undulatum**.

Perianth without a stipelike base; plants tall, much branched...3. **E. molle**.

Perianth glabrous or nearly so.

Involucres in heads or cymes.

Leaf blades spatulate or rounded-rhombic, densely tomentose on both sides, the margins not revolute-----4. *E. pondii*.

Leaf blades linear, oblong, or oblanceolate, glabrate on the upper surface, the margins strongly revolute-----5. *E. fasciculatum*.

Involucres racemose or spicate.

Involucres 1-flowered-----6. *E. taxifolium*.

Involucres several-flowered.

Branches erect, slender-----7. *E. wrightii*.

Branches divaricate, very stout-----8. *E. nodosum*.

1. *Eriogonum orcuttianum* S. Wats. Proc. Amer. Acad. 20: 371. 1885.

Baja California; type from Cantillas Mountains.

Shrub, about a meter high, with tortuous branches, the bark brownish and fissured; leaves rounded-obovate; branches of the inflorescence divaricate, the flowers whitish.

2. *Eriogonum undulatum* Benth. in DC. Prodr. 14: 7. 1856.

Chihuahua to San Luis Potosí and Hidalgo.

Low depressed shrub; leaves oval to oblanceolate, white-tomentose beneath, long-petiolate; involucres umbellate or solitary; flowers white, showy.

This has been reported from Mexico as *E. jamesii* Benth., a name probably synonymous with *E. undulatum*.

3. *Eriogonum molle* Greene, Pittonia 1: 207. 1888.

Known only from the type locality, Cedros Island, Baja California.

Erect shrub, 30 to 60 cm. high; leaves oval or ovate, thick, white beneath; involucres in a dense long-pedunculate cyme.

4. *Eriogonum pondii* Greene, Pittonia 1: 267. 1889.

Baja California; type from Cedros Island.

Low depressed shrub; leaves about 1 cm. long; flowers white or pink.

5. *Eriogonum fasciculatum* Benth. Trans. Linn. Soc. Bot. 17: 411. 1837.

Baja California. California (type locality), Nevada, and Arizona.

Shrub, 0.6 to 1 meter high; leaves short, often fascicled, white-tomentose or glabrate; flowers white.

The Coahuilla Indians of southern California use a decoction of the leaves for pains in the head or stomach, and a decoction of the flowers as an eye wash.

6. *Eriogonum taxifolium* Greene, Pittonia 1: 267. 1889.

Known only from Cedros Island, Baja California.

Low, slender, much branched shrub; leaves linear; flowers white, the involucres in long interrupted spikes.

7. *Eriogonum wrightii* Torr.; Benth. in DC. Prodr. 14: 15. 1856.

Chihuahua and Sonora to San Luis Potosí; Baja California (?). Western Texas (type locality) to southern California.

Cespitose shrub, 30 to 60 cm. high, white-tomentose throughout; leaves oval to oblong; flowers white.

8. *Eriogonum nodosum* Small, Bull. Torrey Club 25: 49. 1898.

Northern Baja California. Southern California; type from Dos Cabezas.

Densely tomentose shrub, 0.3 to 1 meter high.

2. *HARFORDIA* Greene & Parry, Proc. Davenport Acad. 5: 27. 1888.

Low, densely branched shrubs, with stiff gray branches; leaves very small, fleshy, spatulate; flowers axillary, the sepals in fruit large, reddish, conspicuously veined.

Plants fruticose only at the base, the branches slender; leaves linear to spatulate-----1. *H. macroptera*.

Plants woody almost throughout, the branches very stout; leaves broadly spatulate-----2. *H. fruticosa*.

1. *Harfordia macroptera* (Benth.) Greene & Parry, Proc. Davenport Acad. 5: 28. 1888.

Pterostegia macroptera Benth. Bot. Voy. Sulph. 44. 1844.

Pterostegia galioides Greene, Bull. Calif. Acad. 4: 213. 1885.

Baja California.

2. *Harfordia fruticosa* Greene; Parry, Proc. Davenport Acad. 5: 28. 1888.

Pterostegia fruticosa Greene, Bull. Calif. Acad. Sci. 4: 212. 1885.

Known only from Cedros Island, Baja California.

Densely branched shrub, 0.6 to 1 meter high.

Perhaps not specifically different from the preceding.

3. MUHLENBECKIA Meisn. Gen. Pl. 1: 316. 1840.

Muhlenbeckia platyclada Meisn., a curious plant with long flat ribbon-like leafless stems, a native of the Solomon Islands, is sometimes cultivated. Seler reports that it grows upon trees in Veracruz, where it is perhaps naturalized.

1. *Muhlenbeckia tamnifolia* (H. B. K.) Meisn. Gen. Pl. 2: 227. 1840.

Polygonum tamnifolium H. B. K. Nov. Gen. & Sp. 2: 180. 1817.

Polygonum quadrangulatum Mart. & Gal. Bull. Acad. Brux. 10³: 353. 1843.

Veracruz to Morelos. Central America to Chile; type from Colombia.

Scandent or trailing shrub with brown stems; leaves oblong or ovate, cordate at base, acuminate; flowers very small, greenish, glomerate-spicate.

4. COCCOLOBA L. Syst. Nat. éd. 10. 1007. 1759.

REFERENCE: Lindau, Bot. Jahrb. Engler 13: 106-229. 1890.

Trees or shrubs; flowers small and inconspicuous, perfect, fascicled within small bracts, the fascicles spicate; perianth often very fleshy in fruit.

Ramírez reports the vernacular name "totó" for a Tabasco species of doubtful determination.

Perianth lobes accrescent and inclosing the fruit. Leaf blades obovate or oval, glabrous-----1. *C. floribunda*.

Perianth tube accrescent and inclosing the fruit.

Leaves more or less pubescent beneath, sometimes pubescent also on the upper surface.

Leaf blades mostly orbicular or nearly so, about as broad as long.

Leaves minutely puberulent beneath-----2. *C. uvifera*.

Leaves short-pilose beneath.

Leaf blades 12 to 50 cm. long, pilose on the upper surface.

3. *C. grandifolia*.

Leaf blades 5 to 8 cm. long, glabrous on the upper surface.

7. *C. goldmanii*.

Leaf blades about twice as long as broad or longer.

Rachis of the inflorescence glabrous or very minutely puberulent.

4. *C. lapathifolia*.

Rachis of the inflorescence densely short-pilose.

Leaf blades obtuse-acuminate, 12 to 18 cm. long, 5 to 7 cm. wide.

5. *C. lindeniana*.

Leaf blades rounded at the apex, 6 to 13 cm. long, 2.5 to 7 cm. wide.

6. *C. liebmanni*.

Leaves glabrous, or sometimes sparsely pilose beneath along the costa.

Leaves peltate-----14. *C. acapulcensis*.

Leaves not peltate.

Rachis of the inflorescence pubescent.

Pedicels as long as the ocreolae. Leaf blades 8 to 22 cm. long, 9 to 13 cm. wide-----8. *C. schiedeana*.

Pedicels twice as long as the ocreolae or longer.

Leaf blades rounded or cordate at base-----9. *C. cozumelensis*.

Leaf blades narrowed to the base-----10. *C. chiapensis*.

Rachis of the inflorescence glabrous.

Leaf blades narrowed at base; nodes 1-flowered-----11. *C. orizabae*.

Leaf blades rounded or cordate at base; nodes 1 to 3-flowered.

Pedicels 1 to 2 mm. long, much exceeding the ocreolae.

12. *C. humboldti*.

Pedicels 1 mm. long or shorter, about equaling the ocreolae.

13. *C. jurgenseni*.

1. *Coccoloba floribunda* (Benth.) Lindau, Bot. Jahrb. Engler 13: 217. 1890.

Campderia floribunda Benth. Bot. Voy. Sulph. 159. pl. 52. 1844.

Campderia mexicana Meisn. in DC. Prodr. 14: 171. 1856.

Oaxaca. Central America to Brazil; type from Honduras.

Tree; leaves 5 to 11 cm. long, 3 to 5 cm. wide, rounded or subcordate at base.

2. *Coccoloba uvifera* (L.) Jacq. Enum. Pl. Carib. 19. 1760.

Polygonum uvifera L. Sp. Pl. 365. 1753.

In coastal thickets, Tamaulipas to Yucatán and Sinaloa. Florida, West Indies, Central America, and northern South America.

Shrub or tree, sometimes as much as 15 meters high, with a trunk a meter in diameter, but usually much smaller, densely branched; bark thin, smooth, brown; leaves about 20 cm. wide, very thick, the veins often red; flowers white; fruit purple, 1 to 2 cm. in diameter, in long dense heavy racemes; wood hard, dark brown, taking a good polish, its specific gravity about 0.96. "Uva de la playa" (Tamaulipas, Veracruz, Venezuela); "uva de la mar" (Tamaulipas, Yucatán, Oaxaca, Porto Rico); "uvero" (Tamaulipas, Cuba); "uva" (Yucatán, Veracruz, Santo Domingo); "manzano" (Sinaloa); "uva caleta" (Cuba); "papaturro" (Costa Rica); "uvero de playa" (Panama, Costa Rica); "uvilla" (Santo Domingo).

In Florida and the British West Indies the plant is known as "sea-grape." "pigeon-wood," "horsewood," and "hopwood." The wood is highly esteemed in tropical America for cabinet work, and is used also for fuel. It is said to yield a red dye. The roots are astringent and have been employed as a remedy for dysentery. The fruit is edible, with an acidulous, somewhat astringent flavor, and in the West Indies it has been fermented, with sugar, to produce an alcoholic drink. Febrifuge properties are attributed to the bark. The shrub is often planted (as in Florida) for ornamental purposes, for the large thick leaves are of striking and handsome appearance. It grows readily from cuttings.

The first account of the plant, probably, is that given by Oviedo (Lib. VIII, Cap. XIII), who says: "The Christians give the name *uvero* to the tree the Indians call *quiabara*. This is a fine tree, with good wood, especially for making charcoal for blacksmiths and silversmiths; as they are trees with spreading tops, and not straight, although the branches are thick and the wood strong, they are useless for construction of houses, but may be employed for butchers' blocks and shoe lasts. The wood resembles that of *madroño*, for it is red, but it is stronger. The fruit consists of thin racemes of grapes, sepa-

rated from each other, rose or purple in color, and good to eat, although the stone is very large in proportion to the size of the fruit and the amount of flesh; the largest are the size of a filbert. The leaves are like those illustrated; they are so different from other leaves that I have shown them here. The largest of these leaves are a palm broad or larger, and some are smaller. At the time that wars were going on in Hispaniola and the other islands and on Tierra-Firma, as the Christians did not carry with them paper and ink, they used these leaves like paper. The leaves are green and thick as those of ivy; the veins are red or purple and fine, and with a pin or sharp point one can write anything on them, from one end to the other, while they are green and freshly cut; the letters resemble white scratches and stand out so well from the face of the leaf that they are easily legible. Thus written upon, the leaves were sent by an Indian wherever the Spaniards wished them to go. Although the midvein of the leaf is rather large, the other veins are so small that they do not interfere with the writing."

3. *Coccoloba grandifolia* Jacq. Enum. Pl. Carib. 19. 1760.

Coccoloba pubescens L. Sp. Pl. ed. 2. 523. 1762.

Reported from Mexico, the locality not stated. West Indies and the Guianas.

Tree, 12 to 25 meters high, with erect trunk; leaves orbicular or broadly cordate, 8 to 60 cm. wide, coriaceous. "Moralón" (Porto Rico).

4. *Coccoloba lapathifolia* Standl., sp. nov.

Type from Acapulco, Guerrero (*Palmer* 206; U. S. Nat. Herb. no. 1,016,048).

Petioles 5 mm. long, finely puberulent; leaf blades narrowly oblong or lance-oblong, 14.5 to 18.5 cm. long, 5 to 5.5 cm. wide, deeply cordate at base, rounded or very obtuse at apex, coriaceous, finely puberulent or glabrate on the upper surface, the venation inconspicuous, pilose or short-villous beneath along the costa and lateral veins or finally glabrate, the venation prominent, the lateral veins about 15 on each side; racemes terminal, 9 to 18 cm. long, slender, glabrous or nearly so, rather densely flowered, the pedicels 3 times as long as the ocreolae, glabrous; perianth glabrous; filaments exerted.

5. *Coccoloba lindeniana*¹ (Benth.) Lindau, Bot. Jahrb. Engler 13:182. 1890.

Campderia lindeniana Benth.; Benth. & Hook. Gen. Pl. 3:103. 1880.

Known only from the type locality, Teapa, Tabasco.

Shrub; leaves oblong or lance-oblong, cordate at base.

6. *Coccoloba liebmanni* Lindau, Bot. Jahrb. Engler 13:189. 1890.

Colima to Oaxaca; type from Pochutla, Oaxaca.

Leaves oblong-obovate or oblong, coriaceous, cordate at base.

7. *Coccoloba goldmanii* Standl., sp. nov.

Type from the valley of the Río Fuerte, Sinaloa (*Goldman* 245; U. S. Nat. Herb. no. 335744).

Branches puberulent at first; ocreae 4 to 5 mm. long; petioles 12 to 15 mm. long, densely puberulent; leaf blades orbicular or nearly so, 5 to 8 cm. long, rounded at apex, rounded or emarginate at base, thick-coriaceous, green on the upper surface, puberulent on the veins, the costa and lateral veins slender, prominent, the other venation inconspicuous, slightly paler beneath, short-pilose, especially on the veins, the venation very prominent, reticulate; racemes

¹ Named in honor of Jean Jules Linden, who was associated with Ghiesbreght in botanical exploration of Mexico. He collected (about 1837-1839) in Yucatán, Chiapas, and Tabasco, and perhaps elsewhere. He afterwards became the proprietor of the famous nurseries at Ghent, once the property of Verschaffelt.

12 to 25 cm. long, slender, the rachis short-pilose, the pedicels mostly solitary, puberulent, stout, twice as long as the ocreolae; fruiting calyx glabrous, 8 mm. long; achene ellipsoid, brown, lustrous.

8. *Coccoloba schiedeana* Lindau, Bot. Jahrb. Engler 13: 187. 1890.

Coccoloba barbadensis mexicana Meisn. in DC. Prodr. 14: 153. 1856.

?*Coccoloba oaxacensis* Gross, Repert. Nov. Sp. Fedde 12: 219. 1913.

Veracruz to Guerrero, Chiapas, and Yucatán; type from Papantla, Veracruz. Guatemala.

Small or large tree; leaves mostly oval, obtuse to cordate at base; flowers white. "Carnero de la costa" (Oaxaca); "tepalcahuite" (Veracruz); "tamulero" (Michoacán, Guerrero); "carnero" (Chiapas, Oaxaca); "uvero" (Veracruz); "palo de carnero" (Oaxaca).

The wood is used for cart wheels and other purposes. The fruit is edible.

The writer has seen no material of *C. oaxacensis*, and it may be a distinct species.

9. *Coccoloba cozumelensis* Hemsl. Biol. Centr. Amer. Bot. 4: 108. 1887.

Coccoloba yucatanica Lindau, Bot. Jahrb. Engler 13: 190. 1890.

Yucatán; type from Cozumel Island.

Leaves ovate or oblong-ovate, obtuse or acute, 3 to 10 cm. long.

10. *Coccoloba chiapensis* Standl. Proc. Biol. Soc. Washington 33: 67. 1920.

Known only from the type locality, Finca Irlanda, Chiapas.

Large tree; leaves elliptic, 15 to 20 cm. long, acuminate.

11. *Coccoloba orizabae* Lindau, Bot. Jahrb. Engler 13: 189. 1890.

Known only from Orizaba, the type locality.

Leaves lance-ovate, obtuse-acuminate, 4.5 to 10 cm. long; fruit 1 cm. long.

12. *Coccoloba humboldti* Meisn. in DC. Prodr. 14: 163. 1856.

Tamaulipas to Oaxaca and Tabasco.

Shrub or small tree; leaves oval or ovate, about 8 cm. long; flowers white. "Tocó prieto" (Tabasco).

13. *Coccoloba jurgenseni* Lindau, Bot. Jahrb. Engler 13: 188. 1890.

Colima to Oaxaca (type locality).

Leaves oblong or oval, 8 to 20 cm. long.

14. *Coccoloba acapulcensis* Standl. Proc. Soc. Washington 33: 66. 1920.

Known only from the type locality, Acapulco, Guerrero.

Easily distinguished from the other Mexican species by its peltate suborbicular leaves, these 5.5 to 8 cm. wide.

5. **NEOMILLSPAUGHIA** Blake, Bull. Torrey Club 48: 84. 1921.

1. *Neomillspaughia emarginata* (Gross) Blake, Bull. Torrey Club 48: 85. 1921.

Podopterus emarginatus Gross, Repert. Sp. Nov. Fedde 12: 218. 1913.

Yucatán; type from Kabah.

Glabrous shrub or tree; leaves orbicular, 7 to 10 cm. wide, coriaceous, emarginate at base and apex; flowers in long racemes; perianth segments 5, the outer ones winged, the inner ones small.

In general appearance the plant resembles some species of *Coccoloba*.

6. **PODOPTERUS** Humb. & Bonpl. Pl. Aequin. 2: 89. 1809.

Shrubs or small trees; leaves thin, early deciduous; flowers fasciculate or racemose, perfect; outer perianth segments with broad scarious wings; stamens 5.

One other species is known, a native of Guatemala.

Leaf blades broadly obovate or rhombic-obovate, acute to acuminate at base.

1. *P. mexicanus*.

Leaf blades oval-ovate, cordate at base-----2. *P. cordifolius*.

1. *Podopterus mexicanus* Humb. & Bonpl. Pl. Aequin. 2: pl. 107. 1809.

Tamaulipas to Colima, Oaxaca, and Yucatán; type from Veracruz. Guatemala.

Shrub or small tree, sometimes 6 meters high, with stout spinose branchlets; leaves deciduous, glabrous; flowers in dense fascicles, appearing when the plant is leafless, greenish tinged with brown.

2. *Podopterus cordifolius* Rose & Standl. Proc. Biol. Soc. Washington 33: 66. 1920.

Colima to Oaxaca; type locality, on the seashore at Manzanillo, Colima.

Small tree with very straggling, pendent branches.

7. *ANTIGONON* Endl. Gen. Pl. 310. 1837.

Plants fruticose or chiefly herbaceous, scandent; leaves cordate or deltoid; flowers fasciculate, the fascicles racemose.

Exterior sepals ovate in anthesis-----1. *A. guatimalense*.

Exterior sepals cordate in anthesis.

Leaf blades decurrent on the petiole.

Sepals reddish, in fruit nearly as broad as long, obtuse or rounded at apex, usually apiculate; plants usually copiously pubescent.

2. *A. cinerascens*.

Sepals yellowish, longer than broad in fruit, acute or acutish; plants nearly glabrous-----3. *A. flavescens*.

Leaf blades not decurrent-----4. *A. leptopus*.

1. *Antigonon guatimalense* Meisn. in DC. Prodr. 14: 184. 1856.

Polygonum grandiflorum Bertol. Nov. Comm. Acad. Bonon. 4: 412. 1840. Not *P. grandiflorum* Willd. 1799.

Antigonon grandiflorum Robinson, Proc. Amer. Acad. 44: 613. 1909.

Guerrero and Oaxaca. Central America and Colombia; type from Guatemala.

Leaves broadly cordate; inflorescence copiously pubescent, the flowers rose-colored; sepals in fruit about 3 cm. long.

2. *Antigonon cinerascens* Mart. & Gal. Bull. Acad. Brux. 10¹: 14. 1843.

Veracruz, Oaxaca, and Chiapas; type from Jalapa. Central America.

Leaves broadly ovate-cordate, abruptly short-acuminate; flowers purplish red. "Bejuco de colación" (El Salvador); "bellísima" (Nicaragua).

3. *Antigonon flavescens* S. Wats. Proc. Amer. Acad. 22: 446. 1887.

Jalisco to Oaxaca; type from Chapala, Jalisco.

Leaves deltoid, often very large, glabrous, acute or acuminate; flowers greenish white or yellowish. "Coamecate," "coamecatl" (Jalisco, *Urbina*).

4. *Antigonon leptopus* Hook. & Arn. Bot. Beechey Voy. 308. pl. 69. 1839-40.

Antigonon cordatum Mart. & Gal. Bull. Acad. Brux. 10¹: 14. 1843.

Chihuahua to Baja California, southward to Oaxaca; often cultivated elsewhere; type from the west coast.

Large vine, often climbing to the tops of the highest trees, sometimes running over low shrubs; leaves deltoid or cordate, acuminate; sepals at first small and inconspicuous but becoming large, purplish red, and very showy, the racemes (as in the other species) furnished with tendrils. "Flor de San Diego" (Veracruz, Oaxaca, Yucatán); "enredadera de San Diego" (Nuevo León, Oaxaca); "rosa de mayo" (Sinaloa); "corona de la reina" (Tamaulipas); "hierba de

Santa Rosa" (Morelos); "San Miguelito" (Sonora, Sinaloa); "fulmina" (Guerrero, Morelos); "bellísima" (Oaxaca, Colombia); "corona" (Sinaloa, Tamaulipas); "flor de San Miguel" (Sonora, Guatemala); "coronilla" (Sinaloa); "coamecate" (Morelos, Sinaloa); "coamecatl" (Guanajuato, Texas); "cuamecate" (Durango, Jalisco; from the Nahuatl, *cuau-mecatl*=tree+cord); "bejuco de colación" (El Salvador); "coralillo," "coralillo rosado" (Cuba); "cadena de amor" (Philippine Islands).

A very showy and handsome plant, and cultivated for this reason not only in Mexico but in many other regions. In general appearance it suggests *Bougainvillea*, and is equally handsome. It is a rapid grower and remains in bloom a long time. In Florida it is known as "Confederate vine." The flower clusters serve as tendrils for the support of the plant, and shorten themselves by bending at the joints in a zigzag form. The roots bear tubers which are usually small, although they are said sometimes to weigh as much as 15 pounds. They are edible and have a nutlike flavor. For an illustration of this species see Contr. U. S. Nat. Herb. 8: pl. 18.

8. **GYMNOPODIUM** Rolfe in Hook. Icon. Pl. IV. 7: pl. 2699. 1901.

Shrubs or trees; leaves alternate, subsessile; flowers fascicled in racemes, slender-pediceled; inner perianth segments small and inconspicuous; stamens 9; fruit a small 3-angled achene.

One other species is known, a native of British Honduras.

Sepals cordate at base-----1. *G. antigonoides*.
 Sepals cuneate or decurrent at base-----2. *G. ovatifolium*.

1. *Gymnopodium antigonoides* (Robinson) Blake, Bull. Torrey Club 48: 84. 1921.

Millspaughia antigonoides Robinson; Millsp. & Loes. Bot. Jahrb. Engler 36: Beibl. 80: 14. 1905.

Yucatán and Chiapas; type from Progreso, Yucatán.

Shrub or tree, sometimes 12 meters high; leaves obovate to oval, 2 to 5.5 cm. long, rounded at apex, puberulent when young; flowers fasciculate, racemose, greenish, the sepals in age 7 mm. long.

The Chiapas specimens have slightly broader and larger leaves than those from Yucatán.

2. *Gymnopodium ovatifolium* (Robinson) Blake, Bull. Torrey Club 48: 84. 1921.

Millspaughia ovatifolia Robinson; Millsp. & Loes. Bot. Jahrb. Engler 36: Beibl. 80: 14. 1905.

Known only from the type locality, Progreso, Yucatán.

Leaves broadly ovate, 5 cm. long, acutish.

9. **TRIPLARIS** L. Syst. Nat. ed. 10. 881. 1759.

1. *Triplaris auriculata* Meisn. in DC. Prodr. 14: 174. 1856.

Chiapas and perhaps elsewhere in Mexico, the type from some unknown locality.

Shrub or tree, more or less pubescent; leaves large, oval, short-petiolate; flowers dioecious, racemose, the pistillate calyx accrescent and in fruit about 5 cm. long.

The Mexican material seen appears to be the same as *T. macombii* Donn. Smith, and is perhaps not different from *T. surinamensis* Cham. *T. auriculata* is probably the plant reported from Chiapas as *Triplaris* sp. with the vernacular

name "palo mulato." A related species, *T. tomentosa* Wedd., is a small tree with hollow stems infested by ants, known in Costa Rica as "hormigo" and "tabaco."

10. RUPRECHTIA C. A. Meyer, Mém. Acad. St. Pétersb. VI. 6: 148. 1840.

Trees or shrubs with rather small leaves; flowers dioecious, fasciculate in short spikes; pistillate calyx accrescent in fruit.

Venation of the lower surface of the leaves very prominent and finely reticulate.

Fruiting sepals 3.5 to 4 cm. long-----1. *R. macrosepala*.

Fruiting sepals 1.3 to 2.7 cm. long.

Leaf blades narrowly elliptic-oblong or lanceolate, 0.8 to 2.5 cm. wide, nearly glabrous beneath; fruiting sepals 1.3 to 1.8 cm. long.

2. *R. occidentalis*.

Leaf blades elliptic, 1.8 to 3.5 cm. wide, densely short-pilose beneath;

fruiting sepals about 2.5 cm. long-----3. *R. fusca*.

Venation of the lower surface of the leaves neither prominent nor reticulate.

Leaves densely short-pilose beneath-----4. *R. pringlei*.

Leaves glabrous beneath or nearly so.

Leaves ovate or broadly ovate, widest at or below the middle, acute or acuminate-----5. *R. cumingii*.

Leaves mostly oblanceolate-oblong, widest above the middle, obtuse or acutish-----6. *R. pallida*.

1. Ruprechtia macrosepala Standl., sp. nov.

Sinaloa; type from Varal, Municipalidad de Mazatlán (*Dehesa* 1508; U. S. Nat. Herb. no. 1,012,464).

Branchlets slender, brownish; ocreae 2.5 to 3 mm. long; petioles stout, 3 to 5 mm. long; leaf blades elliptic-ovate, 6.5 to 11.5 cm. long, 3 to 4.5 cm. wide, obtuse or rounded at base, acute or acuminate at apex, green and glabrous on the upper surface, slightly paler beneath, sparsely strigose along the veins, the venation very prominent and finely reticulate; pistillate racemes numerous, laxly flowered, the flowers slender-pedicellate; calyx 3.5 to 4 cm. long, densely appressed-pilose below, glabrate above; inner calyx lobes linear-attenuate, 4 to 5 mm. long, the outer lobes ligulate-spatulate, reticulate-veined, rounded at apex, tinged with red at first; achene 8 to 9 mm. long, glabrous.

2. Ruprechtia occidentalis Standl. Proc. Biol. Soc. Washington 33: 66. 1920.

Sinaloa; type from San Blas.

Shrub, about 3 meters high; leaves 3 to 8 cm. long, 1 to 2.5 cm. wide, acuminate to acutish.

3. Ruprechtia fusca Fernald, Proc. Amer. Acad. 33: 86. 1897.

Puebla and Guerrero; type from Acapulco.

Shrub or small tree, 4.5 meters high, the trunk 20 cm. in diameter; leaves very thick, acute, with fulvous pubescence.

4. Ruprechtia pringlei Greenm. Proc. Amer. Acad. 33: 476. 1898.

Oaxaca; type from Tomellín Canyon.

Shrub or small tree, 4 to 6 meters high, with gray bark; leaves oblong-ovate, 4 to 7 cm. long; fruiting calyx 2 to 2.5 cm. long.

5. Ruprechtia cumingii Meisn. in DC. Prodr. 14: 179. 1856.

Veracruz. Central America and Colombia (type locality).

Large or small tree with rounded crown; leaves ovate, acuminate, comparatively thin, 4 to 7.5 cm. long, 1.8 to 3.5 cm. wide; fruiting calyx about 2 cm. long.

6. *Ruprechtia pallida* Standl., sp. nov.

Michoacán and Guerrero; type from Cayaco, Michoacán (*Nelson* 6964; U. S. Nat. Herb. no. 399283).

Branches blackish brown, rugose; ocreae 1.5 mm. long; petioles 3 to 5 mm. long; leaf blades oblanceolate-oblong or elliptic-oblong, 4.5 to 7 cm. long, 1.5 to 2 cm. wide, usually cuneate at base, obtuse to subacute at apex, subcoriaceous, pale on both surfaces, glabrous above, the venation inconspicuous, glabrous beneath except for a few scattered hairs along the costa, the lateral veins about 9 on each side, prominent, the other venation inconspicuous; pistillate racemes (very immature) about 2 cm. long, densely flowered; calyx densely pilose with short subappressed hairs.

32. CHENOPODIACEAE. Goosefoot Family.

REFERENCE: Standley, *Chenopodiaceae*, N. Amer. Fl. 21: 3-93. 1916.

Shrubs, usually low, often succulent; leaves opposite or alternate, estipulate, sometimes reduced to scales; flowers small, perfect or unisexual; fruit a utricle, 1-seeded.

A large number of herbaceous species of various genera are found in Mexico. Leaves reduced to scales; stems jointed; flowers in fleshy spikes or sunk in the joints of the stems.

Branches alternate-----3. **ALLENROLFEA.**

Branches opposite-----4. **ARTHROCNUM.**

Leaves well developed; stems not jointed; flowers solitary or clustered in the axils of the leaves.

Embryo spirally coiled; leaves very fleshy, terete or semiterete--5. **DONDIA.**

Embryo not coiled; leaves usually flat.

Pubescence of inflated hairs or wanting, never of slender hairs.

1. **ATRIPLEX.**

Pubescence of silky hairs-----2. **EUROTIA.**

1. ATRIPLEX L. Sp. Pl. 1052. 1753.

Shrubs with scurfy whitish pubescence; leaves alternate or opposite, entire or dentate; flowers unisexual; fruit inclosed by bracts.

Several herbaceous representatives of the genus are found in Mexico. The plants are of considerable value as forage for stock.

Fruiting bracts with 4 longitudinal wings.

Bracts 7 to 25 mm. long, the free portion equaling or usually shorter than the wings -----1. **A. canescens.**

Bracts 4 to 10 mm. long, the free portion much longer than the wings.

Pedicels of the fertile flowers 2 mm. long or less; bracts 4 to 6 mm. long.

2. **A. linearis.**

Pedicels 4 to 7 mm. long; bracts 6 to 10 mm. long-----3. **A. macropoda.**

Fruiting bracts not winged.

Leaves all or nearly all opposite. Leaves sessile, 2 to 5 mm. long.

4. **A. matamorensis.**

Leaves alternate, or the lowest opposite.

Leaves dentate-----5. **A. acanthocarpa.**

Leaves entire.

Leaves sagittate, clasping, 2 to 4 mm. long-----6. **A. julacea.**

Leaves never sagittate, usually much larger.

Bracts entire, 5 to 12 mm. long-----7. **A. confertifolia.**

Bracts dentate or crenulate, usually smaller.

Plants tall shrubs, usually a meter high or more; leaves neither obovate nor orbicular.

Bracts crenulate; leaves petiolate, the blades 1.5 to 5 cm. long.

8. *A. lentiformis*.

Bracts laciniate-dentate; leaves sessile, usually less than 1 cm. long.

9. *A. polycarpa*.

Plants low shrubs, rarely 60 cm. high or, if larger, the leaves obovate or orbicular.

Bracts 2 to 3 mm. long-----10. *A. insularis*.

Bracts 4 to 10 mm. long.

Bracts 4 to 8 mm. long, broader than long-----11. *A. obovata*.

Bracts 8 to 10 mm. long, longer than broad----12. *A. pringlei*.

1. *Atriplex canescens* (Pursh) Nutt. Gen. Pl. 1: 197. 1818.

Calligonum canescens Pursh, Fl. Amer. Sept. 370. 1814.

Obione tetraptera Benth. Bot. Voy. Sulph. 48. 1844.

Obione berlandieri Moq. in DC. Prodr. 13²: 114. 1849.

Baja California to Coahuila, San Luis Potosí, and Zacatecas. Northward in the United States to Oregon and South Dakota; type from South Dakota.

Densely branched, grayish shrub, usually 1 to 1.5 meters high, often forming broad clumps; leaves mostly linear, obtuse; flowers dioecious. "Costillas de vaca" (Zacatecas); "chamiso" (Baja California, Chihuahua, New Mexico); "cenizo" (Chihuahua, Sonora).

In some parts of its range this plant, like others of the genus, is of some importance as a forage plant. The leaves have a salty flavor. The seeds of this and other species have been used as food by the Gosiute Indians of Utah.

2. *Atriplex linearis* S. Wats. Proc. Amer. Acad. 24: 72. 1889.

Dry plains and hillsides, Sonora and Baja California; type from Guaymas. Southern Arizona and California.

Dense shrub, 1 to 2.5 meters high; leaves linear, 1 to 5 cm. long, whitish. "Chamiso" (Baja California).

3. *Atriplex macropoda* Rose & Standl. N. Amer. Fl. 21: 72. 1916.

Known only from the type locality, Pichilique Island, Baja California.

Shrub with slender branches; leaves linear, 1 to 1.8 cm. long.

4. *Atriplex matamorensis* A. Nels. Proc. Biol. Soc. Washington 17: 99. 1904.

Atriplex oppositifolia S. Wats. Proc. Amer. Acad. 9: 118. 1874. Not *A. oppositifolia* Vill. 1779.

Tamaulipas; type from the Rio Grande Valley, near Matamoros, southwestern Texas.

Small shrub, 20 to 40 cm. high, with slender, very leafy branches; leaves sessile, lance-oblong, 2 to 5 mm. long, entire, obtuse or acutish; bracts sub-orbicular, 3 mm. long, dentate.

5. *Atriplex acanthocarpa* (Torr.) S. Wats. Proc. Amer. Acad. 9: 117. 1874.

Obione acanthocarpa Torr. U. S. & Mex. Bound. Bot. 183. 1859.

Chihuahua to Nuevo León. Western Texas and southern New Mexico; type from plains near the Burro Mountains, New Mexico.

Shrub, 1 meter high or less; leaves oblong to broadly obovate, 1.5 to 5 cm. long, coarsely dentate; flowers monoecious; bracts 7 to 15 mm. long, the margins laciniate, the sides with numerous long flattened appendages.

6. *Atriplex julacea* S. Wats. Proc. Amer. Acad. 20: 370. 1885.

Baja California; type from Bahía de Todos Santos.

Procumbent or erect shrub, the slender branches densely leafy; leaves scale-like; flowers dioecious; bracts 4 to 5 mm. long, with corky appendages on the sides.

7. *Atriplex confertifolia* (Torr.) S. Wats. Proc. Amer. Acad. 9: 119. 1874.

Obione confertifolia Torr. in Frém. Rep. Exped. Rocky Mount. 318. 1845.

Chihuahua. Northward in the United States to Oregon and South Dakota; type from Utah.

Shrub, rarely over 50 cm. high, often forming broad clumps; leaves mostly oval, entire, 1 to 2 cm. long; flowers dioecious; bracts oval or suborbicular.

8. *Atriplex lentiformis* (Torr.) S. Wats. Proc. Amer. Acad. 9: 118. 1874.

Obione lentiformis Torr. in Sitgreaves, Rep. Zuñi & Colo. 169. 1853.

Northern Sonora. Southern California to southwestern Utah; type from Arizona.

Dense shrub, 1 to 4 meters high; leaves ovate to ovate-deltoid or oblong, obtuse or rounded at apex; bracts smooth on the sides.

The Coahuilla Indians of southern California grind the seeds and boil the meal in salted water. The various species of *Atriplex* were rather important food plants among many of the Indians of the arid portions of North America. Among the Pimas of Arizona the young shoots, which have a salty flavor, were boiled and eaten. The same tribe made use of the seeds (presumably including also the bracts), cooking them in pits over night, then drying and parching them and storing for winter use. Seeds so preserved were eaten as *pinole*—a mixture of the ground seeds with water. The Pimas used the powdered root as a dressing for sores.

9. *Atriplex polycarpa* (Torr.) S. Wats. Proc. Amer. Acad. 9: 117. 1874.

Obione polycarpa Torr. U. S. Rep. Expl. Miss. Pacif. 4: 130. 1857.

Atriplex curvidens T. S. Brandeg. Proc. Calif. Acad. II. 2: 201. 1889.

Sonora and Baja California. California to Arizona; type from the Gila River, Arizona.

Dense shrub, 1 to 2 meters high; leaves rhombic or deltoid, 2 to 5 cm. long, grayish; flowers dioecious; bracts with a few subulate appendages on the sides.

10. *Atriplex insularis* Rose, Contr. U. S. Nat. Herb. 1: 80. 1890.

Islands off the west coast of Baja California; type from Raza Island.

Erect shrub, 1.5 to 2 meters high; leaves obovate or orbicular, 1 to 1.5 cm. long, short-petiolate or sessile, rounded at apex; bracts coarsely and irregularly dentate, short-tuberculate on the sides.

11. *Atriplex obovata* Moq. Chenop. 61. 1840.

Atriplex greggii S. Wats. Proc. Amer. Acad. 9: 118. 1874.

Chihuahua to Zacatecas; type from San Luis Potosí. Western Texas and southern New Mexico.

Shrub, 15 to 40 cm. high; leaves oblong to oval, 1 to 3 cm. long; flowers dioecious; bracts denticulate, the sides sparsely tuberculate or crested near the base, rarely smooth.

12. *Atriplex pringlei* Standl. N. Amer. Fl. 21: 68. 1916.

Known only from the type locality, alkaline plains, Hacienda de Angostura, San Luis Potosí.

Shrub, 20 to 30 cm. high; leaves obovate, 1.5 to 3 cm. oblong, rounded at apex; bracts not compressed, irregularly dentate, the sides with few or numerous appendages.

2. *EUROTIA* Adans. Fam. Pl. 2: 260. 1763.

1. *Eurotia subspinos*a Rydb. Bull. Torrey Club 39: 312. 1912.

Chihuahua and Coahuila. Southern California to Utah; type from Utah.

Much-branched shrub a meter high or less, copiously pubescent; leaves linear, alternate, 1 to 3 cm. long, stellate-pubescent; flowers dioecious, clustered in the leaf axils; fruit covered with long white or brownish hairs.

The plant is of some importance for forage. The closely related *E. lanata* (Pursh) Moq., of the western United States, is often known as "winter-fat."

3. ALLENROLFEA Kuntze, Rev. Gen. Pl. 545. 1891.

1. *Allenrolfea occidentalis* (S. Wats.) Kuntze, Rev. Gen. Pl. 1: 546. 1891.
Halostachys occidentalis S. Wats. in King, Geol. Expl. 40th Par. 5: 293. 1871.

Spirostachys occidentalis S. Wats. Proc. Amer. Acad. 9: 125. 1874.

In alkaline soil, Sonora and Baja California; probably also in Chihuahua. Northward in the United States to Oregon; type from Utah.

Shrub, 1.5 meters high or less, much branched, green, with very succulent, fragile, jointed branches; flowers arranged spirally by 3's or 5's in the axils of fleshy peltate bracts. "Hierba del burro" (New Mexico).

Eaten sparingly by stock. Known in New Mexico as "burroweed."

4. ARTHROCNEMUM Moq. Chenop. 111. 1840.

1. *Arthrocnemum subterminale* (Parish) Standl. Journ. Washington Acad. Sci. 4: 399. 1914.

Salicornia subterminalis Parish, Erythea 6: 87. 1898.

In alkaline soil, Baja California and Sinaloa. California; type from Riverside County.

Low leafless shrub with succulent jointed branches; flowers in groups of 3 on the opposite sides of the joints, the flowering joints forming terminal spikes.

The seeds were ground into meal and eaten by the Coahuilla Indians of southern California.¹

5. DONDIA Adans. Fam. Pl. 2: 261. 1763.

Low shrubs or herbs, glabrous or pubescent, often glaucous; leaves short, terete or semiterete, very succulent; flowers small, perfect, axillary.

The plants perhaps scarcely deserve to be classed as shrubs. They are sometimes burned to secure ashes from which lye for soap making is made. The Coahuilla Indians of California are said to use the plants for dyeing baskets black. The salty-flavored leaves were cooked and eaten by the Pimas and other Indians of the arid regions. The following names are said to be applied to various species of doubtful identification: "Romerito"; "romerillo"; "jauja" (Durango, Tamaulipas); "sosa" (Sonora); "quelite salado" (Chihuahua).

Stems and leaves glabrous or nearly so.

Seed 1.5 to 2 mm. broad.....1. *D. californica*.

Seed 0.8 mm. broad.....2. *D. fruticosa*.

Stems and leaves densely villous or tomentulose, at least when young.

Branches of the inflorescence very slender, spreading or divaricate, flexuous, elongate; leaves flattened.....3. *D. ramosissima*.

Branches of the inflorescence stout, ascending or erect, not flexuous, short; leaves terete.

Calyx densely pubescent.....4. *D. brevifolia*.

Calyx nearly or quite glabrous.

Leaves glaucous, 3 to 7 mm. long, rounded at apex; seed 1.5 mm. broad.

5. *D. palmeri*.

Leaves green, 7 to 15 mm. long, acute; seed 1 mm. broad.

6. *D. tampicensis*.

¹ See D. P. Barrows, The ethno-botany of the Coahuilla Indians of southern California, pp. 1-82, 1900. Doctorate thesis of the University of Chicago.

1. *Dondia californica* (S. Wats.) Heller, Cat. N. Amer. Pl. 3. 1898.
Suaeda californica S. Wats. Proc. Amer. Acad. 9: 89. 1874.
 Salt marshes, coast of Baja California. California; type from San Francisco Bay.
 Shrub, 20 to 80 cm. high; leaves 1.5 to 3.5 cm. long.
2. *Dondia fruticosa* (L.) Druce, List. Brit. Pl. 60. 1908.
Chenopodium fruticosum L. Sp. Pl. 221. 1753.
Suaeda fruticosa Forsk. Fl. Aegypt. Arab. 70. 1775.
 Coahuila and probably elsewhere. Northward to Alberta; Bahamas and Cuba; Europe, Asia, and Africa.
 Shrub, 20 to 80 cm. high; leaves 1 to 1.5 cm. long.
3. *Dondia ramosissima* Standl. N. Amer. Fl. 21: 91. 1916.
 Baja California. Southern California and Arizona; type from Lees Ferry, Arizona.
 Shrub, 1 meter high; leaves 0.5 to 2 cm. long.
4. *Dondia brevifolia* Standl. N. Amer. Fl. 21: 92. 1916.
 Baja California. Southern California; type from Newport.
5. *Dondia palmeri* Standl. N. Amer. Fl. 21: 91. 1916.
 Coahuila and Zacatecas; type from Parrás, Coahuila.
 Low shrub. "Saladillo" (Zacatecas).
6. *Dondia tampicensis* Standl. N. Amer. Fl. 21: 91. 1916.
 Known only from the type locality, along the coast near La Barra, Tamaulipas, near Tampico.

33. AMARANTHACEAE. Amaranth Family.

REFERENCE: Standley, Amaranthaceae, N. Amer. Fl. 21: 95-169. 1917.

Shrubs or small trees; leaves opposite or alternate, estipulate, entire; flowers small, perfect or unisexual, usually whitish, mostly spicate; fruit very small, dry.

Many herbaceous representatives of the family occur in Mexico.

Leaves opposite. Fruit 1-seeded.

Stigma capitate or shallowly bilobate. Plants scandent.....5. **PFAFFIA**.

Stigma with 2 or 3 subulate or filiform lobes.....6. **IREZINE**.

Leaves alternate.

Fruit with 2 or more seeds. Flowers perfect.

Fruit 1-seeded.....1. **CELOSIA**.

Sepals glabrous; anthers 4-celled.

Seeds with an aril; stems usually scandent or reclining.....2. **CHAMISSOA**.

Seeds without an aril; stems erect.....3. **LAGREZIA**.

Sepals villous; anthers 2-celled.....4. **DICRAURUS**.

1. **CELOSIA** L. Sp. Pl. 205. 1753.

Low shrubs or herbs; leaves alternate, entire or lobed, petiolate; flowers perfect, spicate.

The best-known representative of the genus is the cockscomb, *Celosia argentea* L., various forms of which are cultivated for ornament. It is known in Mexico as "cresta de gallo," "abanico," "Cinco de Mayo," and "mano de león." The cultivated plants are the form with fasciated inflorescence, described by Linnaeus as *Celosia cristata*. This is the only species besides those enumerated below which occurs in Mexico.

Sepals 5 to 6 mm. long, prominently nerved.

Leaf blades hastately lobed; stigmas 2.....1. *C. palmeri*.

Leaf blades not lobed; stigmas 3.

Seeds 5 to 8; leaf blades ovate to lanceolate, decurrent nearly to the base of the petiole.....2. *C. virgata*.

Seeds about 20; leaf blades deltoid to triangular-lanceolate, short-decurrent.
3. *C. nitida*.

Sepals 3 mm. long or less, obscurely nerved.

Leaf blades, at least most of them, hastately lobed, puberulent beneath.

4. *C. floribunda*.

Leaf blades entire, glabrous.

Flowers pedicellate.....7. *C. chiapensis*.

Flowers sessile.

Fruit stipitate; sepals dark brown.....5. *C. moquini*.

Fruit sessile; sepals stramineous.....6. *C. orcuttii*.

1. *Celosia palmeri* S. Wats. Proc. Amer. Acad. 18: 163. 1883.

Coahuila, Nuevo León, and San Luis Potosí; type from Monclova, Coahuila. Western Texas.

Low shrub, much branched, glabrous except about the inflorescence; leaves lanceolate or lance-triangular, 1.5 to 5 cm. long; spikes 1 to 2 cm. long; seeds 3 or 4.

2. *Celosia virgata* Jacq. Coll. Bot. 2: 279. 1788.

Veracruz and Yucatán. Cuba and Porto Rico; northern South America.

Plants suffrutescent, 0.5 to 1 meter high; leaves ovate or lanceolate; flower spikes 1 to 5 cm. long.

3. *Celosia nitida* Vahl, Symb. Bot. 3: 44. 1794.

San Luis Potosí to Yucatán. West Indies, western Texas, and northern South America.

Plants fruticose below, the slender stems erect or clambering over other plants, glabrous; leaves 2 to 7 cm. long. "Abanico" (Colombia).

Used in Martinique as a remedy for dysentery.

4. *Celosia floribunda* A. Gray, Proc. Amer. Acad. 5: 167. 1861.

Southern Baja California; type from the vicinity of Cape San Lucas.

Shrub, 4 meters high or less; leaves 3 to 18 cm. long; spikes 2 to 15 cm. long.

5. *Celosia moquini* Guillem.; Moq. in DC. Prodr. 13²: 239. 1849.

Southern Mexico, the localities not definitely known.

Leaves 15 to 30 cm. long; flower spikes arranged in large panicles.

6. *Celosia orcuttii* Greenm. Field Mus. Bot. 2: 330. 1912.

Colima, the type from the city of Colima.

Leaves 6 to 17 cm. long, acute.

Rather doubtfully distinct from the last species.

7. *Celosia chiapensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 363. 1917.

Chiapas; type from Finca Irlanda.

Glabrous shrub; leaves slender-petiolate, lanceolate or elliptic-lanceolate, 9 to 14 cm. long, acuminate.

2. **CHAMISSOA** H. B. K. Nov. Gen. & Sp. 2: 196. 1817.

1. *Chamissoa altissima* (Jacq.) H. B. K. Nov. Gen. & Sp. 2: 197. 1817.

Achyranthes altissima Jacq. Enum. Pl. Carib. 17. 1762.

Sinaloa to Tamaulipas, Tabasco and Oaxaca. Central America, West Indies, and northern South America; type from Jamaica.

Shrub, the stems 2 meters long or more, scandent or reclining, glabrous or nearly so; leaves ovate or lanceolate, 6 to 18 cm. long, acute; flowers spicate, in large panicles. "Pate" (Nicaragua); "guaniquique" (Cuba); "pabellón del rey" (Santo Domingo).

This is probably the plant described by Sessé and Mocino¹ as *Celosia alomicis*.

3. **LAGREZIA** Moq. in DC. Prodr. 13²: 252. 1849.

1. **Lagrezia monosperma** (Rose) Standl. Journ. Washington Acad. Sci. 5: 393. 1915.

Celosia monosperma Rose, Contr. U. S. Nat. Herb. 1: 352. 1895.

Colima and Guerrero; type from Manzanillo, Colima.

Shrub, 2 to 5 meters high, glabrous or nearly so; leaves ovate to lanceolate, 5 to 12 cm. long; flowers perfect, small, in slender paniculate spikes.

4. **DICRAURUS** Hook. f. in Benth. & Hook. Gen. Pl. 3: 42. 1880.

Erect shrubs, copiously pubescent; leaves chiefly alternate, but some of them frequently opposite; flowers unisexual, small, spicate, the spikes paniculate.

Leaves ovate to ovate-lanceolate, acute, 3 to 9 mm. wide; petioles 1 to 2 mm. long-----1. **D. leptocladus**.

Leaves rounded-ovate or rounded-deltoid, usually rounded at the apex, 13 to 35 mm. wide; petioles 5 to 10 mm. long-----2. **D. alternifolius**.

1. **Dicraurus leptocladus** Hook. f. in Benth. & Hook. Gen. Pl. 3: 43. 1880.

Dicraurus diffusus Baill. Hist. Pl. 9: 214. 1888.

Chihuahua to San Luis Potosí. Western Texas (type locality).

Shrub, 0.2 to 1 meter high, with numerous stems.

2. **Dicraurus alternifolius** (S. Wats.) Uline & Bray, Bot. Gaz. 21: 355. 1896.

Iresine alternifolia S. Wats. Proc. Amer. Acad. 24: 72. 1889.

Shrub, 1 to 3.5 meters high, with grayish or brownish branches.

5. **PFAFFIA** Mart. Nov. Gen. & Sp. 2: 20. 1826.

1. **Pfaffia hookeriana** (Hemsl.) Greenm. Field Mus. Bot. 2: 330. 1912.

Hebanthe hookeriana Hemsl. Biol. Centr. Amer. Bot. 3: 19. 1882.

Veraacruz, the type from Córdoba. Central America.

Scandent shrub, more or less pubescent; leaves ovate, acute, short-petiolate; flowers mostly perfect, yellowish white, spicate, the sepals covered with long white hairs.

6. **IRESINE** P. Br. Civ. Nat. Hist. Jam. 358. 1756.

Shrubs or small trees, erect or sometimes scandent; leaves opposite, petiolate; flowers perfect or unisexual, usually spicate, the sepals variously hairy.

A number of herbaceous species occur in Mexico. A plant described by Sessé and Mocino² as *Celosia dioica* belong, apparently, to this genus, but its identification is doubtful.

Flowers perfect or polygamous.

Branches of the inflorescence glabrous or nearly so.

Bracts and bractlets rounded or obtuse at the apex.

Inflorescence naked; bracts stramineous or whitish; pubescence of the sepals bright white; leaf blades broadest at the middle--1. **I. nigra**.

Inflorescence leafy; bracts fuscous; pubescence of the sepals brownish; leaf blades broadest near the base-----2. **I. pacifica**.

¹ Pl. Nov. Hisp. 41, 1887. The specific name is written "*Alomiris*" in Fl. Mex. 74, 1894.

² Pl. Nov. Hisp. 38. 1893.

Bracts and bractlets acute or acuminate, cuspidate.

Staminodia minute; sepals acute or acutish; bracts sparsely villous.

3. *I. angustifolia*.

Staminodia one-third as long as the filaments; sepals obtuse or rounded at apex; bracts densely villous-----4. *I. arenaria*.

Branches of the inflorescence densely canescent or tomentose.

Leaf blades elliptic to oblanceolate-oblong, 12 to 20 cm. long, soon glabrate; spikelets sessile; sepals sparsely lanate at base-----5. *I. tomentella*.

Leaf blades ovate to lanceolate, 8 cm. long or less, permanently pubescent; spikelets mostly pedicellate; sepals densely lanate----6. *I. hartmanii*.

Flowers dioecious.

Branches of the inflorescence glabrous or nearly so.

Leaves 25 to 33 cm. long-----7. *I. herrerae*.

Leaves 2 to 15 cm. long.

Bracts subcoriaceous, rounded at apex; lateral veins of the leaves nearly obsolete-----8. *I. palmeri*.

Bracts scarious, mucronulate; lateral veins of the leaves coarse and prominent-----9. *I. interrupta*.

Branches of the inflorescence densely pubescent.

Staminate spikelets glomerate at the ends of branches; leaf blades about as broad as long, mostly suborbicular-----10. *I. rotundifolia*.

Staminate spikelets paniculate; leaf blades much longer than broad.

Sepals of the pistillate flowers rigid, green, the tips slightly spreading.-----11. *I. pringlei*.

Sepals of the pistillate flowers thin, whitish, the tips erect or incurved. Pubescence of branched hairs-----12. *I. stricta*.

Pubescence of simple hairs.

Panicles on long naked peduncles, narrow, the branches usually short.

Leaves soon glabrate; pubescence of the stems lustrous.

13. *I. nitens*.

Leaves permanently pubescent, at least beneath; pubescence dull.

14. *I. schaffneri*.

Panicles short-pedunculate or usually sessile, broad, the branches commonly elongate.

Leaves white beneath with a usually dense tomentum.

Spikes usually sessile, short; leaves thick, subrugose; branches of the panicle stout-----15. *I. cassiniaeformis*.

Spikes nearly all pedunculate, elongate; leaves thin; branches of the panicle slender, flexuous-----16. *I. discolor*.

Leaves not white beneath, the pubescence of yellowish, straight or loosely matted hairs.

Panicles very dense; bracts and sepals villous only at base; sepals of the staminate flowers 2.5 to 3 mm. long.

17. *I. grandis*.

Panicles loose and open; bracts and sepals copiously villous; sepals of the staminate flowers 2 mm. long or shorter.

18. *I. calea*.

1. *Iresine nigra* Uline & Bray, Bot. Gaz. 21: 350. 1896.

Veracruz and Chiapas. Central America; type from San Pedro Sula, Honduras.

Shrub with slender branches; leaves mostly ovate, 4.5 to 14 cm. long, acute to long-acuminate, glabrous.

2. *Iresine pacifica* Standl. Contr. U. S. Nat. Herb. 18: 96. 1916.
Sinaloa to Colima; type from Manzanillo.
Slender erect shrub, or often herbaceous, nearly glabrous; leaves ovate or lanceolate, 4 to 10 cm. long.
3. *Iresine angustifolia* Euphrasén, Beskr. St. Barthel. 165. 1795.
Iresine elatior Rich.; Willd. Sp. Pl. 4: 766. 1805.
Veracruz; Baja California. West Indies; Costa Rica to Brazil and Ecuador; type from St. Bartholomew Island, West Indies.
Much-branched shrub, a meter high, or often herbaceous, nearly glabrous; leaves mostly lanceolate, 5 to 10 cm. long.
4. *Iresine arenaria* Standl. Contr. U. S. Nat. Herb. 18: 93. 1916.
Sinaloa, on sandy hillsides, the type from Topolobampo.
Plants erect, fruticose at base, nearly glabrous; leaves mostly lanceolate, 2.5 to 4.5 cm. long.
5. *Iresine tomentella* Standl. Contr. U. S. Nat. Herb. 18: 97. 1916.
Known only from the type locality, Gómez Farias, Tamaulipas.
Erect shrub, 1.5 to 2 meters high, with white flowers. "Tepozán."
6. *Iresine hartmanii* Uline, Field Mus. Bot. 1: 422. 1899.
Sonora and Durango; type from Granados, Sonora.
Shrub, 1.5 to 2.5 meters high.
7. *Iresine herrerae* Blake, Contr. Gray Herb. n. ser. 53: 55. 1918.
Known only from the type locality, Río Concordia, Oaxaca.
Erect shrub, 3 meters high, glabrous.
8. *Iresine palmeri* (S. Wats.) Standl. Journ. Washington Acad. Sci. 5: 395. 1915.
Hebanthe palmeri S. Wats. Proc. Amer. Acad. 18: 144. 1883.
Nuevo León to Veracruz; type from Guajuco, Nuevo León.
Scandent or decumbent shrub, nearly glabrous; leaves mostly ovate-oblong, 2 to 6 cm. long.
9. *Iresine interrupta* Benth. Bot. Voy. Sulph. 156. 1844.
Alternanthera richardii Moq. in D. C. Prodr. 13²: 353. 1849.
Hebanthe subnuda Hemsl. Biol. Centr. Amer. Bot. 3: 20. 1882.
Sonora to San Luis Potosí, Veracruz, and Puebla; type from Tepic. Guatemala.
Scandent or reclining shrub, 4 to 6 meters long, nearly glabrous, with pale stems; leaves broadly ovate or lanceolate, acute or attenuate. "Barba del viejo" (Sinaloa).
10. *Iresine rotundifolia* Standl. Contr. U. S. Nat. Herb. 18: 96. 1916.
Puebla; type from San Luis Tultitlanapa.
Leaves 3.5 to 17 mm. long, tomentose beneath.
11. *Iresine pringlei* S. Wats. Proc. Amer. Acad. 25: 161. 1890.
On rocky slopes, Jalisco to Puebla and Oaxaca; type from Guadalajara.
Erect shrub, 1.5 to 3 meters high; leaves ovate, 4 to 8 cm. long, acuminate; flowers in large panicles.
12. *Iresine stricta* Standl. Contr. U. S. Nat. Herb. 18: 97. 1916.
Puebla and Oaxaca; type from Tehuacán, Puebla.
Erect shrub, 30 to 80 cm. high; leaves oval to ovate, 1.3 to 3.5 cm. long.
13. *Iresine nitens* Standl. Contr. U. S. Nat. Herb. 18: 95. 1916.
Known only from the type locality, Tehuacán, Puebla.
Low erect shrub; leaves lanceolate, 2 to 6 cm. long, acute.

14. *Iresine schaffneri* S. Wats. Proc. Amer. Acad. 21: 437. 1886.

Dry rocky hillsides, Chihuahua to San Luis Potosí, and Hidalgo; type from San Luis Potosí.

Erect shrub, 1 meter high or less; leaves ovate or lanceolate, 2 to 9 cm. long. "Tlatlón" (Querétaro).

15. *Iresine cassiniaeformis* Schauer, Linnaea 19: 708. 1847.

Tamaulipas and San Luis Potosí.

Erect shrub, 1 to 1.5 meters high; leaves mostly ovate, acute or obtuse.

16. *Iresine discolor* Greenm. Proc. Amer. Acad. 33: 477. 1898.

Puebla and Oaxaca; type from Santa Catarina Canyon, Oaxaca.

Erect shrub with slender branches; leaves oval, ovate, or oblong, 2 to 7 cm. long.

17. *Iresine grandis* Standl. N. Amer. Fl. 21: 163. 1917.

Jalisco to San Luis Potosí, Veracruz, Mexico, and Michoacán; type from Las Canoas, San Luis Potosí. Guatemala.

Shrub, 1.5 to 3 meters high; leaves ovate, 6 to 13 cm. long.

18. *Iresine calea* (Ibáñez) Standl. Contr. U. S. Nat. Herb. 18: 94. 1916.

Gomphrena latifolia Mart. & Gal. Bull. Acad. Brux. 10¹: 349. 1843.

Achyranthes calea Ibáñez, Naturaleza 4: 79. 1879.

Iresine latifolia Benth. & Hook. Gen. Pl. 3: 42. 1880. Not *I. latifolia* D. Dietr. 1839.

Hebanthe mollis Hemsl. Biol. Centr. Amer. Bot. 3: 20. 1882.

Iresine laxa S. Wats. Proc. Amer. Acad. 21: 454. 1886.

Baja California to Coahuila, Tamaulipas, and Chiapas; type from Puebla. Central America.

Erect shrub, 1.5 to 6.5 meters high; leaves ovate, 4 to 10 cm. long. "Tepozán" (Tamaulipas); "amargosillo" (Michoacán, Guerrero); "pié de paolma" (Valley of Mexico, Ramírez); "tlatlancuaya," "hierba del tabardillo," "hierba de la calentura" (Puebla); "mosquitero" (El Salvador). Robelo gives one of the Mexican names as "clacancauayo" derived from the Nahuatl *tlatiancua-ye*, "which has knees," referring to the jointed stems.

Reputed to have diuretic and diaphoretic properties; decoction of the plant used in Puebla in the treatment of fevers.

34. ALLIONIACEAE. Four-o'clock Family.

REFERENCE: Standley, Allioniaceae, N. Amer. Fl. 21: 171-254. 1918.

Shrubs or trees, sometimes scandent; leaves opposite (in the genera listed here), entire; flowers small and usually inconspicuous; corolla none.

Many herbaceous representatives of the family occur in Mexico. *Bougainvillea spectabilis* Willd., a native of Brazil, is a favorite ornamental plant in Mexico. It is a tall spiny climber with alternate leaves, the small flowers being borne on large, showy, purplish red bracts. It is known in Mexico by the following names: "Azalea de guía," "bugambilla," "bugevilla," "bombilla," "bugavilea," "hernandiazéa," "camelina." Another well-known cultivated plant of the family is the four-o'clock, *Mirabilis jalapa* L., known in Mexico as "arrebolera," "maravilla," "Don Diego de noche," and "trompetilla."

Fruit bearing short-stalked glands.

Plants armed with spines; flowers in cymes-----3. **PISONIA.**

Plants unarmed; flowers in umbels.

Plants erect; stamens 6 to 11-----4. **PISONIELLA.**

Plants scandent or trailing; stamens 2 to 5-----5. **COMMICARPUS.**

Fruit without glands.

Fruit with longitudinal wings; low shrubs.....6. **SELINOCARPUS**.

Fruit not winged; trees or large shrubs.

Stamens included.....1. **NEEA**.

Stamens exserted.....2. **TORRUBIA**.

1. **NEEA**¹ Ruiz & Pav. Fl. Peruv. Chil. Prodr. 52. 1794.

Leaves sometimes verticillate; flowers dioecious; staminate perianth urceolate, 4 or 5-dentate; stamens 5 to 10; fruit ellipsoid.

Leaves coriaceous, opposite.....1. **N. choriophylla**.

Leaves membranaceous.

Leaves mostly 2 to 6 cm. wide; stamens 5.....2. **N. psychotrioides**.

Leaves less than 2 cm. wide; stamens 6.

Leaves partly verticillate, acuminate at apex.....3. **N. tenuis**.

Leaves opposite, obtuse or acutish.....4. **N. sphaerantha**.

1. **Neea choriophylla** Standl. Contr. U. S. Nat. Herb. 13: 384. 1911.

Yucatán.

Leaf blades oval to obovate-oval, 4.5 to 7 cm. long, abruptly acuminate; perianth 3 mm. long.

2. **Neea psychotrioides** Donn. Smith, Bot. Gaz. 16: 199. 1891.

Tabasco and Oaxaca. Guatemala (type from Escuintla) to Costa Rica.

Slender shrub, 2 to 3 meters high; leaves opposite or verticillate, oblong to elliptic, 8 to 15 cm. long, glabrous; perianth 4 to 8 mm. long.

3. **Neea tenuis** Standl. Contr. U. S. Nat. Herb. 13: 384. pl. 74. 1911.

Known only from the type locality, Orizaba, Veracruz.

Leaf blades elliptic-oblong or lance-elliptic, 4.4 to 5 cm. long; perianth 3 to 4 mm. long.

4. **Neea sphaerantha** Standl. Contr. U. S. Nat. Herb. 13: 384. 1911.

Known only from the type locality, Izamal, Yucatán.

Leaves oblong or oval, 1 to 2 cm. wide, glabrous; perianth 4 to 5 mm. long.

2. **TORRUBIA** Vell. Fl. Flum. 139. 1827.

Shrubs or small trees; flowers small, dioecious; fruit small, drupaceous.

Inflorescence lax, few-flowered; leaf blades oval or oblong-oval...1. **T. potosina**.

Inflorescence dense, many-flowered; leaf blades elliptic...2. **T. linearibracteata**.

1. **Torrubia potosina** Standl. Contr. U. S. Nat. Herb. 18: 99. 1916.

Known only from the type locality, Rascón, San Luis Potosí.

Leaves 5 to 10.5 cm. long, acute or acuminate.

2. **Torrubia linearibracteata** (Heimerl) Standl. Contr. U. S. Nat. Herb. 18: 100. 1916.

Pisonia linearibracteata Heimerl, Repert. Sp. Nov. Fedde 12: 221. 1913.

Yucatán; type from Chichen Itzá.

Leaves 7.5 cm. long and 4.3 cm. wide or smaller.

3. **PISONIA**² L. Sp. Pl. 1026. 1753.

Flowers small, dioecious, cymose; fruit 5-sided, puberulent, with stalked glands along the angles.

¹The genus was named in honor of Luis Née, a Frenchman by birth but a Spaniard by naturalization, who was an associate of Malaspina on his voyage around the world (1789-1794). He collected chiefly in South America, but also visited Mexico, landing at Acapulco and journeying to the capital, in company with Haenke. His collections are at Madrid.

²Named in honor of Willem Piso, a Dutch physician and naturalist, who visited Brazil in 1637.

Mature fruit 7 to 10 mm. thick-----1. *P. macranthocarpa*.

Mature fruit 3 to 4 mm. thick.

Staminate flowers yellowish green, in loose open cymes 2.5 to 6 cm. broad.

2. *P. aculeata*.

Staminate flowers dark red, in compact headlike cymes 1 to 2.2 cm. broad.

Leaf blades acute or acutish, obovate or oblong-obovate, nearly glabrous;

spines straight-----3. *P. flavescens*.

Leaf blades rounded or obtuse at apex, orbicular or rounded-obovate,

densely pubescent; spines usually recurved-----4. *P. capitata*.

1. *Pisonia macranthocarpa* Donn. Smith, Bot. Gaz. 20: 293. 1895.

Pisonia aculeata macranthocarpa Donn. Smith, Bot. Gaz. 16: 198. 1891.

Chiapas. Central America, Venezuela, and Cuba; type from Escuintla, Guatemala.

Shrub or small tree with reddish brown branches, armed with few, usually straight spines; leaves elliptic to broadly oval; flowers greenish yellow; fruit 1 to 2 cm. long.

2. *Pisonia aculeata* L. Sp. Pl. 1026. 1753.

Tamaulipas to Sinaloa and southward, chiefly along sea beaches. Southern Florida, West Indies, Central America, tropical South America, and southern Asia.

Densely branched shrub, often with a thick trunk, the branches long and drooping or subscandent, very spiny; leaves mostly 3 to 10 cm. long, variable in shape; flowers sweet-scented; fruit 9 to 12 cm. long. "Beeb" or "hbeeb" (Yucatán, Maya) "garabato" (Durango); "garabato prieto," "uña del diablo" (Michoacán, Guerrero); "coma de uña" (Tamaulipas); "uña de gato" (Tabasco, Cuba, Santo Domingo, Porto Rico); "huele de noche" (Oaxaca, Guatemala); "espino y camote" (Oaxaca or Chiapas, *Seler*); "gu-ichi-gu" (Oaxaca, *Seler*); "zarza" (Cuba); "escambrón" (Porto Rico); "espino negro" (Nicaragua).

The branches are said to be used in Jamaica for barrel hoops. A decoction of the leaves and bark is used in Yucatán, Jamaica, and elsewhere for rheumatism and venereal diseases. The glands of the fruit are extremely viscid, and in herbarium specimens they retain their viscosity indefinitely. The fruits adhere easily to the feathers of birds, sometimes in such abundance as to prevent their flying.

3. *Pisonia flavescens* Standl. Contr. U. S. Nat. Herb. 13: 389. 1911.

Extreme southern Baja California; type from San José del Cabo.

Branches slender, gray; leaves 4 to 6.5 cm. long; fruit about 1 cm. long.

4. *Pisonia capitata* (S. Wats.) Standl. Contr. U. S. Nat. Herb. 13: 388. 1911.

Cryptocarpus capitatus S. Wats. Proc. Amer. Acad. 24: 71. 1889.

In sandy soil, Sonora to Tepic; type from Guaymas, Sonora.

Densely branched shrub or small tree, sometimes 5 meters high, branched to the ground or often with a distinct trunk; leaves 2 to 6 cm. long; fruit 7 to 10 mm. long. "Bainoro prieto," "vainoro prieto," "garabato prieto" (Sinaloa); "garambullo" (Sonora, Sinaloa).

A decoction of the fruit is said to be used for fevers.

4. *PISONIELLA* (Heimerl) Standl. Contr. U. S. Nat. Herb. 13: 385. 1911.

1. *Pisoniella arborescens* (Lag. & Rodr.) Standl. Contr. U. S. Nat. Herb. 13: 385. 1911.

Boerhaavia arborescens Lag. & Rodr. Anal. Cienc. Nat. 4: 257. 1801.

Pisonia hirtella H. B. K. Nov. Gen. & Sp. 2: 217. 1818.

Pisonia mexicana Willd.; Link, Enum. Pl. 1: 354. 1821.

Boerhaavia octandra S. Wats. Proc. Amer. Acad. 26: 145. 1891.

Pisonia arborescens Kuntze, Rev. Gen. Pl. 3²: 265. 1898.

Jalisco to Veracruz and Oaxaca; type from Salvatierra, Guanajuato.

Shrub, 2 meters high or less; leaves broadly ovate or ovate-orbicular, 2.5 to 7 cm. long, obtuse or acute; flowers perfect, greenish white, 5 to 7 mm. long; fruit dry, about 1 cm. long. "Jazmincillo" (Valley of Mexico, etc.)

5. **COMMICARPUS** Standl. Contr. U. S. Nat. Herb. 12: 373. 1909.

Plants fruticose or suffrutescent, more or less scandent; flowers perfect, umbellate or verticillate, small; fruit dry, cylindric, with very viscid glands.

Perianth 3 mm. long and broad, glabrous or obscurely puberulent; glands of the fruit irregularly scattered-----1. *C. scandens*.

Perianth 7 to 8 mm. long, 10 mm. broad, short-villous or hirtellous; glands of the fruit grouped in transverse bands-----2. *C. brandegei*.

1. *Commicarpus scandens* (L.) Standl. Contr. U. S. Nat. Herb. 12: 373. 1909.

Boerhaavia scandens L. Sp. Pl. 3. 1753.

Nearly throughout Mexico, in fencerows and waste ground. Western Texas and southern Arizona; West Indies; South America; type from Jamaica.

Leaves cordate-ovate or ovate-deltoid, 1.5 to 6.5 cm. long, acute; flowers greenish yellow; fruit about 1 cm. long. "Bejuco de purgación" (Porto Rico); "sonorita" (Sinaloa).

A decoction of the roots is said to be used in Porto Rico for venereal diseases.

2. *Commicarpus brandegei* Standl. Contr. U. S. Nat. Herb. 12: 374. 1909.

Boerhaavia elongata T. S. Brandeg. Proc. Calif. Acad. II. 2: 199. 1889. Not

B. elongata Salisb. 1796.

Southern Baja California; type from San Pablo.

Plants 2 meters long or more, with whitish stems; flowers white.

6. **SELINOCARPUS** A. Gray, Amer. Journ. Sci. II. 15: 262. 1853.

Low shrubs, more or less pubescent; flowers perfect, solitary in the leaf axils.

Several herbaceous species also occur in Mexico.

Perianth 1 cm. long. Leaves linear or linear-oblong-----1. *S. angustifolius*.

Perianth 2.5 to 3.5 cm. long.

Leaves linear, 1 to 4 cm. long, obscurely glandular-puberulent or glabrous.

2. *S. palmeri*.

Leaves narrowly spatulate-oblong, 0.4 to 1.1 cm. long, densely glandular-hirtellous-----3. *S. purpusianus*.

1. *Selinocarpus angustifolius* Torr. U. S. & Mex. Bound. Bot. 170. 1859.

Coahuila. Western Texas, the type from Presidio del Norte.

Plants fruticose below, 10 to 40 cm. high; flowers often cleistogamous; fruit 5.5 to 7.5 mm. long, with 5 thin wings.

2. *Selinocarpus palmeri* Hemsl. Biol. Centr. Amer. Bot. 3: 6. 1882.

Known only from the type locality, San Lorenzo de Laguna, Coahuila.

Flowers 3.5 cm. long, the stamens long-exserted.

3. *Selinocarpus purpusianus* Heimerl, Oesterr. Bot. Zeitschr. 63: 353. 1913.

Known only from the type locality, Sierra del Rey, Coahuila.

Shrub, 10 to 20 cm. high; flowers 2.5 to 3 cm. long.

35. BATIDACEAE.**1. BATIS** L. Syst. Nat. ed. 10. 1380. 1759.**1. Batis maritima** L. Syst. Nat. ed. 10. 1380. 1759.

On seacoasts, Tamaulipas to Yucatán; Baja California and Sonora to Colima and probably to Chiapas. Widely distributed in tropical America; Hawaii.

Erect or prostrate shrub, sometimes a meter high; leaves opposite, fleshy, semiterete, 1 to 2.5 cm. long; flowers small, dioecious, in short axillary spikes. "Lechuga de mar" (Nicaragua); "barrilla" (Porto Rico).

The leaves have a salty flavor and have been eaten as a salad. In the West Indies ashes of the plant have been used in the manufacture of soap and glass. Descourtilz reports that the leaves were used in the treatment of ulcers, and that they have aperitive and diuretic properties.

36. PHYTOLACCACEAE. Pokeweed Family.

REFERENCE: Walter in Engl. Pflanzenreich IV. 83. 1909.

Shrubs or small trees; leaves alternate, entire; flowers small, perfect or unisexual; corolla usually none.

A number of herbaceous species of other genera occur in Mexico. It may be that some of the Mexican species of *Phytolacca* become shrubs, but the writer has seen no conclusive evidence to this effect.

Petals 5; aril of the seed large. Fruit a capsule, 1 to 5-seeded.

1. STEGNOSPERMA.

Petals none; aril small or none.

Ovary semi-inferior; leaves cordate. Plants scandent; fruit dry, 1-seeded.

2. AGDESTIS.

Ovary superior; leaves not cordate.

Perianth 5-parted. Fruit baccate-----**3. ACHATOCARPUS.**

Perianth 4-parted.

Pedicels ebracteolate; branches spinose-----**4. PHAULOTHAMNUS.**

Pedicels bracteolate; branches not spinose.

Fruit dry; flowers subsessile, appressed to the rachis.

5. PETIVERIA.

Fruit baccate; flowers pedicellate, not appressed.

Plants erect; stamens 4-----**6. RIVINA.**

Plants scandent; stamens 8 to many-----**7. TRICHOSTIGMA.**

1. STEGNOSPERMA Benth. Bot. Voy. Sulph. 17. 1844.**1. Stegnosperma halimifolium** Benth. Bot. Voy. Sulph. 17. 1844.

Baja California and Sonora to Oaxaca and Veracruz; type from Baja California. Guatemala and Nicaragua; Cuba, Jamaica, and Hispaniola.

Glabrous shrub, 1 to 3.5 meters high; leaves obovate or elliptic; flowers perfect, racemose, green tinged with red. "Amole" (Baja California); "bledo carbonero" (Cuba).

The powdered root is used in Baja California as a substitute for soap. The plant has the reputation of being a cure for hydrophobia. It grows at low elevations, usually near the seacoast. The flowers are borne at nearly all times of the year.

2. AGDESTIS Moc. & Sessé; DC. Reg. Veg. Syst. 1: 543. 1818.**1. Agdestis clematidea** Moc. & Sessé; DC. Reg. Veg. Syst. 1: 543. 1818.

Nuevo León to Veracruz and Oaxaca. Western Texas; Guatemala; reported from the West Indies and Brazil, but probably cultivated there.

Plants scandent, the stems mostly herbaceous; root large, turnip-shaped; leaves rounded-cordate; flowers white, showy, with a slight fetid odor, arranged in paniculate racemes. "Hierba del indio" (Tamaulipas); "tripas de Judas" (Oaxaca, *Reko*). Walter reports the name "thusch" from Mexico. Palmer states the roots weigh as much as six pounds.

3. **ACHATOCARPUS** Triana, Ann. Sci. Nat. IV. 9: 45. 1858.

Trees or shrubs; flowers small, dioecious; perianth 5-lobed; stamens 10 to 20; fruit baccate.

Leaves densely pubescent beneath.....1. **A. oaxacanus**.

Leaves glabrous.

Branchlets aculeate.....2. **A. gracilis**.

Branchlets unarmed.....3. **A. mexicanus**.

1. **Achatocarpus oaxacanus** Standl., sp. nov.

Type collected between Jamiltepec and Río Verde, Oaxaca (*Nelson* 2358; U. S. Nat. Herb. no. 569298).

Branches puberulent, armed with slender spines 6 mm. long or less; leaves short-petiolate, obovate-oblong or elliptic-oblong, 5.5 to 6.5 cm. long, 2.5 to 3.5 cm. wide, obtuse or rounded at apex, acute to attenuate at base, glabrate above, densely pubescent beneath along the costa; racemes numerous, few-flowered, 2.5 cm. long, or less, the rachis puberulent, the pedicels 1 to 2 mm. long; sepals 2 mm. long, obovate to suborbicular, rounded at apex, minutely puberulent or glabrate; fruit 3 mm. in diameter, glabrous.

2. **Achatocarpus gracilis** H. Walt. in Engl. Pflanzenreich IV. 83:137. *f.* 41. 1909.

Known only from the type locality, Petatlán, Guerrero, altitude 50 meters.

Glabrous tree with slender brown branches, armed with straight spines; leaves obovate-lanceolate, 6 cm. long, obtuse; flowers small, paniculate.

3. **Achatocarpus mexicanus** H. Walt. in Engl. Pflanzenreich IV. 83:139. 1909.

Veracruz and Chiapas; type collected between Tapana and La Junta, Chiapas.

Shrub or tree, glabrous, unarmed; leaves elliptic, 8.5 cm. long; flowers racemose.

4. **PHAULOTHAMNUS** A. Gray, Proc. Amer. Acad. 20:294. 1885.

1. **Phaulothamnus spinescens** A. Gray, Proc. Amer. Acad. 20:294. 1885.

Baja California, Sonora (type locality), and Sinaloa.

Erect glabrous shrub, 1 to 2.5 meters high, with gray branches; leaves oblanceolate, about 1.5 cm. long; flowers small, in short racemes.

5. **PETIVERIA** L. Sp. Pl. 342. 1753.

1. **Petiveria alliacea** L. Sp. Pl. 342. 1753.

Petiveria octandra L. Sp. Pl. ed. 2. 486. 1762.

Petiveria hexandria Sessé & Moc. Fl. Mex. 98. 1894.

Baja California to Jalisco, Chiapas, Yucatán, and Veracruz. Widely distributed in tropical America; type from Jamaica.

Suffrutescent, about a meter high, or often wholly herbaceous, with a strong odor of garlic; leaves ovate or elliptic, with minute stipules; flowers small, pink, white, or green, in long slender interrupted spikelike racemes. "Zorrillo" (Tabasco, Yucatán, Sinaloa, Nicaragua, Michoacán, Guerrero); "hierba de las gallinitas" (Oaxaca, Yucatán); "pay-ché," "xpay-ché" (Yucatán, Maya; "skunk-plant"); "anamú" (Cuba, Porto Rico, Panama, Colombia, Santo Domingo); "apazote de zorro" (Guatemala); "hispasina" (Guatemala); "ipacina" (Nicaragua).

Known in Jamaica as "guinea-hen weed." Probably as a result of its strong and characteristic odor, the plant has been much used in domestic medicine. It is reputed to have diuretic, sudorific, expectorant, antispasmodic, and depurative properties, and has been used as a vermifuge, emmenagogue, and abortifacient, and for toothache (the roots inserted in cavities in the teeth), fevers, rheumatism, paralysis, venereal diseases, hysteria and other nervous diseases, hydrophobia, and scorpion stings. Palmer's notes indicate that in Sinaloa the leaves are bound upon the forehead to relieve headache, and that the powdered roots are used as a snuff for nasal catarrh. It is stated that when cows eat the plant an alliaceous flavor is imparted to their milk. Descourtilz reports that in the West Indies the roots were placed among woolen goods to protect them from insects.

6. *RIVINA* L. Sp. Pl. 121. 1753.

1. *Rivina humilis* L. Sp. Pl. 121. 1753.

Rivina laevis L. Mant. Pl. 1: 41. 1767.

Nearly throughout Mexico. Widely distributed in tropical America.

Suffrutescent, up to 1 meter high, sometimes wholly herbaceous; leaves petiolate, ovate, acute or acuminate, bright green; flowers small, white or greenish, racemose; fruit a small, 1-seeded, red or orange berry. "Coral" (various localities); "coralito," "coralillo" (Durango); "hierba mora," "saca-tinta," "coralillo," "coralillo carmín" (Nicaragua); "carmín" (Colombia, Porto Rico); "ojo de ratón," "coralitos" (Cuba); "pimpín," "pinta-pinta" (Colombia); "sangre de toro" (Argentina, Uruguay); "caimancillo" (Santo Domingo).

The fruit is full of blood-red juice, which yields a red dye. The leaves are said to be used for catarrh and for treating wounds. The fruit is reported to be edible. Sometimes known as "rouge-plant."

R. portulaccoides Nutt., with slightly larger flowers, and *R. purpurascens* Schrad., with purplish flowers in long stiff racemes, are recognized by Walter as distinct species, but they do not appear to differ essentially from the common form.

7. *TRICHOSTIGMA* A. Rich. Pl. Vasc. Cub. 1: 627. 1845.

1. *Trichostigma octandrum* (L.) H. Walt. in Engl. Pflanzenreich IV. 83: 109. 1909.

Rivina octandra L. Cent. Pl. 2: 1756.

Villamilla octandra Benth. & Hook. Gen. Pl. 3: 81. 1880.

Sinaloa to Tamaulipas, Tabasco, and Chiapas. Widely distributed in tropical America.

Scandent shrub, sometimes 5 meters long; leaves elliptic or ovate, acute, petiolate; flowers small, whitish or purplish, racemose; fruit a small black 1-seeded berry. "Bejuco de paloma" (Porto Rico); "guacamayo" (Colombia); "sotacaballo" (Costa Rica); "bejuco canasta," "guaniquí" (Cuba); "pabelón del rey" (Santa Domingo).

The leaves have been used in Colombia for the treatment of wounds, and the stems in Jamaica for barrel hoops.

37. *PORTULACACEAE*. *Portulaca* Family.

Some of the species of *Talinum* should perhaps be classed as shrubs.

1. *TALINOPSIS* A. Gray, Pl. Wright. 1: 14. 1852.

1. *Talinopsis frutescens* A. Gray, Pl. Wright. 1: 15. pl. 3. 1852.

Chihuahua to San Luis Potosí and Puebla. Western Texas (type locality) and southern New Mexico.

Brittle erect shrub, 60 cm. high or less; leaves opposite, linear, fleshy; flowers in terminal cymes; fruit a capsule.

38. RANUNCULACEAE. Buttercup Family.

Many herbaceous representatives of the family occur in Mexico.

1. CLEMATIS L. Sp. Pl. 543. 1753.

Scandent shrubs; leaves opposite, pinnate; flowers often showy; fruit of achenes, each with a long hairy tail.

Several Asiatic species of *Clematis* are frequent in cultivation as ornamental vines, and some of them are grown in Mexico. Ramírez reports the name "sacamecate" as used in Hidalgo for some unidentified native species.

Flowers solitary; sepals erect, purplish-----1. *C. pitcheri*.

Flowers paniculate; sepals spreading, white.

Flowers polygamo-dioecious, the staminate and pistillate borne upon the same plant.

Leaflets 3, mostly 4.5 to 9 cm. long, long-acuminate-----2. *C. pubescens*.

Leaflets normally 5 or 7, usually less than 3.5 cm. long, obtuse or acutish.

3. *C. pauciflora*.

Flowers dioecious.

Leaflets all or partly 3-lobed or parted-----4. *C. drummondii*.

Leaflets entire or dentate or very shallowly-lobed.

Leaflets entire, very densely yellow-sericeous-----5. *C. rufa*.

Leaflets entire or dentate, if entire, never densely sericeous.

Leaflets entire or with a few narrow acute teeth, glabrous or thinly sericeous beneath, usually rounded at base-----6. *C. dioica*.

Leaflets with few or numerous broad, obtuse or rounded teeth, often densely sericeous or pilose beneath, frequently cordate at base.

Leaflets large, mostly 6 to 10 cm. long, usually densely pilose or sericeous beneath-----7. *C. grossa*.

Leaflets mostly less than 4 cm. long, thinly sericeous or glabrate beneath-----8. *C. ligusticifolia*.

1. *Clematis pitcheri* Torr. & Gray, Fl. N. Amer. 1: 10. 1839.

Clematis filifera Benth. Pl. Hartw. 285. 1848.

Clematis filifera incisa Hemsl. Biol. Centr. Amer. Bot. 1: 2. 1879.

Clematis pitcheri filifera Robinson in A. Gray, Syn. Fl. 1¹: 6. 1895.

Viorna pitcheri Britton in Britt. & Brown, Illustr. Fl. ed. 2. 2: 123. 1913.

Coahuila to Sinaloa and Hidalgo. Texas to Nebraska and Indiana.

Shrub with reddish stems, sparsely pubescent; leaflets ovate, with prominent veins, acute or acutish; flowers about 2.5 cm. long, with thick leathery sepals.

"Barba de viejo" (Sinaloa).

The specimens are somewhat variable, but apparently they represent a single species. This plant is reported by Sessé and Mociño¹ as *Clematis viorna*, a species native of the eastern United States.

2. *Clematis pubescens* Benth. Pl. Hartw. 5. 1839.

Guanajuato (type locality) to Oaxaca.

Leaflets 5 to 9 cm. long, long-acuminate, sparsely dentate or entire; sepals about 8 mm. long.

3. *Clematis pauciflora* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 9. 1838.

Baja California; reported from Sonora. California.

Plants nearly glabrous; sepals about 2 cm. long; achenes glabrous.

A specimen from western Chihuahua probably belongs here also.

¹ Pl. Nov. Hisp. ed. 2. 85. 1893.

4. *Clematis drummondii* Torr. & Gray, Fl. N. Amer. 1: 9. 1838.*Clematis nervata* Benth. Pl. Hartw. 5. 1839.

Tamaulipas and San Luis Potosí to Baja California and Sinaloa. Texas (type locality) to Arizona.

Plants copiously pubescent, scandent over other shrubs; leaflets usually small and narrow, rarely over 3 cm. long, attenuate, usually deeply lobed; sepals 8 to 14 mm. long, white. "Barba de chivo" (Chihuahua, Coahuila, Zacatecas, Tamaulipas, etc.); "hierba de los avaros" (San Luis Potosí, *Safford*).

Very variable in pubescence and leaf form, but none of the forms seem specifically distinct.

5. *Clematis rufa* Rose, Contr. U. S. Nat. Herb. 10: 95. 1906.

Known only from the type locality, between Tenejapa and Yatalón, Chiapas.

The plant differs from *C. grossa* only in its entire leaflets, and additional material is necessary to determine its claim to specific rank. This and the following species are very closely related, and it is probable that they are all forms of a single one, *C. dioica*.6. *Clematis dioica* L. Syst. Nat. ed. 10. 1084. 1759.*Clematis americana* Mill. Gard. Dict. ed. 8. *Clematis* no. 14. 1768.*Clematis acapulcensis* Hook. & Arn. Bot. Beechey Voy. 410. 1841.*Clematis grahami* Benth. Pl. Hartw. 5. 1839.

San Luis Potosí to Sinaloa, Chiapas, and Yucatán. West Indies, Central America, and South America.

Very variable in pubescence and shape of the leaflets; flowers often in large showy panicles; fruit conspicuous because of the feathery tails, these 3 to 6 cm. long. "Cabeza de vieja" (Chiapas); "barba de viejo" (Tabasco, Michoacán, Valley of Mexico, Costa Rica, Guatemala, Nicaragua); "barbas de chivo" (Michoacán, etc.); "barba de chivato" (Nuevo León); "barbas de gato" (Mexico); "chilillo" (Michoacán); "chilillo de cerro" (Hidalgo); "cabellos de ángel" (Guatemala, Costa Rica, Cuba, Porto Rico); "crespillo" (Nicaragua).

Known in Jamaica as "virgin's-bower" and "traveler's joy." The stems contain a coarse fiber and are used occasionally as a substitute for twine. The leaves of this and other species have an acrid flavor; crushed and applied to the skin they are rubefacient and finally vesicant, and because of this property they are used in domestic medicine. The dried leaves lose their acrid properties. An ointment made with the leaves is used for cutaneous diseases. An infusion of the flowers and leaves is employed as a cosmetic, for removing freckles and other blemishes from the skin. The plant is said to be poisonous to cattle, and the root to have purgative properties.

In spite of the variability exhibited, it seems impossible to divide the ample material at hand into groups characterized by any constant or important character. Specimens referred by Hemsley to *C. flammulastrum* Griseb. belong here, as well as material referred to *C. caripensis* H. B. K. and *C. sericea* H. B. K.*Clematis dioica* or a closely related species is figured and described by Hernández¹ under the heading, "De *Cocoztamatl*, seu luteo *tamatli*, *Urinaria mirabili*." His account, in part, is as follows:"Cocoztamatl, which some call *Cocoztic*, *Cocoztin*, or *Cocoztli*, is a climbing shrub, having a thick pale root, whence the name. The stems are smooth, slender, and round; the leaves sinuous and divided into three points. The flowers are white, of moderate size, very like those of *Izquioxochitl*, and from them there spring berries, not unlike cherries, but white in color. The root is pale and¹Thesaurus 118. 1651.

inodorous, its taste slimy, of moderate temper or slightly inclined to coldness and humidity. It is a wonderful diuretic, expels phlegm, and removes all urinary obstructions."

The name "cocoztamatl" ("yellow tomato," of no application to the plant) is doubtless incorrect, and should be rather "cocotemecatl" ("pungent-vine"), as is indicated by Hernández's second account¹ of the plant, which also is accompanied by a figure. The description of the fruit, of course, is erroneous. The second account is headed "De Cocotemecatl, seu fune volubili acri," and is as follows:

"*Cocotemecatl*, which some call *Cocotemecaxihuitl*, is an herb with leaves like those of basil [*Ocimum*], but much larger, angled, and crenate. The stem is purplish and climbing; the flowers are small, borne on the ends of hairy branchlets, and they change into purplish white pappus; the roots are fibrous. It grows at Yacapichtlan and Quauhquechollan, in hot and rocky places. The leaves, which are glutinous, if crushed and taken in the quantity of a handful, cure dysentery. The root and stems are hot and dry in the fourth degree; they are a remedy for ringworm and, if taken in a dose of two drachms, calm pains in the stomach and colic; they are diuretic, aid parturition, cure those affections which arise from cold, and allay pains caused by wind."

7. *Clematis grossa* Benth. Pl. Hartw. 33. 1840.

Clematis rhodocarpa Rose, Contr. U. S. Nat. Herb. 10: 95. 1906.

Tamaulipas to Tepic and Chiapas; type from San Bartolo. Central America.

Closely related to *C. dioica*, but apparently distinct, but perhaps not essentially different from *C. sericea* H. B. K., to which specimens have been referred; leaflets usually with numerous large coarse teeth. "Chilillo" (Mexico, Veracruz); "barba de vejo" (Oaxaca, Guatemala); "barba de chivo" (Oaxaca, Veracruz).

Roots said to be used as a remedy for distemper in horses.

8. *Clematis ligusticifolia* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 9. 1838.

Northern Chihuahua and Sonora. Western United States; type from the Rocky Mountains.

Leaflets usually 5 or 7; achenes densely sericeous.

C. neomexicana Woot. & Standl.,² described from the San Luis Mountains, on the border between Sonora and New Mexico, is probably not essentially different.

39. BERBERIDACEAE. Barberry Family.

1. *ODOSTEMON* Raf. Amer. Month. Mag. 192. 1817.

REFERENCE: Fedde, Bot. Jahrb. Engler 31: 30-133. 1901.

Shrubs or small trees with yellow wood; leaves alternate, estipulate, pinnate, the leaflets 3 to many, usually dentate, the teeth often spine-tipped; flowers yellow, perfect, racemose; fruit a berry, with few seeds.

The wood is used in Mexico to give a yellow dye. The roots of *O. aquifolium* (Pursh) Rydb. (*Berberis aquifolium* Pursh), a species native of the western United States, but closely related to some of the Mexican ones, are official in the U. S. Pharmacopoeia. They are bitter and contain the alkaloids berberine, oxyacanthine, and berbamine. Both the fruit and roots have been recommended as possessing alterative, laxative, tonic, and diuretic properties. They are employed in syphilitic and scrofulous affections, chronic cutaneous diseases, convalescence from fevers, etc. This plant is known in the United States as Oregon grape; it is the state flower of Oregon.

¹ Thesaurus 141. 1651.

² Contr. U. S. Nat. Herb. 16: 122. 1913.

Leaflets 3, the terminal one sessile.

Leaflets green, merely coriaceous, dentate.....18. *O. eutriphyllus*.

Leaflets pale, rigid-coriaceous, deeply lobed.....13. *O. trifoliolatus*.

Leaflets usually more than 3, if 3 the terminal leaflet petiolulate.

Flowers paniculate or in elongate long-pedunculate racemes.

Leaflets entire.

Inflorescence paniculate.....1. *O. ehrenbergii*.

Inflorescence racemose.

Leaflets acute.....4. *O. tenuifolius*.

Leaflets rounded or very obtuse at the apex.

Pedicels 3 to 5 mm. long; leaflets green.....2. *O. chochoco*.

Pedicels 15 to 20 mm. long; leaflets very pale, especially beneath.

3. *O. longipes*.

Leaflets dentate.

Leaflets narrowly lanceolate, mostly 8 to 12 cm. long.....5. *O. lanceolatus*.

Leaflets ovate or oval, usually much less than 8 cm. long.

Lateral leaflets 2 pairs.....6. *O. quinquefolius*.

Lateral leaflets 3 to 6 pairs.

Leaflets acute or acutish.

Teeth of the leaflets small, appressed; leaflets subcoriaceous.

7. *O. hartwegii*.

Teeth of the leaflets large, spreading; leaflets coriaceous.

8. *O. ilicinus*.

Leaflets rounded or very obtuse at the apex.

Flowers racemose.....9. *O. andrieuxii*.

Flowers paniculate.

Leaflets subsessile, remote.....10. *O. pallidus*.

Leaflets evidently petiolulate, the margins overlapping.

Leaflets 4 to 5 cm. long, 2 to 3 cm. wide.....11. *O. zimapanus*.

Leaflets 5 to 11 cm. long, 3 to 9 cm. wide.....12. *O. paxii*.

Flowers in short, sessile or short-pedunculate racemes.

Leaflets very rigid, pale on both surfaces, with large stiff teeth.

14. *O. fremontii*.

Leaflets merely coriaceous, deep green on one or both surfaces.

Leaflets entire or with few appressed teeth.....15. *O. gracilis*.

Leaflets with numerous spreading teeth.

Leaflets 1 to 2 cm. long, 0.7 to 1 cm. wide.....16. *O. angustifolius*.

Leaflets 3 to 8 cm. long, 1 to 4 cm. wide.

Leaflets ovate-lanceolate or lanceolate.....17. *O. incertus*.

Leaflets ovate to broadly oval.

Leaflets usually 5.....19. *O. trifolius*.

Leaflets 7 to 11 in all or most of the leaves.

Leaflets much longer than broad, mostly 1 to 1.5 cm. wide, with numerous small teeth.....20. *O. fascicularis*.

Leaflets little longer than broad, 2.5 to 4 cm. wide, with few large teeth.....21. *O. wilcoxii*.

1. *Odostemon ehrenbergii*¹ (Kunze) Standl.

Berberis ehrenbergii Kunze, *Linnaea* 20: 45. 1847.

Mahonia ehrenbergii Fedde, *Bot. Jahrb. Engler* 31: 106. 1901.

¹ Carl August Ehrenberg (1801–1849) spent 10 years (1831–1840) in Mexico in Oaxaca, Puebla, Mexico, Hidalgo, San Luis Potosí, and other states. He was especially interested in Cactaceae, many species of which he introduced into cultivation in Europe. His collections consisted of about 2,000 numbers.

Grown from seeds from southern Mexico, probably from Veracruz; not known in the wild state.

Leaflets 7 to 15, ovate, obtuse, entire; flowers whitish, in lax racemes.

2. *Odostemon chochoco* (Schlecht.) Standl. Proc. Biol. Soc. Washington 31: 133. 1918.

Berberis chochoco Schlecht. Bot. Zeit. 12: 652. 1854.

Mahonia chochoco Fedde, Bot. Jahrb. Engler 31: 103. 1901.

Nuevo León, San Luis Potosí, and Veracruz; type from Chococala.

Tree, 6 to 9 meters high; leaflets oval or oblong, 3.5 to 5.5 cm. long, lustrous, with conspicuous venation; fruit blue. "Chochoco," "palo amarillo."

Wood used for tanning and dyeing.

3. *Odostemon longipes* Standl. Proc. Biol. Soc. Washington 31: 133. 1918.

Known only from the type locality, San Ramón, Durango.

Tree, 7.5 to 9 meters high, with a trunk 60 cm. or less in diameter, and a large crown; leaflets 11 or 13, oblong, 3.5 to 5.5 cm. long; fruit blue, edible. "Palo amarillo."

4. *Odostemon tenuifolius* (Lindl.) Standl.

Berberis tenuifolia Lindl. Bot. Reg. Misc. 24. 1838.

Mahonia tenuifolia Loud.; Steud. Nom. Bot. ed. 2. 1: 197. 1840.

Berberis fraxinifolia Hook. Icon. Pl. pl. 329, 330. 1841.

Veracruz; type from Zacuapan.

Shrub, 3 meters high; leaflets oblong-lanceolate, 4.5 to 10 cm. long, bright green; flowers in very long racemes.

5. *Odostemon lanceolatus* (Benth.) Standl.

Berberis lanceolata Benth. Pl. Hartw. 34. 1840.

Mahonia lanceolata Fedde, Bot. Jahrb. Engler 31: 92. 1901.

Hidalgo; type from Apulco; perhaps also in Oaxaca.

Shrub, 1 to 2 meters high; leaflets 11 to 17, spine-toothed; fruit blue.

6. *Odostemon quinquefolius* Standl. Proc. Biol. Soc. Washington 31: 133. 1918.

Puebla; type from Cerro Matzize, near San Luis Tlutilanapa.

Large glabrous shrub; leaflets 5, oblong-ovate or ovate-oval, 3 to 5.3 cm. long; racemes 7 to 11 cm. long.

7. *Odostemon hartwegii* (Benth.) Standl.

Berberis hartwegii Benth. Pl. Hartw. 34. 1840.

Mahonia hartwegii Fedde, Bot. Jahrb. Engler 31: 109. 1901.

Known only from the type locality, Contadero, Hidalgo.

Leaflets 11 to 15, ovate-lanceolate, acuminate; racemes 30 cm. long.

8. *Odostemon ilicinus* (Schlecht.) Standl.

Mahonia ilicina Schlecht. Linnaea 10: 236. 1835.

Berberis ilicina Hemsl. Biol. Centr. Amer. Bot. 1: 23. 1879.

Veracruz and Hidalgo; type from plains between Guantololalpa and Tlachichilco, Veracruz.

Shrub, 0.5 to 3 meters high; leaflets 11 to 15.

9. *Odostemon andrieuxii*¹ (Hook. & Arn.) Standl.

Berberis andrieuxii Hook. & Arn. Bot. Beechey Voy. 318. 1841.

Mahonia andrieuxii Fedde, Bot. Jahrb. Engler 31: 103. 1901.

Known only from the original collection, from somewhere in southern Mexico.

¹ G. Andrieux, concerning whom no accurate data are available, collected in the states of Oaxaca, Puebla, and Mexico about 1834. His collections were distributed to various European herbaria.

10. *Odostemon pallidus* (Hartw.) Standl.*Berberis pallida* Hartw.; Benth. Pl. Hartw. 34. 1840.*Mahonia pallida* Fedde, Bot. Jahrb. Engler 31: 109. 1901.

Hidalgo to Oaxaca; type from Cardonal, Hidalgo.

Shrub or small tree, 2 to 6 meters high; leaflets 9 to 13, oval, 3 to 6.5 cm. long, rounded or obtuse at the apex, pale beneath; panicles 15 to 25 cm. long. "Palo amarillo."

11. *Odostemon zimapanus* (Fedde) Standl.*Mahonia zimapana* Fedde, Bot. Jahrb. Engler 31: 111. 1901.

Hidalgo and Mexico; type from Las Verdosas, near Zimapán, Hidalgo.

12. *Odostemon paxii* (Fedde) Standl.*Mahonia paxii* Fedde, Bot. Jahrb. Engler 31: 113. 1901.

Known only from the type locality, between Zimapán and Encarnación, Hidalgo.

13. *Odostemon trifoliolatus* (Moric.) Heller, Muhlenbergia 7: 139. 1912.*Berberis trifoliolata* Moric. Pl. Amer. Rar. 113. pl. 69. 1841.*Berberis ilicifolia* Scheele, Linnaea 21: 591. 1848.*Mahonia trifoliolata* Fedde, Bot. Jahrb. Engler 31: 96. 1901.

Chihuahua and Coahuila to San Luis Potosí. Western Texas (type locality) and southern New Mexico.

Shrub, 1 to 4.5 meters high; leaflets mostly 3 to 5 cm. long, very thick and rigid, pale, especially beneath, with large spiny lobes or teeth; fruit red. "Agritos" (Coahuila, Nuevo León, Texas); "agrillo" (San Luis Potosí, Safford); "palo amarillo" (Chihuahua, Nuevo León, Durango).

In Texas and New Mexico the name "agrito" is corrupted into "agarita" or even "algerita."

The wood is sometimes used for tanning and for making ink. Like that of other species, it yields a yellow dye. The acid fruit is utilized for jelly, preserves, and tarts, and wine has been made from it. The roasted seeds are said to have been used as a coffee substitute. A decoction of the root is reported to be employed in Texas as a remedy for toothache. The flowers are said to supply bees with a good quality of honey.

This is presumably the species to which Berlandier¹ gives the name *Chryso-dendron tinctoria*, a new genus which, however, is not technically described. He states that the plant is known in Tamaulipas as "palo amarillo," and is used by the Indians to dye deerskins and cotton goods.

14. *Odostemon fremontii* (Torr.) Rydb. Bull. Torrey Club 33: 141. 1906.*Berberis fremontii* Torr. U. S. & Mex. Bound. Bot. 30. 1859.*Mahonia fremontii* Fedde, Bot. Jahrb. Engler 31: 98. 1901.

Sonora and Baja California. New Mexico to southern Utah (type locality) and California.

Shrub, 2 to 4 meters high, often forming dense rounded clumps; leaflets usually 5, about 2 cm. long, very spiny; fruit reddish, nearly dry.

A specimen collected by Pringle in Sonora is referred by Fedde to *O. haematocarpus* (Wooton) Heller.² This and *O. fremontii* are not very sharply differentiated. It seems better to the present writer to refer all the Mexican

¹ In Diario de viage de la Comisión de Límites que puso el Gobierno de la República bajo la dirección del Exmo. Sr. general de división D. Manuel de Mier y Teran. Mexico, 1850. The name appears on p. 170.

² Muhlenbergia 7: 129. 1912. *Berberis haematocarpa* Wooton, Bull. Torrey Club 25: 304. 1898; type from New Mexico.

material to the latter species. One of the Baja California specimens seems to be intermediate between the two species.

15. *Odostemon gracilis* (Hartw.) Standl.

Berberis gracilis Hartw.; Benth. Pl. Hartw. 34. 1840.

Mahonia subintegrifolia Fedde, Bot. Jahrb. Engler 31: 94. 1901.

Mahonia gracilis Fedde, Bot. Jahrb. Engler 31: 95. 1901.

Nuevo León to Oaxaca; type from Zimapán, Hidalgo.

Shrub, 1 to 1.5 meters high; leaflets 5 or 7, ovate, 3 to 5 cm. long, acute; fruit blue. "Palo amarillo" (Mexico).

16. *Odostemon angustifolius* (Hartw.) Standl.

Berberis angustifolia Hartw.; Benth. Pl. Hartw. 34. 1840.

Mahonia angustifolia Fedde, Bot. Jahrb. Engler 31: 91. 1901.

Known only from the type locality, between Actopan and Pachuca, Hidalgo.

Shrub, about 4 meters high; leaflets 5 to 9, oblong-lanceolate; fruit purple, sweet.

17. *Odostemon incertus* (Fedde) Standl.

Mahonia incerta Fedde, Bot. Jahrb. Engler 31: 93. 1901.

Known only from the type locality, between Real del Monte and Atotonilco El Chico, Hidalgo.

18. *Odostemon eutriphyllus* (Fedde) Standl.

Mahonia eutriphylla Fedde, Bot. Jahrb. Engler 31: 91. 1901.

Coahuila to Mexico; type from La Encarnación.

Low shrub; leaflets oval or broader, 2 to 3 cm. long, very spiny.

A specimen from Ixtaccihuatl was collected on rocks above timber line at an altitude of 3,900 meters. It is possible that the material referred here represents more than a single species. Palmer's no. 14, from Coahuila, is referred to *O. schiedeana* by Fedde, but the specimen of this collection in the National Herbarium is certainly not that species. Probably two different plants were distributed under the same number.

19. *Odostemon trifolius* (Cham. & Schlecht.) Standl.

Berberis trifolia Cham. & Schlecht. Linnaea 5: 211. 1830.

Mahonia trifolia Roem. & Schult. Syst. Veg. 7: 1616. 1830.

Berberis schiedeana Schlecht. Bot. Zeit. 12: 654. 1854.

Mahonia schiedeana Fedde, Bot. Jahrb. Engler 31: 90. 1901.

Hidalgo and Mexico; type from the plains between Guantotalapa and Tlachichilco (Veracruz?).

Low shrub, sometimes prostrate; ascending in the Sierra de las Cruces to 3,600 meters; leaflets oval, 2 to 3 cm. long, very spiny; fruit blue.

20. *Odostemon fascicularis* (DC.) Abrams, Bull. N. Y. Bot. Gard. 6: 360. 1910.

Berberis pinnata Lag. Elench. Hort. Madr. 6. 1803, nomen nudum.

Mahonia fascicularis DC. Reg. Veg. Syst. 2: 19. 1821.

Berberis moranensis Roem. & Schult. Syst. Veg. 7: 17. 1829.

Mahonia pinnata Fedde, Bot. Jahrb. Engler 31: 86. 1901.

Mahonia pinnata cachira Fedde, Bot. Jahrb. Engler 31: 88. 1901.

Veracruz to Guanajuato, Michoacán, and Oaxaca. Guatemala; California, the type from Monterey.

Shrub, 1 to 3.5 meters high; leaflets with small spiny teeth. The following names are reported, but probably at least some of them apply to other species: "Retamilla," "xoxoco" (Mexico); "palo jarilla" (Valley of Mexico); "cachisdá" (Hidalgo, Mexico, Guanajuato); "camisdá" (Hidalgo, Veracruz); "quisquirindin," "quisquiringuin" (Hidalgo, Distrito Federal); "palo amarillo"; "leña amarilla"; "palo de teñir"; "yagabuxe" (Oaxaca).

The fruit is rather sweet and edible; it and the bark are used in domestic medicine.

21. *Odostemon wilcoxii* (Kearney) Heller, *Muhlenbergia* 7: 139. 1912.

Berberis wilcoxii Kearney, *Trans. N. Y. Acad.* 14: 29. 1894.

Northern Sonora. Southern Arizona and New Mexico; type from Fort Huachuca, Arizona.

Low shrub; leaflets 3 to 5 cm. long, lustrous; fruit blue.

This is referred by Fedde to *O. dictyotus* (Jepson) Abrams,¹ and may not be specifically distant from that California plant.

40. MENISPERMACEAE. Moonseed Family.

Shrubs, usually scandent; leaves alternate, estipulate, petiolate, entire or lobate; flowers small, dioecious, cymose, the cymes racemose or paniculate; petals and sepals usually 6 each; stamens as many as the petals and opposite them.

Endosperm none; leaves thick-coriaceous, glabrous-----1. **HYPERBAENA.**

Endosperm present; leaves never thick-coriaceous.

Carpel 1; bracts of the inflorescence large, leaflike; stamens connate. Leaves usually peltate-----2. **CISSAMPELOS.**

Carpels usually 3; bracts of the inflorescence small; stamens free.

Leaves not peltate; sepals and petals subequal-----3. **CEBATHA.**

Leaves peltate; sepals and petals unequal-----4. **MENISPERMUM.**

1. **HYPERBAENA** Miers, *Ann. Sci. Nat.* II. 7: 44. 1851.

REFERENCE: Diels in *Engl. Pflanzenreich* IV. 94: 198-203. 1910.

1. *Hyperbaena mexicana* Miers, *Ann. Sci. Nat.* III. 19: 94. 1867.

Known only from the original collection from somewhere in Mexico.

Scandent shrub, nearly glabrous; leaves oblanceolate-oblong, 10 to 12 cm. long, acuminate, entire.

2. **CISSAMPELOS** L. *Sp. Pl.* 1031. 1753.

REFERENCE: Diels in *Engl. Pflanzenreich* IV. 94: 283-306. 1910.

1. *Cissampelos pareira* L. *Sp. Pl.* 1031. 1753.

Cissampelos caapeba L. *Sp. Pl.* 1032. 1753.

Cissampelos tomentosa DC. *Reg. Veg. Syst.* 1: 535. 1818.

Cissampelos acuminata Benth. *Pl. Hartw.* 445. 1840. Not *C. acuminata* DC. 1818.

Cissampelos benthamiana Miers, *Ann. Nat. Hist.* III. 17: 144. 1866.

Tamaulipas to Sonora, Chiapas, and Yucatán. Distributed almost throughout the tropics of the world.

Scandent shrub, usually densely pubescent, the hairs somewhat stinging; leaves orbicular, reniform, or cordate; bracts of the pistillate inflorescence similar to the leaves but smaller; flowers very small, greenish white; fruit a red or orange drupe. "Oreja de ratón" (Michoacán, Guerrero); "butua" (Colima, Guerrero, Veracruz); "pareira brava" (Veracruz, Oaxaca); "iztac-coanenepilli" (*Nueva Farmacopea Mexicana*); "bejuco azul," "venadero" (Costa Rica); "picamano" (Nicaragua); "bejuco de mono" (Porto Rico); "alcotán" (Guatemala, El Salvador); "bejuco de alcotán" (El Salvador);

¹ *Bull. N. Y. Bot. Gard.* 6: 360. 1910. *Berberis dictyota* Jepson, *Bull. Torrey Club* 18: 319. 1891.

"cotán" (Guatemala); "hierba ratón" (Venezuela); "tomatillo de sabana" (Cuba).

The roots are hard, tortuous, brown, and rugose, with a bitter flavor. They are said to have diuretic, emmenagogue, febrifuge, and expectorant properties, and are used in treating urinary and venereal diseases. The plant also has a great reputation throughout tropical America as a remedy for the bites of venomous snakes. It has been confused with the "pareira brava" of commerce, which is furnished by a South American plant (*Chondodendron tomentosum* Ruiz & Pavón) of the same family, and is used sometimes as an adulterant of that drug. The leaves are said to be employed as a poultice for treating wounds. The name "velvet-leaf" is applied to the plant in Jamaica. The leaves have been suspected to be poisonous to cattle.

3. **CEBATHA** Forsk. Fl. Aegypt. Arab. 172. 1775.

REFERENCE: Diels in Engl. Pflanzenreich IV. 94: 227-241. 1910.

Slender scandent shrubs; leaves thin, entire or shallowly lobate; petals 6; stamens 6 to 9; fruit a drupe.

Leaves densely pilose beneath, those of the flowering branches broadly ovate or ovate-deltoid-----1. *C. carolina*.

Leaves glabrous or glabrate beneath, those of the flowering branches usually lance-linear to elliptic-oblong-----2. *C. diversifolia*.

1. *Cebatha carolina* (L.) Britton, Mem. Torrey Club 5: 162. 1891.

Menispermum carolinum L. Sp. Pl. 340. 1753.

Cocculus carolinus DC. Reg. Veg. Syst. 1: 524. 1818.

Tamaulipas. Eastern United States; type from Carolina.

Plants copiously pubescent; leaves 3.5 to 6.5 cm. wide, obtuse or rounded at apex, pale beneath; flowers cream-colored; fruit red, edible. "Hierba del ojo" (Tamaulipas).

2. *Cebatha diversifolia* (DC.) Kuntze, Rev. Gen. Pl. 1: 9. 1891.

Cocculus diversifolius DC. Reg. Veg. Syst. 1: 523. 1818.

Cocculus oblongifolius DC. Reg. Veg. Syst. 1: 529. 1818.

Tamaulipas to Sonora and Oaxaca; described from one of Mociño and Sessé's drawings. Western Texas and southern Arizona.

Climbing over shrubs and fences; leaves extremely variable, ranging from linear to broadly ovate, entire or lobate; fruit dark purple.

4. **MENISPERMUM** L. Sp. Pl. 340. 1753.

1. *Menispermum canadense* L. Sp. Pl. 340. 1753.

Menispermum mexicanum Rose, Contr. U. S. Nat. Herb. 13: 302. 1911.

Mountains of Nuevo León. Eastern and southern United States.

Slender pubescent vine; leaves long-petiolate, the blades nearly orbicular, 5 to 20 cm. wide, angulate or shallowly lobed, sometimes entire, pale beneath; stamens 10 to 20; fruit dark blue, about 1 cm. wide.

The roots of moonseed have been used in the United States in domestic medicine as a tonic and for venereal diseases. They contain an alkaloid, menispine, and were formerly official as a substitute for sarsaparilla.

41. **MAGNOLIACEAE.** Magnolia Family.

Trees or shrubs; leaves alternate, stipulate or estipulate, entire; flowers perfect, often large and showy, solitary or fasciculate; sepals 2 to 6; petals 6 to many; stamens numerous; fruit of few or numerous carpels.

Stipules large, deciduous; flowers large, 5 to 10 cm. long; carpels of the fruit imbricate in numerous series.

- Carpels bivalvate at maturity; petals comparatively thin---1. **MAGNOLIA**.
 Carpels indehiscent; petals thick and leathery-----2. **TALAUMA**.
 Stipules none; flowers less than 3 cm. long; carpels verticillate in a single series.
 Leaves glaucous beneath; carpels indehiscent; sepals valvate---3. **DRIMYS**.
 Leaves green beneath; carpels dehiscent; sepals imbricate----4. **ILLICIUM**.

1. **MAGNOLIA** L. Sp. Pl. 535. 1753.

Large trees; leaves petiolate, persistent or deciduous; flowers large, white, solitary; sepals 3; petals 6 to 12; fruit conelike.

Most of the species of magnolias have very showy flowers, and many are in cultivation. *Magnolia grandiflora* L., the bull bay of the southeastern United States, with handsome evergreen leaves, is said to be cultivated in Mexico and to be known as "magnolia" and "Semíramis."

Leaves persistent, the blades rounded to acute at base, green beneath.

1. **M. schiedeana**.

Leaves deciduous, the blades cordate at base, white beneath----2 **M. dealbata**.

1. **Magnolia schiedeana** Schlecht. Bot. Zeit. 1864: 144. 1864.

Veracruz to Tepic and Sinaloa.

Large tree; leaves oval or elliptic, 12 to 17 cm. long, acute, glabrous, with very prominent, finely reticulate venation; flowers creamy white, the petals about 6 cm. long. "Corpus" (Tepic, *Rose*).

Rose reports that a decoction of the flowers is used in Tepic as a remedy for scorpion stings.

2. **Magnolia dealbata** Zucc. Abh. Bayer. Akad. 2: 373. pl. 3, 4. 1836.

Veracruz and Oaxaca; type collected in forests near Rincón, at an altitude of 600 to 900 meters.

Tree, 4.5 to 5.5 meters high (according to Zuccarini); leaves obovate-oval, 30 to 50 cm. long or larger, green on the upper surface, white beneath, obtuse or acutish at apex; flowers yellowish white, fragrant, 30 to 40 cm. broad; seeds covered with a fleshy orange aril. "Elosúchil" (Oaxaca; from the Nahuatl, *elotl*, a green ear of corn with husk, and *xochitl*, flower).

A relative of *M. macrophylla* Michx., of the southeastern United States, and perhaps not distinct from it. Reported from Mexico by Sessé and Mociño¹ as *M. tripetala*, a species confined to the southeastern United States.

2. **TALAUMA** Juss. Gen. Pl. 281. 1789.

1. **Talauma mexicana** (DC.) Don, Hist. Dichl. Pl. 1: 851. 1831.

Magnolia mexicana DC. Reg. Veg. Syst. 1: 451. 1818.

Talauma macrocarpa Zucc. Abh. Bayer. Akad. 2: 369. pl. 1, 2. 1836.

Mountains of Veracruz, Oaxaca, Mexico, and Morelos.

A large tree, sometimes 30 meters high, with a trunk 1.2 to 1.5 meters in diameter; leaves persistent, oval or elliptic, 12 to 25 cm. long or larger, acute, lustrous, reticulate-veined; flowers large, white, sweet-scented, the petals and sepals very thick and leathery, often tinged with purple; sepals 3; seeds surrounded by a fleshy red aril, hanging by a white threadlike funicle. "Flor de corazón" (Oaxaca, Veracruz, Morelos); "hualhua" (Veracruz, Morelos); "yoloxochitl" (Nahuatl); "hierba de las mataduras" (Morelos, Mexico, *Ramírez*); "laurel tulipán" (Morelos); "guielachi" (Oaxaca, Zapotec, *Reko*).

This is one of the best-known of Mexican trees. It was highly esteemed by the early inhabitants because of the sweet odor of the blossoms, a single flower being sufficient to perfume a whole house. The tree was cultivated in gardens, and the flowers were reserved for the exclusive use of the nobility. The plant

¹ Fl. Mex. 145. 1894.

was valued also for its reputed medicinal properties, and it still finds use in domestic medicine. The bark is employed for fevers, and is said also to have an effect upon the heart similar to that of digitalis. A decoction of the flowers is administered for epilepsy, paralysis, and various heart affections, and as a tonic. The plant, upon analysis, is said to yield a glucoside which dissolves the blood corpuscles.¹

The Nahuatl name, "yoloxochitl," signifies "heart-flower," an allusion to the shape of the unopened flower buds. Robelo gives "chipagua" as one of the vernacular names—a derivative of the Nahuatl *chipahuac*, "the beautiful." The species has been reported from Mexico² as *Magnolia glauca*, a name synonymous with *M. virginiana* L., which pertains to the sweet bay of the eastern and southern United States. It appears, also, that *Talauma mexicana* and *Magnolia schiedeana* have often been confused. The two species are much alike in leaf form and in the appearance of their flowers, but the fruits are very different.

Talauma macrocarpa is mentioned by Acosta (1590) under the name "yolosuchil." It is illustrated and described by Hernández³ under the name "yoloxochitl." The latter author discusses its medical properties, stating that "it is an excellent remedy for sterility," and remarks that the flowers were sometimes used to flavor chocolate.

3. *DRIMYS* Forst. Char. Gen. 83. 1776.

1. *Drimys winteri* Forst. Char. Gen. 84. pl. 42. 1776.

Drimys granatensis L. f. Suppl. Pl. 269. 1781.

Drimys mexicana Moc. & Sessé; DC. Reg. Veg. Syst. 1: 444. 1818.

Veracruz and Oaxaca; reported from other states; sometimes cultivated. Central America and southward to the Straits of Magellan.

An evergreen shrub or tree, in some parts of its range 18 meters high, with grayish bark; leaves mostly oblong or oblong-obovate, 7 to 13 cm. long, coriaceous, persistent, green above, glaucous beneath, petiolate; flowers solitary or umbellate, white; sepals 2 or 3; petals 6 or more; fruit purplish black. "Chilillo," "chachaca," "palo picante" (various parts of Mexico); "palo de chile" (Oaxaca); "muelo," "quiebra-muelas" (Costa Rica); "canelo" (Chile).

This plant, which furnishes the Winter's bark of commerce, was first obtained by Winter, who was captain of one of the ships which accompanied Sir Francis Drake's expedition of 1577. The three vessels of the fleet were struck by a storm in the southern ocean and Winter's ship was driven to the Straits of Magellan, where three weeks were spent with the object of improving the health of the crew. *Drimys* was one of the plants which attracted Winter's attention, and he used the bark for treating scurvy. Specimens of the bark were presented to the famous botanist Clusius, who gave it the name of Cortex Winteranus. It became a favorite remedy in Europe, but as it was difficult to obtain the drug from South America the bark of *Canella alba*, a West Indian tree, was often substituted for it. Winter's bark is little used at the present time except in domestic medicine in the regions where it is native. It is aromatic and pungent and has tonic and antiscorbutic properties. In Brazil it is used for dysentery and for gastric disturbances. In Costa Rica the bark is chewed for toothache. The powdered bark is sometimes employed in Mexico as a condiment.

¹ For accounts of the plant see A. L. Herrera, *El yoloxochitl*, Estudio 4: 133; E. Armendáriz, *Analysis de las semillas del yoloxochitl*, Estudio 4: 248.

² Sessé & Moc. Pl. Nov. Hisp. 90. 1887.

³ Thesaurus 40. 1651.

It may be that the species as accepted here should be divided into two or more, but the general practice of recent writers has been to refer all the American forms to a single species.

4. ILLICIUM L. Syst. Nat. ed. 10. 1050. 1759.

1. Illicium floridanum Ellis, Phil. Trans. London 60: 524. pl. 12. 1770.

Veracruz and Puebla. Florida to Louisiana.

Aromatic evergreen shrub, 1.5 to 3 meters high; leaves elliptic or lance-elliptic, 7 to 14 cm. long, acuminate, petiolate, persistent, gland-dotted beneath; flowers long-pedicellate, with 20 to 30 narrow, dark crimson or purple petals. "Matacaballos" (Veracruz); "ixcapantl" (Puebla).

The shrub is reputed poisonous to stock. It is known in Florida as "poison bay" and "sweet laurel." The Mexican form has been illustrated recently (Bol. Dir. Estud. Biol. 1: 661. 1916).

A related species of China, *Illicium verum* Hook. f., is the star-anise, whose fruit is much used in oriental countries for flavoring food.

42. ANNONACEAE. Custard-apple Family.

Trees or shrubs, often aromatic; leaves alternate, estipulate, entire; flowers solitary or clustered, usually perfect, commonly with 3 sepals and 6 fleshy or leathery petals; stamens numerous; fruit of 1 or more carpels, these sessile or stipitate, usually fleshy, free or united to form a many-celled fruit.

Petals, at least the outer ones, imbricate.

Seeds solitary, attached at the base of the cell; flowers small.

1. GUATTERIA.

Seeds several, attached to the side of the cell; flowers usually very large.

2. SAPRANTHUS.

Petals valvate.

Outer petals separated, not connivent.

Carpel of the fruit one-----**3. TRIDIMERIS.**

Carpels numerous.

Inner petals clawed-----**4. CYMBOPETALUM.**

Inner petals not clawed-----**5. DESMOPSIS.**

Outer petals connivent.

Ovules 2 to many in each carpel; carpels distinct in fruit---**6. XYLOPIA.**

Ovules one in each carpel; carpels concrete in fruit.

Petals connate into a 3 or 6-lobed tube, the outer ones wing-appendaged.

7. ROLLINIA.

Petals not connate, the outer ones not appendaged-----**8. ANNONA.**

1. GUATTERIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 85. 1794.

Trees or shrubs; peduncles 1-flowered, axillary, solitary or fasciculate, pubescent; fruit composed of numerous stipitate berries.

Petals about 6 mm. long-----**1. G. bibracteata.**

Petals 1 cm. long or often much larger.

Leaves cordate at base-----**2. G. macrantha.**

Leaves rounded to acute at base.

Leaves short-acuminate at apex.

Petals 2 to 4.3 cm. long; leaves 5 to 15 cm. long.

Leaves 2 to 2.5 cm. long-----**3. G. gaumeri.**

Leaves 3 to 5 cm. wide-----**7. G. depressa.**

Petals 1 to 1.5 cm. long; leaves mostly 15 to 25 cm. long.

4. G. diospyroides.

Leaves long-acuminate at apex.

Flowers geminate -----5. *G. galeottiana*.

Flowers solitary -----6. *G. jurgensenii*.

1. *Guatteria bibracteata* (Hook.) Hemsl. Diag. Pl. Mex. 1. 1878.

Annona bibracteata Hook. Icon. Pl. 4: pl. 328. 1841.

Veracruz; type from Consoquintla.

Tree; leaves oblong-lanceolate, short-petiolate, sparsely pubescent or glabrous; flowers green.

2. *Guatteria macrantha* Presl, Rel. Haenk. 2: 78. 1835.

Described from somewhere in Mexico.

Perhaps not of this genus.

3. *Guatteria gaumeri* Greenm. Field Mus. Bot. 2: 251. 1907.

Vicinity of Izamal, Yucatán.

Tree, 10 to 15 meters high, with gray bark; leaves elliptic or elliptic-oval, with an aromatic odor when crushed. "Elemuy."

Used medicinally.

4. *Guatteria diospyroides* Baill. Adansonia 8: 269. 1868.

Oaxaca; type from Trapiche de la Concepción.

Leaves lance-elliptic, 10 to 25 cm. long, short-petioled, glabrous or nearly so; flowers green.

5. *Guatteria galeottiana* Baill. Adansonia 8: 268. 1868.

Oaxaca (type locality) and Campeche.

Leaves lanceolate, 10 to 25 cm. long.

6. *Guatteria jurgensenii* Hemsl. Diag. Pl. Mex. 1. 1878.

Oaxaca; type from Sierra San Pedro Nolasco.

Leaves lanceolate, 15 to 23 cm. long; flowers (as in the other species) sericeous, about 2.5 cm. broad.

7. *Guatteria depressa* (Baill.) Safford.

Annona depressa Baill. Adansonia 8: 267. 1868.

Veracruz and perhaps elsewhere; type from Tozamapa.

Similar to *G. gaumeri*, but with broader leaves, these very thick and lustrous; carpels of the fruit numerous, ellipsoid, long-stipitate.

2. *SAPRANTHUS* Seem. Journ. Bot. 4: 369. 1866.

Shrubs or trees; flowers very large, solitary, with an extremely disagreeable odor of carrion; fruit of few large sessile carpels.

Petals mostly 6 to 8 cm. long -----1. *S. foetidus*.

Petals 4 cm. long or shorter.

Leaf blades oblong-elliptic, acuminate; petals about 4 cm. long

2. *S. campechianus*.

Leaf blades oblong-obovate, obtuse or acutish; petals about 2 cm. long.

3. *S. microcarpus*.

1. *Sapranthus foetidus* (Rose) Safford.

Asimina foetida Rose, Contr. U. S. Nat. Herb. 5: 134. 1897.

Sinaloa to Oaxaca; type from Acapulco.

Shrub or small tree, 4 to 5 meters high, copiously pubescent; leaves oval to oblong, 7 to 14 cm. long or larger, short-petiolate, acute or obtuse; petals greenish yellow at first, maroon or dark purple at maturity, with conspicuous veins. "Madre de cacao" (Oaxaca); "murciélago" (Guerrero); "zopilotillo" (Sinaloa).

2. *Sapranthus campechianus* (H. B. K.) Standl.*Asimia campechiana* H. B. K. Nov. Gen. & Sp. 5: 61. 1821.*Asimina insularis* Hemsl. in Hook. Icon. Pl. 16: pl. 151 $\frac{1}{4}$. 1886.

Campeche (type locality) and Yucatán.

Tree, 6 meters high; leaves elliptic-oblong, 6.5 to 8.5 cm. long, acuminate, pubescent.

Asimina insularis is perhaps distinct but, judging from the description, the species are very closely related.**3. *Sapranthus microcarpus* (Donn. Smith) Fries, Svensk. Vet. Akad. Handl. 34^o: 12. 1900.***Porcelia microcarpa* Donn. Smith, Bot. Gaz. 20: 1. 1895.*Asimina purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 375. 1913.

Veracruz and Oaxaca. Guatemala; type from Ocosito.

Shrub, 1.8 to 2.7 meters high; leaves obovate or oval-oblong, mostly 5 to 8 cm. long, obtuse or acute; carpels 2.5 to 4.5 cm. long.

DOUBTFUL SPECIES.

UNONA VIOLACEA Dunal, Monogr. Anon. 105. pl. 25. 1817. This plant, described from Mexico, is probably the same as one of the species listed above, perhaps *S. foetidus*.**3. *TRIDIMERIS* Baill. Adansonia 9: 219. 1869.****1. *Tridimeris hahniana*¹ Baill. Adansonia 9: 219. 1869.**

Type from the forests of San Cristóbal (Oaxaca?).

A small tree.

4. *CYMBOPETALUM* Benth. Journ. Linn. Soc. Bot. 5: 69. 1861.**1. *Cymbopetalum penduliflorum* (Dunal) Baill. Adansonia 8: 268. 1868.***Unona penduliflora* Dunal, Monogr. Anon. 100. pl. 28. 1817.

Veracruz and Oaxaca. Guatemala.

Tree or large shrub with long narrow leaves; petals purplish within, greenish outside. "Guineillo," "guineillo prieto" (Oaxaca); "xochinacaztli" (Nahuatl).

The aromatic petals were used in preconquest days for flavoring chocolate and are still so used in some localities. The flowers were used also as a remedy for asthma and other diseases.² This plant was highly esteemed by the early inhabitants of Mexico, having been brought from the south to be grown in the gardens of the emperor. It is first mentioned by Sahagún (1509), under the name "teunacaztli," "the sacred ear." He states that the flowers were valued for their odor and for flavoring chocolate. Hernández describes and figures³ the plant in a chapter entitled "De *Xochinacaztli*, seu flore auriculæ." The Nahuatl term *xochinacaztli* signifies "ear-flower." Hernández states that the plant is a native of the *tierra caliente*, and that in the *tiangués* or markets of the Indians there is nothing more frequently found or more highly prized than this flower, "which is wont to give the greatest charm and taste, together with a very fragrant

¹ Ludwig Hahn spent nearly 20 years in Mexico as a teacher of music, and made extensive collections of plants and animals, most of which were sent to Berlin. He was a member of the French Scientific Commission, and an associate of Bourgeau. He died in Mexico in 1873. Some of his plants are in the U. S. National Herbarium.

² See W. E. Safford, Science, n. ser. 33: 470. 1911; Smiths. Rept. 1910: 428. 1911; Journ. Washington Acad. Sci. 2: 234. 1912.

³ Thesaurus 30. 1651.

odor and flavor to that celebrated drink cacao, which they call chocolate, and it imparts to it certain tonic properties and wholesomeness as well. It is said that when drunk in water this flower dispels flatulency, causes phlegm to become thin, warms and comforts the stomach which has been chilled or weakened, as well as the heart; and that it is efficacious in asthma, ground to a powder with addition of two pods of the red peppers called *texochilli*, with their seeds removed and toasted on a *comal*, which is a kind of griddle on which the natives toast and make their bread called by us *tortillas*, adding to the same three drops of balsam and taking it in some suitable liquor." It is of interest to note that the dried flowers are still offered for sale in the markets of Guatemala.

5. DESMOPSIS Safford, Bull. Torrey Club 43: 184. 1916.

1. *Desmopsis galeottiana* (Baill.) Safford, Bull. Torrey Club 43: 187. 1916.
Trigymeia galeottiana Baill. Adansonia 8: 181. 1868.

Veracruz; type from Palanque.

Shrub or small tree with elliptic-lanceolate leaves; flowers green, on long slender pedicels; fruit of 7 to 11 carpels.

6. XYLOPIA L. Syst. Nat. ed. 10. 1250. 1750.

1. *Xylopia trunciflora* Schlecht. & Cham. Linnaea 6: 417. 1831.

Known only from the type locality, near Colipa, Veracruz.

Small tree; leaves lance-elliptic, 10 cm. long, obtuse, subsessile, pubescent beneath; flowers borne along the trunk; carpels 5 to 7, globose or ellipsoid, 1 to 3-seeded.

7. ROLLINIA St. Hil. Fl. Bras. Merid. 1: 28. 1825.

1. *Rollinia mucosa* (Jacq.) Baill. Adansonia 8: 268. 1868.

Annona mucosa Jacq. Obs. Bot. 16. 1764.

Veracruz. Trinidad and Lesser Antilles; type locality, Martinique.

Tree with brownish branches; leaves oblong or elliptic, 7 to 14 cm. long, acuminate; flowers solitary, long-pedunculate. "Anona" (*Ramirez*); "anón," "candongo" (Santo Domingo).

8. ANNONA L. Sp. Pl. 536. 1753.

REFERENCES: Safford, Classification of the genus *Annona*, with descriptions of new and imperfectly known species, Contr. U. S. Nat. Herb. 18: 1-68. pl. 1-41, f. 1-75. 1914; Safford, *Annona sericea* and its allies, Contr. U. S. Nat. Herb. 16: 263-275. pl. 85-99, f. 42-44. 1913; Safford, The genus *Annona*: The derivation of its name and its taxonomic subdivisions, Journ. Washington Acad. Sci. 1: 118. 1911; Safford, *Annona*, in Bailey, Stand. Cycl. Hort. 291-295. 1914.

Trees or shrubs; leaves deciduous or persistent; flowers usually solitary, lateral; fruit very variable, composed of numerous carpels crowded together into a fleshy mass.

The generic name (sometimes, but incorrectly, written *Anona*) is a modification of the Haitian name of some of the species, "anón." Belmar gives the Mixe equivalents of "anona" as "ai-dium," "ait-keip" (the tree), and "tzaptzaidium."

Flowers subglobose or broadly pyramidal in bud.

Petals 3 or, if 6, the inner ones rudimentary or much narrower than the outer ones.

Leaf blades 4 to 9 cm. long, thinly appressed-pilose beneath; flowers short-pedicellate.....1. *A. globiflora*.

Leaf blades 9 to 14 cm. long, densely soft-pilose beneath; flowers long-pedicellate.....2. *A. longipes*.

Petals 6, broad, in 2 series.

Inner petals valvate.....3. *A. glabra*.

Inner petals imbricate.

Leaves with minute pockets beneath in the axils of the lateral nerves.

4. *A. muricata*.

Leaves without pockets in the axils of the nerves.....5. *A. purpurea*.

Flowers elongate and more or less triquetrous in bud.

Peduncles with clasping leaflike bracts at base; testa of seeds thick and hard.

6. *A. diversifolia*.

Peduncles without clasping leaflike bracts at base; testa thin.

Outer petals about 8 mm. long. Fruit 2 to 2.5 cm. in diameter; leaves

lanceolate.....7. *A. palmeri*.

Outer petals 1.8 to 5 cm. long.

Leaves rounded or obtuse at apex, oval or rounded, soft-pilose or tomentose beneath.

Outer petals 1.8 to 2.5 cm. long.....8. *A. cherimola*.

Outer petals 4 to 5 cm. long.....9. *A. longiflora*.

Leaves acute or acuminate at apex, oblong-lanceolate to elliptic-oval, nearly glabrous beneath, at least in age. Flowers 2 to 3 cm. long.

Fruit composed of numerous rounded, loosely cohering carpels, the surface very rough, with a glaucous bloom. Leaves mostly lanceolate

.....10. *A. squamosa*.

Fruit smooth or nearly so, the surface often divided into angular areoles by impressed lines.

Leaves mostly lanceolate; fruit with conspicuous areoles, turning red when ripe.....11. *A. reticulata*.

Leaves elliptic-oval; fruit smooth, yellow.....12. *A. lutescens*.

1. *Annona globiflora* Schlecht. *Linnaea* 10: 235. 1836.

Annona fruticosa Sessé & Moc. *Fl. Mex.* ed. 2. 134. 1894.

Tamaulipas, San Luis Potosí, and Veracruz; type from Hacienda de la Laguna, near Jalapa.

Shrub, 0.6 to 2 meters high; leaves oblong or lance-oblong, 4 to 9 cm. long, thin, acute or obtuse, pale beneath; fruit subglobose, 3 to 4 cm. in diameter, muricate, with scant edible pulp. "Anonilla" (Veracruz); "chirimoya" (Tamaulipas, San Luis Potosí); "anonita de papagayos" (Veracruz).

2. *Annona longipes* Safford, *Contr. U. S. Nat. Herb.* 16: 269. *pl.* 89. 1913.

Known only from the type locality, Lake Catemaco, Veracruz.

Tree, 10 meters high; leaves ovate-oval, 9 to 14 cm. long, acute or acuminate; fruit shaped like a strawberry, 2.5 cm. long, covered with gibbous areoles, tomentose, with scant pulp.

3. *Annona glabra* L. *Sp. Pl.* 537. 1753.

Annona palustris L. *Sp. Pl.* ed. 2. 757. 1762.

Veracruz and Guerrero, in wet soil; reported from Yucatán, Tabasco, and Oaxaca. Widely distributed in tropical America; type from the Bahamas.

Shrub or tree, sometimes 12 meters high, the trunk as much as 50 cm. in diameter, often swollen or with buttresses at the base, the bark thin, reddish brown; leaves oval, oblong, or ovate, 6 to 15 cm. long, deep green, acute or acuminate; outer petals yellowish, with a deep red spot near the base; fruit 5 to 12 cm. long, ovoid, smooth, yellowish at maturity, with cream-colored pulp; wood brown, soft, weak, its specific gravity about 0.50. "Corcho" (Guerrero, Tabasco, Yucatán, Porto Rico); "árbol de corcho" (Veracruz); "palo de corcho" (Yucatán); "mag" (Yucatán, Maya); "cayur," "corazón cimarrón," "guanábano cimarrón," "anón" (Porto Rico); "bagá," "palo

bobo" (Cuba); "anonillo" (Guatemala, Honduras); "guanábano de corcho" (Santo Domingo).

The tree often grows about salt water, associated with mangroves. Its English names are "pond-apple," "alligator-apple," and "monkey-apple." The fruit is insipid but is said to be eaten in some localities, while in others it is regarded as poisonous. It is said to be eaten by the alligators that frequent the banks where it grows, hence the name "alligator-apple." The very light wood is used to make bottle corks and floats for fish nets.

4. *Annona muricata* L. Sp. Pl. 536. 1753.

Widely cultivated in Mexico and elsewhere in tropical America, the native region not definitely known.

Small tree, usually 4 to 5 meters high; leaves ill-scented, lustrous, obovate, ovate, or elliptic, persistent; flowers yellow; fruit very large, sometimes weighing five pounds, ovoid or heart-shaped, the ill-smelling skin furnished with numerous recurved fleshy spines, the pulp white and juicy, with a pleasant subacid flavor; wood light-colored, soft, its specific gravity about 0.397. "Guanábano" or "guanábana" (Yucatán, Chiapas, Oaxaca, Nicaragua, Porto Rico, Colombia, Peru, Philippines, Santo Domingo); "anona amarilla" (Tabasco, *Ramírez*); "catuche" or "catucho" (Jalisco, *Ramírez*); "polvox" (Maya, *Urbina*); "zapote de viejas" (*Urbina*); "cabeza de negro" (Oaxaca, Jalisco); "huanaba" (Guatemala); "guanaba" (El Salvador).

The fruit of the soursop is highly esteemed in tropical regions. It is eaten fresh, used in preparing beverages, made into jelly, tarts, or preserves, and sometimes fermented to obtain an intoxicating drink. Stock also are fond of the fruit. It is reputed to have pectoral, antiscorbutic, and febrifuge properties. The seeds and green fruit are astringent and are employed as a remedy for dysentery. The leaves, too, are used medicinally, also the flowers. One of the earliest writers to describe the plant is Oviedo (Lib. VIII, Cap. XVII), who used the Haitian name "guanábano."

5. *Annona purpurea* Moc. & Sessé; Dunal, Monogr. Anon. 64. pl. 2. 1817.

Annona involucrata Baill. Adansonia 8: 265. 1868.

Veracruz, Oaxaca, and Yucatán. Central America and Venezuela.

Small or medium-sized tree, sometimes 7.5 meters high; leaves oval to oblong, 15 to 38 cm. long, short-petiolate, acuminate, thin; petals velvety outside, deep purple within; fruit 10 to 20 cm. in diameter, broadly ovoid or subglobose, bearing numerous rigid pyramidal protuberances covered with a feltlike tomentum, the pulp orange-colored, fragrant, fibrous. "Cabeza de negro" (Veracruz); "cabeza de llama" (Veracruz, Oaxaca); "chincua," "ilama de Tehuantepec" (Oaxaca); "soncoya," "soncolla," or "sencuya" (Central America); "toreta" (Panama); "manirote" (Venezuela); "matacuy" (Guatemala).

The fruits are sold in the markets of Veracruz and elsewhere. They vary considerably in quality. There is a popular belief that they give rise to chills and fevers.

6. *Anona diversifolia* Safford,¹ Science n. ser. 33: 471. 1911.

Colima and Guerrero; type from Colima. El Salvador.

Small tree with brownish gray aromatic bark; leaves elliptic or oblong, 15 cm. long or less, rounded at apex; fruit ovoid-globose, about 15 cm. in diameter, covered with low rounded protuberances, the pulp fine-flavored, cream-colored or rose-tinted. "Ilama," "hilama," "ilamatzapotl" (Mexico); "anona blanca" (El Salvador).

¹ See also, Safford, *Annona diversifolia*, a custard-apple of the Aztecs, Journ. Washington Acad. Sci. 2: 118-125. f. 1-4. 1912.

7. *Annona palmeri* Safford, Contr. U. S. Nat. Herb. 18: 43. pl. 24. 1914.

Known only from the type locality, Acapulco, Guerrero.

Shrub, 1.5 to 3 meters high; leaves lanceolate or ovate, 5 to 10 cm. long, acute; flowers small, dull white; fruit subglobose, 2 to 2.5 cm. in diameter, with scant pulp. "Anonilla."

8. *Annona cherimola* Mill. Gard. Dict. ed. 8. *Annona* no. 5. 1768.

Widely cultivated in Mexico, and in tropical America generally. Native of the Andes of Peru, but naturalized in Mexico at a very early date.

Tree, 4.5 to 7.5 meters high; leaves mostly oval or rounded-oval, obtuse, pubescent; petals greenish yellow or rufous outside, pale yellow or whitish within; fruit globose or ovoid, the surface with rounded protuberances or marked with U-shaped areoles, sometimes smooth, the pulp white, pleasantly acidulous. "Chirimoyo" or "chirimoya" (Jalisco, Oaxaca, etc., Colombia, Peru; the name of Peruvian origin, said to signify "cold-seed"); "pox," "tzuli pox" (Yucatán, Maya); "quauhtzapotl," "matzapotl" (Nahuatl).

One of the most highly valued species because of its excellent fruit; much cultivated in the *tierra caliente*, in several forms of variable quality. The fruit is sometimes fermented to obtain an alcoholic beverage. Macfadyen states that in Jamaica the dried flowers were used to flavor snuff. The seeds are used in Mexico as an emetic-cathartic and as an insecticide. In the first case one or two seeds are swallowed; they are first roasted slightly, their shell removed, and the embryo crushed in water or milk. For the destruction of parasites upon the human body, the seeds are crushed, mixed with lard, and applied as an ointment to the parts affected. Cortina, who analyzed the seeds,¹ states that they contain sugar, gum, albumen, extractive matter, oil, and resin, the last probably being the emetic-cathartic agent.

9. *Annona longiflora* S. Wats. Proc. Amer. Acad. 22: 397. 1887.

Jalisco; type from Río Blanco.

Shrub, 1 to 3 meters high; leaves mostly oval or orbicular, copiously pubescent; outer petals whitish or cream-colored, with a dark purple spot at base; fruit ovoid-globose, the surface with flat areoles or bearing protuberances. "Chirimoya de la barranca," "chirimoya cimarrona."

The fruit is edible either raw or cooked. A sweetmeat is made by boiling it with sugar together with the fruit of the "tejocote" (*Crataegus mexicana*).

10. *Annona squamosa* L. Sp. Pl. 537. 1753.

Annona cinerea Dunal, Monogr. Anon. 72. pl. 8. 1817.

Widely cultivated in Mexico and elsewhere in tropical America.

Tree, 4.5 to 6 meters high, with grayish bark; leaves lanceolate or oblong, acute; petals greenish yellow or greenish white, usually with a purplish red spot at base; fruit the size of an orange, globose or heart-shaped, composed of loosely adherent carpels, these rounded at apex, forming a tuberculate surface, greenish yellow, the pulp yellowish white, creamy or custard-like, sweet and pleasantly flavored. "Texaltzapotl," "quauhtzapotl" (Nahuatl); "ahate" (Jalisco, Veracruz); "anona blanca" (Chiapas, *Ramírez*); "saramulla," "saramullo" (Yucatán); "tzalmuy" (Yucatán, Maya); "anón" (Colombia, Costa Rica, Porto Rico); "chirimoya" (Porto Rico); "ates" (Philippines); "anón" (Santo Domingo).

Fruit of excellent flavor and highly esteemed; it is produced at nearly all times of the year. It is eaten alone or made into sherbets and is not cooked like that of some other species. The leaves are sometimes rubbed over floors or placed in hens' nests to keep away vermin. The seeds likewise have in-

¹ See Urbina, *Naturaleza* 7: 222. 1901.

secticide properties. The crushed leaves are sometimes applied as poultices to ulcers and malignant sores. The root is a drastic purgative.

The tree is described by Oviedo (Lib. VIII, Cap. XVIII) under the name "hanon." Hernández describes and figures¹ it as "ahate de Panucho (Pánuco)"; he also illustrates it,² without description, as "ate vel ahate de Panuco." The English names applied to this species are "sugar-apple" and "sweetsop."

11. *Annona reticulata* L. Sp. Pl. 37. 1753.

Annona longifolia Sessé & Moc. Fl. Mex. ed. 2. 134. 1894.

Cultivated in Mexico and in places doubtless native. Widely cultivated in the tropics.

Tree, 4.5 to 7.5 meters high; leaves deciduous, lanceolate or oblong, acute, nearly glabrous; petals olive or yellowish, usually stained with purple within and with a dark purple spot at base; fruit 7.5 to 12.5 cm. in diameter, the surface divided into angled areoles, usually reddish or reddish brown, the pulp sweetish, insipid, tallow-like. "Quauhtzapotl" (Nahuatl); "anona" (Oaxaca, etc., Nicaragua, Philippines, Guam); "anona colorada" (Chiapas, Ramírez); "chirimoya" (Oaxaca, Costa Rica); "op" (Yucatán, Maya); "ilama" (Alcocer); "corazón" (Porto Rico); "mamón" (Cuba); "riñón" (Venezuela).

The wood is light and soft. The bark is said to have astringent and tonic properties, and that of young branches to give a useful fiber. The leaves and branches are used for tanning and are said to give a blue or black dye. The English names are "custard-apple" and "bullock's-heart."

12. *Annona lutescens* Safford, Contr. U. S. Nat. Herb. 18: 41. pl. 23. 1914.

Chiapas. Guatemala; type from Cahabón, Alta Verapaz.

Small tree with spreading branches; fruit similar to that of *A. reticulata*, but yellow. "Anona amarilla" (Guatemala).

DOUBTFUL SPECIES.

ANNONA EXCELSA H. B. K. Nov. Gen. & Sp. 5: 59. 1821. Type from La Venta del Exido. Described from sterile branches.

ANNONA LIEBMANNIANA Baill. Adansonia 8: 266. 1868. Type from Comaltepec.

43. MYRISTICACEAE. Nutmeg Family.

1. *COMPSONEURA* Warb. Ber. Deutsch. Bot. Ges. 13: 94. 1895.

1. *Compsonaura sprucei* (A. DC.) Warb. Nov. Act. Acad. Caes. Leop. Carol. 68: 143. 1897.

Myristica sprucei A. DC. in DC. Prodr. 14: 199. 1856.

Myristica mexicana Hemsl. Biol. Centr. Amer. Bot. 3: 67. pl. 73. 1882.

Tabasco. Honduras and Brazil; type from Rio Negro, Brazil.

Glabrous shrub or tree; leaves alternate, estipulate, oblong or obovate-oblong, 12 to 25 cm. long, subacuminate, bright green; flowers very small, dioecious, paniculate or subracemose.

Myristica mexicana is considered synonymous with *Compsonaura sprucei* by Warburg, the monographer of the group, but it seems probable that further study will show that the Mexican plant is a distinct species. The type of *M. mexicana* is from the banks of the Río Puyapatengo.

¹ Thesaurus 348. 1651.

² Thesaurus 454. 1651.

44. MONIMIACEAE. Monimia Family.

REFERENCE: Perkins in Engl. Pflanzenreich IV. 101. 1901.

Shrubs; leaves opposite, entire or irregularly serrate, estipulate; flowers small, perfect or unisexual, usually cymose or racemose; perianth 4 to 6-lobed; corolla none; stamens numerous; fruit of numerous small carpels.

Anthers dehiscent by longitudinal slits.....1. **MOLLINEDIA**.
Anthers dehiscent by valves.....2. **SIPARUNA**.

1. MOLLINEDIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 83. 1794.

Leaves entire or dentate; flowers pedicellate, in axillary cymes; perianth 4-lobed; fruit of numerous small drupes.

Sepals subequal. Stamens 30 to 33.....1. *M. orizabae*.

Sepals unequal, the outer broader than the inner.

Leaves pilose when young. Stamens 23 or 24.....2. *M. viridiflora*.

Leaves glabrous.

Stamens 25.....3. *M. mexicana*.

Stamens 30 to 40.....4. *M. nigrescens*.

1. Mollinedia orizabae Perkins, Bot. Jahrb. Engler 27: 674. 1900.

Known only from the type locality, Orizaba, Veracruz.

Leaves oblong or obovate-oblong, 8 to 12 cm. long, short-acuminate, glabrous.

2. Mollinedia viridiflora Tulasne, Ann. Sci. Nat. IV. 3: 43. 1855.

Oaxaca; type locality, mountains of Oaxaca.

Leaves obovate or elliptic-oblong, 8 to 12 cm. long, petiolate, acuminate, glabrate in age.

3. Mollinedia mexicana Perkins, Bot. Jahrb. Engler 27: 674. 1900.

Known only from the type locality, Mirador, Veracruz.

Leaves narrowly oblong or obovate-oblong, 9 to 13.5 cm. long, long-acuminate.

4. Mollinedia nigrescens Tulasne, Ann. Sci. Nat. IV. 3: 41. 1855.

Known only from the type locality, Tenejapa, Oaxaca.

Leaves lanceolate or oblong-lanceolate, 8 to 12 cm. long, remotely serrate above the middle.

2. SIPARUNA Aubl. Pl. Guian. 2: 864. 1775.

Shrubs, usually with a pleasant odor; flowers in short axillary cymes, usually short-pediceled; fruit of numerous small drupes.

Leaves copiously stellate-pilose.....1. *S. riparia*.

Leaves glabrous or nearly so.

Leaf blades entire or sinuate-dentate.

Leaves coriaceous.....2. *S. andina*.

Leaves membranaceous.....3. *S. nicaraguensis*.

Leaf blades conspicuously serrate or dentate.

Inflorescence dense, short.....4. *S. colimensis*.

Inflorescence lax, conspicuously pedunculate.....5. *S. sumichrastii*.

1. Siparuna riparia (Tulasne) A. DC. in DC. Prodr. 16²: 647. 1868.

Citriosma riparia Tulasne, Ann. Sci. Nat. IV. 3: 36. 1855.

Veracruz and Oaxaca. Guatemala.

Tree or shrub; leaves obovate or oval-obovate, 10 to 17 cm. long, acute or acuminate, irregularly dentate; fruit globose, red. "Limoncillo" (Veracruz); "cerbatana" (Guatemala).

2. Siparuna andina (Tulasne) A. DC. in DC. Prodr. 16²: 648. 1868.

Citriosma andina Tulasne, Ann. Sci. Nat. IV. 3: 36. 1855.

Mountains of Oaxaca.

Leaves ternate, obovate-oblong, 12 to 15 cm. long, petiolate, short-acuminate.

3. *Siparuna nicaraguensis* Hemsl. Biol. Centr. Amer. Bot. 3: 69. 1882.

Guerrero and Oaxaca to Tabasco. Guatemala and Nicaragua (type locality).

Shrub, 3 to 4 meters high, or sometimes a tree, with a strong odor; leaves oval to oblong, 7.5 to 15 cm. long; flowers small, yellowish white; fruit blood-red. "Hierba del talaje," "limoncillo," "hierba de la conchuda" (Oaxaca).

4. *Siparuna colimensis* Perkins, Bot. Jahrb. Engler 28: 682. 1901.

Known only from Colima, the type locality.

Leaves ovate or oblong, 9 to 18 cm. long, short-acuminate; fruit depressed-globose, reddish, acidulous.

5. *Siparuna sumichrastii* (A. DC.) Perkins, Bot. Jahrb. Engler 28: 682. 1901.

Siparuna riparia sumichrastii A. DC. in DC. Prodr. 16^a: 648. 1868.

Veracruz; type from the city of Veracruz.

Shrub, 3 meters high; leaves obovate-oblong or elliptic, 10 to 16 cm. long; fruit 5 mm. in diameter.

45. LAURACEAE. Laurel Family.

REFERENCE: Mez, Jahrb. Bot. Gart. Mus. Berlin 5. 1869.

Aromatic evergreen trees or shrubs; leaves alternate, persistent, glandular-punctate, estipulate, entire; flowers perfect or unisexual, small, green or yellow, usually cymose, umbellate, or capitate; perianth limb usually 6-lobed; corolla none; stamens and staminodia normally twice as many as the segments and opposite them, arranged in 2 or 4 series; anthers erect, 2 or 4-celled; fruit baccate or drupaceous, 1-seeded.

In this family flowers are usually necessary for determination, and fruiting specimens are of little value unless accompanied by flowers.

The common European laurel, *Laurus nobilis* L. ("laurel") is cultivated in Mexico as a shade tree. The writer has seen no material of *Acrodiclidium mexicanum* and *A. misantlae* recently described from Veracruz by Brandegee.¹ The genus is not otherwise known from Mexico, and it is probable that both these species belong to genera listed below.

The only Mexican representative of the family not listed here is *Cassytha filiformis* L., a yellowish leafless twining parasitic plant, in general appearance much like dodder (*Cuscuta* spp.).

Two well-known Old World trees of the family are *Cinnamomum camphora* (L.) Nees & Eberm., camphor ("alcánfor"), and *C. zeylanicum* Nees, cinnamon ("canela").

Inflorescence racemose, subtended by an involucre of bracts.

Bracts of the involucre decussate-opposite.....1. LITSEA.

Bracts imbricate.....2. UMBELLULARIA.

Inflorescence usually paniculate, sometimes racemose or capitate, not involucre.

Sepals very unequal, the outer ones shorter.....3. PERSEA.

Sepals equal or nearly so.

Anthers 2-celled.

Stamens all with introrse anthers.....4. SASSAFRIDIUM.

Stamens partly with extrorse anthers.

Staminodia of the innermost stamens large.....5. HUFELANDIA.

Staminodia of the innermost stamens minute or aborted.

6. MISANTECA.

Anthers 4-celled.

¹ Univ. Calif. Bot. 6: 497. 1919.

Staminodia of the inner series of stamens well developed, sagittate.

Sepals usually deciduous.....3. **PERSEA.**

Sepals persistent.....7. **PHOEBE.**

Staminodia of the inner stamens minute or none, stipelike.

Anther cells in pairs, one pair above the other.....8. **OCOTEA.**

Anther cells all inserted at nearly the same height...9. **NECTANDRA.**

1. **LITSEA** Lam. Encycl. 3: 574. 1789.

REFERENCE: Bartlett, Proc. Amer. Acad. 44: 597-602. 1909.

Shrubs or trees; leaves comparatively small; inflorescence short-racemose, few-flowered, axillary, in bud surrounded by an involucre of 4 to 6 broad bracts; perianth 6 or 4-lobed; stamens usually 9 or 12, those of the first and second ranks eglandular, those of the third and fourth ranks usually with a stipitate gland on each side at the base; anthers introrsely 4-celled.

The aromatic leaves of all the species are used extensively for flavoring food. Leaves copiously pubescent beneath.

Inflorescences corymbose.....1. **L. neesiana.**

Inflorescences solitary or fasciculate.....2. **L. orizabae.**

Leaves glabrous or nearly so.

Leaf blades rounded or subcordate at base.

Inflorescences corymbose or paniculate.

Pedicels much longer than the flowers.....3. **L. pedicellata.**

Pedicels shorter than the flowers.....4. **L. pringlei.**

Inflorescences solitary or fasciculate.

Leaf blades rounded-ovate, obtuse.....5. **L. parvifolia.**

Leaf blades ovate-lanceolate, acute.....6. **L. novoleontis.**

Leaf blades acute or obtuse at base.

Leaves usually glaucous beneath, more than 2 cm. wide; inflorescences corymbose.....7. **L. glaucescens.**

Leaves not glaucous beneath, 1.5 cm. wide or narrower; inflorescences solitary.....8. **L. schaffneri.**

1. **Litsea neesiana** (Schauer) Hemsl. Biol. Centr. Amer. Bot. 3: 76. 1882.

Tetranthera neesiana Schauer, Linnaea 19: 712. 1847.

? *Tetranthera villosa* Mart. & Gal. Bull. Acad. Brux. 10²: 359. 1843.

Veracruz to Sinaloa, Oaxaca, and Chiapas.

Tree or shrub, 2 to 9 meters high; leaves ovate, 2.5 to 5 cm. long, acute or acuminate, green and glabrous above, pale and pubescent beneath. "Laurel" (Chiapas); "laurel de la sierra" (Sinaloa).

One collection placed here by the writer was referred by Bartlett to *L. guatemalensis* Mez. The leaves are used in Sinaloa as a remedy for colic pains.

2. **Litsea orizabae** (Mart. & Gal.) Mez. Jahrb. Bot. Gart. Mus. Berlin 5: 479. 1889.

Persea orizabae Mart. & Gal. Bull. Acad. Brux. 10²: 358. 1843.

Known only from Mount Orizaba, at an altitude of about 4,000 meters.

Shrub; leaves ovate, about 7.5 cm. long, acute.

3. **Litsea pedicellata** Bartlett, Proc. Amer. Acad. 44: 598. 1909.

Known only from the type locality, mountains near Saltillo, Coahuila, at an altitude of 2,135 meters.

Shrub, 1 to 2 meters high; leaves orbicular-ovate, 2 to 3 cm. long, obtuse.

4. **Litsea pringlei** Bartlett, Proc. Amer. Acad. 44: 598. 1909.

Nuevo León and San Luis Potosí; type from limestone ledges of the Sierra Madre above Monterrey, Nuevo León, altitude 850 meters.

Shrub, 1 to 2 meters high; leaves ovate-lanceolate or ovate, 3 to 5 cm. long, acute or attenuate.

5. *Litsea parvifolia* (Hemsl.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 481. 1889.

Umbellularia parvifolia Hemsl. Biol. Centr. Amer. Bot. 3: 77. 1882.

Coahuila and perhaps elsewhere.

Shrub; leaves 1.3 to 4 cm. long, green above, pale beneath.

6. *Litsea novoleontis* Bartlett, Proc. Amer. Acad. 44: 601. 1909.

Nuevo León and San Luis Potosí; type from the Sierra Madre near Monterrey.

Shrub, 1 to 5 meters high; leaves ovate or lance-ovate, 2.5 to 5.5 cm. long; fruit black. "Laurel" (San Luis Potosí).

Tea made from the leaves is used as a beverage, with the addition of sugar and milk. It is used also for asthma and to induce perspiration.

7. *Litsea glaucescens* H. B. K. Nov. Gen. & Sp. 2: 168. 1817.

Litsea cervantesii H. B. K. Nov. Gen. & Sp. 2: 168. 1817.

Tetranthera glaucescens subsolitaria Meissn. in DC. Prodr. 15¹: 193. 1864.

Litsea glaucescens subsolitaria Hemsl. Biol. Centr. Amer. Bot. 3: 76. 1882.

Tamaulipas to Veracruz, Chiapas, and Tepic; type from Acapulco. Central America.

Tree or shrub, sometimes 6 meters high; leaves ovate or lanceolate, 5 to 8 cm. long, acute or attenuate, petiolate, glaucous or green beneath. "Laurel" (Oaxaca, Veracruz, Chiapas, Guatemala, etc.); "sufricaya" or "sufricago" (Veracruz, etc.); "ziz-uch" (Chiapas, *Seler*).

A tea made from the leaves is used as a beverage, as in the other species, also for colic, etc. *L. glaucescens subsolitaria* is a form with solitary or fasciculate (rather than corymbose) inflorescences.

8. *Litsea schaffneri* Bartlett, Proc. Amer. Acad. 44: 601. 1909.

San Luis Potosí and Guanajuato; type from San Miguelito Mountains, San Luis Potosí.

Shrub 2 to 3 meters high; leaves narrowly lanceolate, 2 to 5 cm. long, acute. "Laurel" (San Luis Potosí).

2. UMBELLULARIA Nutt. N. Amer. Sylv. 1: 87. 1842.

1. *Umbellularia californica* (Hook. & Arn.) Nutt. N. Amer. Sylv. 1: 87. 1842.

Tetranthera californica Hook. & Arn. Bot. Beechey Voy. 159. 1833.

Probably in northern Baja California, although no specimens from the Mexican side of the Boundary have been seen. California.

Shrub or tree, sometimes 30 meters high, with a trunk 1.6 meters in diameter, the bark scaly, brown; leaves oblong-lanceolate, 5 to 14 cm. long, acute; flowers yellow; fruit yellowish, 2 to 3 cm. long; wood light brown, strong, hard, its specific gravity about 0.65.

The fruit was eaten by the California Indians, and the leaves are sometimes used for seasoning food. The wood is used for furniture, boats, etc.

3. PERSEA Gaertn. f. Fruct. & Sem. 3: 222. 1805.

REFERENCES: Blake, A preliminary revision of the North American and West Indian avocados, Journ. Washington Acad. Sci. 10: 9-21. 1920; Popenoe, in Bailey, Stand. Cycl. Hort. 436-438, 2555-2556. 1914-16; G. N. Collins, The avocado, a salad fruit from the tropics, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 77. 1905.

Usually trees; flowers in axillary or subterminal, pedunculate panicles; perianth 6-lobed, the 3 outer lobes often smaller than the inner ones; perfect stamens 9, those of the first and second series eglandular, those of the third series with a gland on each side at the base; anthers extrorsely 4-celled; fruit small or often very large.

Species nos. 5 to 9 are referred by some authors to a separate genus, *Nothaphoebe*.

Perianth lobes equal or subequal; flowers comparatively large.

Ovary glabrous; staminal glands sessile.....1. *P. cinerascens*.

Ovary pubescent; staminal glands stipitate.

Pedicels 8 to 15 mm. long; stipe of staminode 2 to 3 times as long and essentially as broad as the elliptic head. Branchlets densely ferruginous-tomentose.....2. *P. schiedeana*.

Pedicels 1 to 6 mm. long; staminode with triangular head much broader than the stipe.

Branchlets fulvous-villous; leaves floccose-tomentose beneath; filaments only one-third longer than the anthers.....3. *P. floccosa*.

Branchlets glabrous to pilosulous; leaves glabrous to pilosulous beneath; filaments 2 to 3 times as long as the anthers.

Leaves not anise-scented; perianth deciduous.....4. *P. americana*.

Leaves anise-(or sassafras)-scented; perianth usually persistent.

4a. *P. americana drymifolia*.

Perianth lobes unequal, the outer ones shorter; flowers small.

Leaves glabrous.....5. *P. longipes*.

Leaves pubescent, at least beneath.

Leaf blades lanceolate or oblong, about 3 cm. wide.

Leaves minutely sericeous beneath, not glaucescent....6. *P. veraguensis*.

Leaves not sericeous beneath, glaucous or glaucescent...7. *P. podadenia*.

Leaf blades mostly ovate, obovate, or elliptic, 3 to 10 cm. wide.

Pubescence of the lower surface of the leaves coarse, loose; inflorescence fulvous-villous.....8. *P. chamissonis*.

Pubescence of the lower surface of the leaves fine, appressed; inflorescence sericeous.....9. *P. liebmanni*.

1. *Persea cinerascens* Blake, Journ. Washington Acad. Sci. 10: 18. f. 2. 1920.

Known only from the type locality, Zacuapan, Veracruz.

Tree; branchlets densely pilose-tomentose; leaf blades elliptic to oval-oblong or obovate, 10 to 20 cm. long, 5 to 8 cm. wide, acute or short-pointed, pilosulous beneath; pedicels 1 mm. long; perianth 7 to 8.5 mm. long; fruit subglobose, glaucous-blue, about 12 mm. in diameter.

2. *Persea schiedeana* Nees, Syst. Laurin. 130. 1836.

Persea gratissima schiedeana Meissn. in DC. Prodr. 15¹: 53. 1864.

Persea pittieri Mez, Bot. Jahrb. Engler 30: Beibl. 67: 15. 1901.

Veracruz and probably elsewhere; type from Misantla. Guatemala to Panama.

Tree, 15 to 20 or rarely even 50 meters high; leaf blades obovate to oval-obovate or oval, 12.5 to 30 cm. long, 7 to 15 cm. wide, obtuse or rounded and short-pointed at apex, beneath glaucous and pilosulous; perianth 6 to 8 mm. long. "Chinini" (Veracruz); "coyó," "coyoté," "kiyó," "kiyau," "chucte," "chaucte," "shucte," "kotyó," (Guatemala); "aguacatón" (Panama).

This species is cultivated in Veracruz and is probably also indigenous there. The flowers are pale greenish yellow, turning crimson at the base in age, or sometimes light rose. The stamens also turn crimson with age, and the glands are bright orange. The flowers of *P. americana* are said to be pale green, not changing color with age.

The fruit is much like that of the common avocado, and equally variable in form and quality. The skin is thick but leathery and pliable; the flesh brownish white, of fine oily texture. The flavor is similar to that of the common avocado but distinguishable, suggesting that of a ripe coconut. The cotyledons when cut are rose-pink; in *P. americana* they are whitish.

3. *Persea floccosa* Mez, Jahrb. Bot. Gart. Berlin 5: 148. 1889.

Known only from the type locality, Chinantla, Oaxaca.

Tree; leaf blades ovate, 11 to 17 cm. long, 5 to 7.5 cm. wide, acuminate, glaucescent beneath; perianth 5 mm. long.

4. *Persea americana* Mill. Gard. Diet. ed. 8. 1768.

Laurus persea L. Sp. Pl. 370. 1753.

Persea gratissima Gaertn. f. Fruct. & Sem. 3: 222. pl. 221. 1807.

Persea persea Cockerell, Bull. Torrey Club 19: 95. 1892.

Commonly cultivated in Mexico, and probably native in the southern part. Widely cultivated in tropical regions.

Tree, sometimes 20 meters high, with a trunk 60 cm. in diameter, the bark rather thin, light gray, fissured; leaves oval to elliptic, 10 to 30 cm. long, 3.5 to 20 cm. wide, acute or obtuse, copiously pubescent when young; flowers greenish; perianth 5.5 to 7 mm. long; fruit oval or pear-shaped, sometimes 18 cm. long, smooth, with thick oily pulp and a very large seed; wood rather soft, fine-grained, reddish brown or light brown, its specific gravity about 0.65.

The fruit is known in Mexico as "aguacate" or "ahuacate," from the Nahuatl "ahuacatl"¹ or "ahuacuahuatl." The following additional names are used, some of them referring to horticultural varieties: "Aguacate oloroso" (Veracruz, Oaxaca); "on" (Yucatán, Maya); "aguacate xinene," "xinene" (Oaxaca, *Reko*); "tonalahuate" (Morelos, Veracruz, *Ramírez*); "cupanda" (Tarascan); "aguacatillo" (Michoacán, Jalisco); "pahuatl" (the name of a large variety, according to Starr²); "pagua" (a large variety, *Robelo*); "koidium," "koitum," "kuitm" (Mixe, the fruit, *Belmar*; the tree is "kuitm-keip"); "ttatzân" (Otomí, *Buelna*); "palta" (Colombia, Ecuador, Peru; the Quechua name; *Ramírez* reports it as in use in Mexico, but this is doubtful); "cura" (Colombia). The best English name is "avocado," a derivative of "aguacate." This word has been variously modified, the extremes being perhaps "abogado," the Spanish word for "lawyer," and "watercats," employed by some English writers. The name "alligator-pear" is sometimes applied, but this is an objectionable name. In the various Maya dialects of Central America the names employed are "o," "oj," "ju," "un," "um," and "on."

The avocado is one of the best-known of Mexican trees, having been cultivated for many centuries. It has been introduced into most tropical regions of the world, and in recent years into southern Florida and California. It is of interest to note that the Trapp avocado, the form most commonly grown in Florida, belongs to a distinct species, of unknown origin, distinguished by having the perianth glabrous within. It has been described recently by Blake³ as *Persea leiogyna*.

Two principal horticultural forms of *Persea americana* are recognized, the "West Indian type," with smooth fruit and leathery skin, and the "Guatemalan type," with rough or warty fruit and brittle skin. There is great variation in the size and shape of the fruit.

In tropical America the trees are grown from seeds, beginning to bear when four or five years old and continuing their production sometimes for 50 years or more. In modern practice the best forms are propagated by budding. A good-sized tree will produce as many as 500 fruits per year. The fruit has a pleasant flavor, and is usually eaten as a salad, with the addition of salt, pepper, vinegar,

¹ This is also the Nahuatl term for testicle. It is uncertain which is the primitive meaning.

² Starr, In Indian Mexico, p. 245. 1908.

³ Journ. Washington Acad. Sci. 10: 19. 1920.

and other condiments, but sometimes it is prepared with sugar or wine. It is eaten by all kinds of domestic animals.

A large number of therapeutic uses are reported for the plant. The pulp is credited with hastening the suppuration of wounds and is reputed to have aphrodisiac and emmenagogue properties. The rind is used to expel intestinal parasites. The seeds contain a milky juice which turns red on exposure, and which produces an indelible stain on linen. Ground and mixed with cheese, meal, etc., the seeds are used to poison rats and mice. An ointment of the pulverized seeds is sometimes employed as a rubefacient, and a decoction of them, or a piece of a seed placed in the cavity of a tooth, is believed to cure toothache. The leaves and bark are employed in domestic medicine because of the pectoral, stomachic, emmenagogue, resolute, and antiperiodic properties ascribed to them. The seeds are used also for the manufacture of various trinkets.

The avocado is noted by all the early writers upon tropical American plants. Oviedo (Lib. IX, Cap. XXIII) gives a very full account of the tree and of the fruit, which he describes as superior to the pears of Castile. Acosta gives a brief account of the fruit, under the name "palta." Sahagún writes the name "auacatl," and states that there are also other kinds besides the common one: The "tlacaçlauacatl," which women nursing dare not eat, because the fruit causes diarrhoea in the children nursed; and the "quillauacatl," or "green aguacate," a form with green skin, "and very good to eat." He states that the powdered seeds were employed as a remedy for dandruff. Hernández also gives a long account¹ of the avocado, in a chapter entitled "*De Ahuaca Quauhiti*, seu Arbore Querciformi butiraceo fructu." He describes the leaves as fragrant, and consequently doubtless refers to the Mexican type, *Persea americana drymifolia*. He states that by pressure oil was obtained from the seeds and used to cure eruptions of the skin.

4a. *Persea americana drymifolia* (Schlecht. & Cham.) Blake, Journ. Washington Acad. Sci. 10: 15. 1920.

Persea drymifolia Schlecht. & Cham. Linnaea 6: 365. 1831.

Nuevo León to Sinaloa, Veracruz, and Puebla; type from Papantla, Veracruz. Guatemala; cultivated in Ecuador.

Leaves usually smaller than in *P. americana*, elliptic or oval, acute or acuminate; fruit thin-skinned. "Aguacate oloroso."

This is the common Mexican avocado, and the vernacular names reported above apply also, presumably, to the variety.

5. *Persea longipes* (Schlecht.) Meissn. in DC. Prodr. 15¹: 55. 1864.

Laurus longipes Schlecht. Linnaea 7: 390. 1832.

Veracruz; type from Hacienda de la Laguna; perhaps also in Guerrero.

Tree or shrub; leaves oblong or lanceolate, 8 to 15 cm. long, attenuate, green and lustrous above, paler beneath.

6. *Persea veraguensis* Seem. Bot. Voy. Herald 193. 1854.

Oaxaca and Chiapas. Type from Chiriquí, Panama.

Tree, sometimes 20 meters high; leaves 8 to 17 cm. long, acuminate, with conspicuous venation, the pubescence of the lower surface somewhat lustrous; flowers sericeous.

7. *Persea podadenia* Blake, Contr. Gray Herb. n. ser. 52: 62. 1917.

Sonora, Durango, and Jalisco; type from San Ramón, Durango.

Shrub or tree; leaves 9 to 16 cm. long, acute or acutish, pale beneath, petiolate. "Laurel" (Jalisco); "laurel de la sierra" (Sonora).

Leaves with a flavor similar to that of sassafras; used for seasoning food.

¹ Thesaurus 89. 1651.

8. *Persea chamissonis* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 168. 1889.

San Luis Potosí, Veracruz, and Oaxaca; type from Chiconquiaco, Veracruz.

Small tree; leaves lance-oblong to obovate-oval, 5.5 to 11 cm. long, obtuse or acute, copiously pubescent.

9. *Persea liebmanni* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 166. 1889.

Sinaloa to Oaxaca; type from Chinantla, Oaxaca.

Tree; leaves mostly oval or oval-ovate, 10 to 18 cm. long, acute or obtuse, very thick; fruit globose, 1 cm. in diameter.

4. **SASSAFRIDIUM** Meissn. in DC. Prodr. 15¹: 171. 1864.1. *Sassafridium macrophyllum* Rose, Contr. U. S. Nat. Herb. 1: 355. 1895.

Sinaloa to Veracruz and Tabasco; type from Manzanillo.

Tree, sometimes 10 meters high, nearly glabrous; leaves lance-oblong to ovate or oval-oblong, 10 to 20 cm. long, petiolate, acute or acuminate, lustrous; flowers numerous, white, sweet-scented; perianth 6-lobed, the lobes subequal; perfect stamens 9, those of the first and second series eglandular, those of the third series with 2 glands at the base; anthers 4-celled, introrse; fruit about 1 cm. long. "Laurel," "laurel blanco" (Tabasco); "aguacatillo" (Michoacán, Guerrero); "laurelón" (Sinaloa).

5. **HUFELANDIA** Nees, Pl. Laur. Expos. 11. 1833.1. *Hufelandia mexicana* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 20. 1889.

Veracruz and Oaxaca.

Shrub or tree; leaves elliptic or ovate, acute or acuminate, green, glabrous; perianth 6-lobed; perfect stamens 9, those of the first and second series eglandular, the anthers 2-celled, introrse, the anthers of the third series extrorse, the filaments each with 2 glands at the base.

Reported from Mexico as *H. pendula* Meisn. and *Beilschmiedia pendula* Hemsl.

6. **MISANTECA** Cham. & Schlecht. Linnaea 6: 367. 1831.

Trees, nearly glabrous, with large leaves, these short-petiolate, acuminate; perianth 6-lobed; perfect stamens 3, connate into a fleshy column about the pistil, the anthers 2-celled; fruit large, partly inclosed in the cuplike accrescent calyx tube.

Flowers sessile, capitate.....1. *M. capitata*.

Flowers pedicellate, paniculate.....2. *M. jurgensenii*.

1. *Misanteca capitata* Cham. & Schlecht. Linnaea 6: 367. 1831.

Acrodiclidium glabrum T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 497. 1919.

Oaxaca and Veracruz; type from Misantla and Papantla, Veracruz. Guatemala.

Large tree; leaves oval to lance-oblong, 11 to 25 cm. long, thick and leathery; flower heads 1 to 1.5 cm. in diameter, very long-pedunculate; fruit 2.5 cm. long. "Laurel," "palo misanteco" (Veracruz); "laurel de la sierra" (Oaxaca).

The wood is said to be valuable for carpentry and cabinet work.

2. *Misanteca jurgensenii* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 102. 1889.

Oaxaca; type from Pinatopa.

Tree; leaves lance-oblong or oblong-oblongate, 14 to 20 cm. long, acute at the base, lustrous; fruit ellipsoid, 2.5 cm. long.

The fruit seated in the large calyx tube resembles an acorn and its cup.

7. **PHOEBE** Nees, Syst. Laurin. 98. 1836.

Trees or shrubs; leaves usually large, glabrous or pubescent, petiolate; flowers paniculate; perianth 6-lobed; perfect stamens 9, those of the first and second

series eglandular, with introrsely 4-celled anthers, those of the third series each with 2 glands at the base, the anthers extrorsely 4-celled.

Ovary pilose.....1. *P. pallescens*.

Ovary glabrous.

Leaves sessile, cordate.....2. *P. amplexicaulis*.

Leaves petiolate.

Mature leaves conspicuously soft-pilose or villous beneath, never 3-nerved.

Filaments pilose.

Leaves acute at base.....3. *P. psychotrioides*.

Leaves obtuse or rounded at base.....4. *P. mollis*.

Filaments of the outer series of stamens glabrous.

Leaves obtuse or cordate at base.

Filaments as long as the anthers or slightly shorter. 5. *P. betazensis*.

Filaments very short or none.

Anthers rectangular-quadrate.....6. *P. helicterifolia*.

Anthers elliptic.....7. *P. nectandroides*.

Leaves acute at base.

Leaves lanceolate.....8. *P. bourgeauviana*.

Leaves elliptic or subovate.....9. *P. pachypoda*.

Mature leaves glabrous beneath or glabrate or short-tomentellous, never soft-pilose.

Leaves pinninerved or very obscurely triplinerved, glabrous.

Filaments less than one-third as long as the anthers.

10. *P. subtriplinervia*.

Filaments about as long as the anthers.

Flowers pubescent; leaves less than 3 cm. wide.

11. *P. tampicensis*.

Flowers glabrous; leaves 4 to 6 cm. wide.....12. *P. ehrenbergii*.

Leaves distinctly triplinerved.

Flowers pilose.....13. *P. mexicana*.

Flowers glabrous.

Inflorescence equaling or longer than the leaves.....14. *P. effusa*.

Inflorescence shorter than the leaves.

Filaments partly pilose.....15. *P. salicifolia*.

Filaments glabrous.....16. *P. barbeyana*.

1. *Phoebe pallescens* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 218. 1889.

Known only from the type locality, Orizaba.

2. *Phoebe amplexicaulis* (Cham. & Schlecht.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 216. 1889.

Persea amplexicaulis Cham. & Schlecht. Linnaea 5: 90. 1830.

Known only from the type locality, Cerro Colorado, Veracruz.

Leaves cordate-oblong, 11.5 cm. long, 3 cm. wide, coriaceous, glabrous, long-acuminate; inflorescence few-flowered.

3. *Phoebe psychotrioides* (H. B. K.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 191. 1889.

Ocotea psychotrioides H. B. K. Nov. Gen. & Sp. 2: 172. 1817.

Forests of Veracruz and Oaxaca; type from Jalapa, Veracruz.

Shrub; leaves elliptic to lance-oblong, 5 to 11 cm. long, acuminate, bright green and lustrous on the upper surface.

4. *Phoebe mollis* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 192. 1889.

Described from Mexico, the locality not known.

Leaves lanceolate, about 7.5 cm. long, acute, white-tomentose beneath.

5. *Phoebe betazensis* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 192. 1889.
Oaxaca; type from Betaza. Guatemala.
Shrub, or perhaps sometimes a tree; leaves elliptic, oblong, or obovate, 8 to 20 cm. long, acuminate, pilose on both surfaces; panicles large, long-pedunculate; fruit 1.5 to 2 cm. long.
6. *Phoebe helicterifolia* (Meissn.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 193. 1889.
Oreodaphne helicterifolia Meissn. in DC. Prodr. 15¹: 123. 1864.
Described from San Bartolo, Chiapas. Guatemala to Costa Rica.
Shrub or tree; leaves oblong, lanceolate, or elliptic, 5 to 10 cm. long, copiously pubescent, acute or acuminate, short-petiolate. "Quizarrá amarilla" (Guatemala, Costa Rica).
7. *Phoebe nectandroides* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 194. 1889.
Veracruz, Oaxaca, and Chiapas; type from Orizaba. Central America.
Tree, about 12 meters high; leaves obovate or broadly elliptic, 15 to 25 cm. long, pilose; branches of the inflorescence glabrous.
Previously reported from Mexico as *Ocotea umbrosa* Mart.
8. *Phoebe bourgeauviana* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 194. 1889.
Known only from the type locality, Córdoba, Veracruz.
Leaves lanceolate, about 10 cm. long, soft-pubescent beneath, acuminate; fruit about 1 cm. long.
9. *Phoebe pachypoda* (Nees) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 196. 1889.
Persea pachypoda Nees, Linnaea 21: 490. 1847.
Oreodaphne benthamiana Nees, Linnaea 21: 521. 1847.
Phoebe hartwegii Meissn. in DC. Prodr. 15¹: 30. 1864.
Persea hartwegii Hemsl. Biol. Centr. Amer. Bot. 3: 72. 1882.
Phoebe benthamiana Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 195. 1889.
San Luis Potosí, Veracruz, and Guanajuato; type from El Banco.
Shrub or tree, 3 to 7 meters high; leaves 7.5 to 12 cm. long, petiolate, acuminate, very thick, green above, pale and soft-pilose beneath; fruit 1 to 1.5 cm. long. "Aguacate cimarrón."
Fruit said to be edible.
10. *Phoebe subtriplinervia* (Meissn.) Standl.
Oreodaphne subtriplinervia Meissn. in DC. Prodr. 15¹: 125. 1864.
Ocotea subtriplinervia Hemsl. Biol. Centr. Amer. Bot. 3: 74. 1882.
Phoebe galeottiana Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 200. 1889.
Veracruz; type from Jalapa.
Shrub or perhaps a tree, glabrous; leaves lanceolate, 4 to 6 cm. long, acuminate, coriaceous; flowers subracemose, white or yellowish, 2 mm. long.
11. *Phoebe tampicensis* (Meissn.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 200. 1889.
Oreodaphne tampicensis Meissn. in DC. Prodr. 15¹: 136. 1864.
Ocotea tampicensis Hemsl. Biol. Centr. Amer. Bot. 3: 74. 1882.
Ocotea angustata Blake, Contr. Gray Herb. n. ser. 52: 63. 1917.
Tamaulipas and San Luis Potosí; type from Tampico.
Tree, 6 to 10 meters high; leaves linear-lanceolate, 6 to 11 cm. long, attenuate, dark green, lustrous; fruit 1.5 to 2 cm. long.
12. *Phoebe ehrenbergii* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 201. 1889.
Type from Temascaltepec, State of Mexico; perhaps also in Oaxaca.
Leaves elliptic or elliptic-lanceolate, 12 to 16.5 cm. long, acute, glabrous.
13. *Phoebe mexicana* Meissn. in DC. Prodr. 15¹: 31. 1864.
Persea mexicana Hemsl. Biol. Centr. Amer. Bot. 3: 72. 1882.

Veracruz; type from Jalapa. Reported from Costa Rica.

Large tree; leaves oblong-lanceolate or oblong, 5 to 12.5 cm. long, acuminate, coriaceous, glabrous. "Quechol aguacate."

14. *Phoebe effusa* Meissn. in DC. Prodr. 15¹: 33. 1864.

Persea effusa Hemsl. Biol. Centr. Amer. Bot. 3: 71. 1882.

Veracruz. Central America.

Tree, sometimes 30 meters high, with a trunk a meter in diameter, the bark grayish; leaves lanceolate to elliptic-oblong, 6 to 14 cm. long, acuminate or obtuse; flowers greenish, ill-scented; wood light brown, moderately soft, light, weak, fine-grained. "Sigua blanca" (Panama).

15. *Phoebe salicifolia* Nees, Linnaea 21: 488. 1847.

Persea salicifolia Hemsl. Biol. Centr. Amer. Bot. 3: 71. 1864.

Known only from the type locality, Regla, Hidalgo.

Tree, 6 meters high; leaves lanceolate or oblong-lanceolate, 6 to 10 cm. long, acuminate.

16. *Phoebe barbeyana* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 209. 1889.

Known only from the type locality, Orizaba, Veracruz.

Leaves elliptic, 8 to 11 cm. long, acuminate, glabrate; fruit about 1 cm. long.

8. *OCOTEA* Aubl. Pl. Guian. 2: 780. 1775.

Trees or shrubs with coriaceous leaves; flowers in axillary or subterminal panicles; perianth 6-lobed; perfect stamens 9, those of the first and second series eglandular, the anthers introrsely 4-celled, those of the third series minute or sometimes wanting; fruit at first inclosed in the indurate perianth tube, later exserted.

Flowers glabrous-----1. *O. cernua*.

Flowers pubescent.

Flowers dioecious-----2. *O. puberula*.

Flowers perfect.

 Anthers of the two outer series sessile, foliose, not contracted at base.

 Leaves mostly 3.5 to 5 cm. wide, obtuse or acutish----3. *O. veraguensis*.

 Leaves 7 to 15 cm. wide, acuminate-----4. *O. perseifolia*.

 Anthers of the two outer series borne on filaments, or sessile but contracted at the base, not foliose.

 Leaves tomentellous beneath, broadly elliptic-----5. *O. rubriflora*.

 Leaves barbate beneath in the axils of the veins, lanceolate or lance-elliptic.

 Staminodia conspicuous, white-pilose-----6. *O. effusa*.

 Staminodia none-----7. *O. klotzschiana*.

1. *Ocotea cernua* (Nees) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 377. 1889.

Oreodaphne cernua Nees, Syst. Laurin. 424. 1836.

Tabasco and Campeche. Lesser Antilles; Central America.

Tree, 6 to 8 meters high, glabrous; leaves elliptic or oval-elliptic, 8 to 17 cm. long, acuminate, petiolate. "Laurel de bajo" (Campeche).

2. *Ocotea puberula* Nees, Syst. Laurin. 472. 1836.

Strychnodaphne puberula Nees, Linnaea 8: 39. 1833.

Reported from Veracruz. Widely distributed in South America.

Leaves elliptic-oblong or lance-oblong, 7.5 to 20 cm. long, acute or acuminate.

3. *Ocotea veraguensis* (Meissn.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 240. 1889.

Sassafridium veraguense Meissn. in DC. Prodr. 15¹: 171. 1864.

Chiapas. Central America; type from Panama.

Small or medium-sized tree, the bark grayish, smooth or slightly rugose, aromatic, with an odor like cinnamon; leaves oblong-elliptic, 7 to 12 cm. long, glabrous; flowers white, sweet-scented; fruit 1.5 cm. long; wood hard, moderately heavy, very close-grained, durable, taking a good polish. "Canelo," "canelillo" (Costa Rica); "sigua canelo" (Panama); "palo colorado" (Nicaragua).

4. *Ocotea perseifolia* Mez & Donn. Smith, Bot. Gaz. 20: 10. 1895.

Forests of Tabasco. Guatemala; type from Yzabal.

Tree; leaves ovate, oblong-ovate, or oval-ovate, 15 to 30 cm. long, acuminate; panicles large, many-flowered. "Laurel de chile" (Tabasco).

5. *Ocotea rubriflora* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 279. 1889.

Known only from the type locality, Teapa, Tabasco.

Tree; leaves broadly elliptic, about 23 cm. long, acuminate.

6. *Ocotea effusa* (Meissn.) Hemsl. Biol. Centr. Amer. Bot. 3: 73. 1882.

Oreodaphne effusa Meissn. in DC. Prodr. 15¹: 120. 1864.

Oaxaca; type from San Pedro Nolasco.

Leaves lanceolate, 5 to 10 cm. long, long-acuminate.

7. *Ocotea klotzschiana* (Nees) Hemsl. Biol. Centr. Amer. Bot. 3: 73. 1864.

Oreodaphne klotzschiana Nees, Linnaea 21: 523. 1847.

Veracruz and perhaps elsewhere.

Tree or shrub; leaves lanceolate or oblong, 5 to 8.5 cm. long, narrowly acuminate, lustrous.

9. **NECTANDRA** Roland; Rottb. Act. Litt. Univ. Hafn. 1: 279. 1778.

Trees or shrubs with coriaceous leaves; flowers in axillary or terminal, pedunculate cymes; perianth 6-lobed; perfect stamens 9, those of the first and second series eglandular, the anthers introrsely 4-celled, those of the third series with glands at base, the anthers extrorsely 4-celled.

Nectandra rodiaei Hook., of northern South America, is the greenheart, whose wood is valuable, especially because of its great durability in water. The bark contains the alkaloids bebeerine, sipirine, and nectrandrine. It is tonic, somewhat astringent, and febrifuge, somewhat resembling cinchona in properties although greatly inferior in quality. It has been used in the treatment of intermittent and remittent fevers. The Indians of British Guiana are said to make a kind of bitter bread from the seeds, which contain nearly 50 per cent of starch. Anthers of the outer series sessile. Flowers pubescent.

Ovary densely tomentose-----1. *N. sinuata*.

Ovary glabrous or nearly so.

Style equaling or longer than the ovary-----2. *N. reticulata*.

Style shorter than the ovary.

Young leaves conspicuously yellowish-tomentellous on the upper surface.

3. *N. pallida*.

Young leaves glabrous or nearly so on the upper surface.

4. *N. glabrescens*.

Anthers of the outer series conspicuously stipitate.

Filaments of the first and second series of stamens pilose.

Leaves not reticulate, sericeous when young-----5. *N. nitida*.

Leaves reticulate, not sericeous-----6. *N. sanguinea*.

Filaments of the first and second series of stamens glabrous.

Style decidedly longer than the ovary; leaves glabrous---7. *N. rectinervia*.

Style equaling or longer than the ovary; leaves more or less pubescent beneath.

Flowers 6 to 9 mm. broad-----8. *N. concinna*.

Flowers 4 to 6 mm. broad-----9. *N. pichurim*.

1. *Nectandra sinuata* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 402. 1889.

Oaxaca. Central America; type from Guatemala.

Tree, 12 to 15 meters high; leaves oblong, obovate, or obovate-oval, 10 to 25 cm. long, petiolate, obtuse or acute, velvety-pilose; flowers large, white within, red outside; fruit about 3 cm. long. "Aguacatillo" (Oaxaca); "quizarra hedionda" (Costa Rica).

2. *Nectandra reticulata* (Ruiz & Pav.) Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 404. 1889.

Laurus reticulata Ruiz & Pav. Fl. Peruv. Chil. 4: pl. 348. 1802.

Ocotea mollis H. B. K. Nov. Gen. & Sp. 2: 164. 1817.

Nectandra mollis Nees, Syst. Laurin. 287. 1836.

Oaxaca and Veracruz. Central America and South America; type from Peru.

Tree, sometimes 40 meters high; leaves elliptic-oblong, 15 to 25 cm. long, acute or acuminate, puberulent, with conspicuous venation; flowers white.

3. *Nectandra pallida* Nees, Linnaea 21: 510. 1847.

Michoacán; also reported from Mexico, the locality not indicated but probably in Veracruz. British Guiana.

Leaves lanceolate, about 11 cm. long, acuminate, tomentellous.

4. *Nectandra glabrescens* Benth. Bot. Voy. Sulph. 161. 1844.

Tepec to Guerrero, the type region. Reported from Central America and Colombia.

Tree, 8 to 14 meters high; leaves lance-oblong to elliptic, 10 to 18 cm. long, acuminate, lustrous; flowers white.

5. *Nectandra nitida* Mez, Jahrb. Bot. Gart. Mus. Berlin 5: 461. 1889.

Type from western Mexico, the locality not indicated. Panama.

Tree, 12 to 15 meters high; leaves ovate or elliptic, about 12.5 cm. long, acuminate, sericeous when young, glabrate in age; fruit subglobose, 6 mm. long.

6. *Nectandra sanguinea* Rottb. Act. Litt. Univ. Hafn. 1: 279. 1778.

Ocotea salicifolia H. B. K. Nov. Gen. & Sp. 2: 166. 1817.

Ocotea globosa Cham. & Schlecht. Linnaea 6: 366. 1831.

Tamaulipas to Tabasco. Central America and northern South America; type from Surinam.

Shrub or small tree, sometimes 8 meters high, with a trunk nearly a meter in diameter; leaves lanceolate to elliptic, 7 to 15 cm. long, obtuse to attenuate, petiolate, lustrous; flowers white or pinkish; fruit globose, 1 cm. in diameter, black. "Piesito de paloma" (Tabasco); "aguacatillo" (Tamaulipas).

Specimens from Yucatán, reported by Mez as *N. coriacea* (Swartz) Griseb., probably belong here. *N. loesenerii* Mez. (Bull. Herb. Boiss. II. 5: 243. 1905), from Veracruz, is closely related, judging from the description.

7. *Nectandra rectinervia* Meissn. in DC. Prodr. 15¹: 158. 1864.

Veracruz. Central America and northern South America; type from Cumaná, Venezuela.

Tree; leaves elongate-oblong, 10 to 20 cm. long, long-acuminate; flowers white or lilac.

8. *Nectandra concinna* Nees, Syst. Laurin. 322. 1836.

Veracruz and Oaxaca. Central and South America.

Tree; leaves elliptic or oblong, 9 to 16 cm. long, acute or acuminate; flowers white. "Angelino aceiteno" (Venezuela).

9. *Nectandra pichurim* (H. B. K.) Mez, Jahrb Bot. Gart. Mus. Berlin 5: 449. 1889.

Ocotea pichurim H. B. K. Nov. Gen. & Sp. 2: 266. 1817.

Reported from Mexico by Mez, the localities not stated. Panama and South America.

Shrub or tree, sometimes 20 meters high, with white bark; leaves lanceolate or ovate-lanceolate, 10 to 19 cm. long, long-acuminate; flowers white, fragrant; fruit globose, 6 mm. in diameter.

47. HERNANDIACEAE. Hernandia Family.

Trees or shrubs; leaves alternate, entire or lobed, estipulate, petiolate; flowers inconspicuous, cymose or paniculate, unisexual; perianth 4 to 10-lobed; corolla none; stamens as many as the perianth lobes, 2-celled; fruit 1-seeded.

Leaves entire; fruit surrounded by a fleshy involucre; flowers in clusters of 3 surrounded by an involucre-----1. **HERNANDIA**.

Leaves usually lobed; fruit nutlike, 2 of the calyx lobes persistent, developing into winglike appendages; flowers not involucre-----2. **GYROCARPUS**.

1. **HERNANDIA**¹ L. Sp. Pl. 981. 1753.

1. *Hernandia guianensis* Aubl. Pl. Guian. 2: 848. 1775.

Veracruz. Costa Rica to the Guianas.

Tree, about 8 meters high; leaves ovate to rounded-oval, 10 to 18 cm. long, 6 to 12 cm. wide, rounded or subcordate at base, rounded and short-pointed at apex, glabrous or somewhat puberulent beneath, long-petiolate; flowers in long-stalked cymes, finely tomentulose, white. "Aguacatillo" (Costa Rica).

A single Mexican specimen has been seen by the writer, collected by Liebmann in dense forests near Pital. The specimen is in poor condition, and the specific determination consequently very doubtful.

2. **GYROCARPUS** Jacq. Stirp. Amer. 282. 1763.

1. *Gyrocarpus americanus* Jacq. Stirp. Amer. 282. pl. 178, f. 80. 1763.

Gyrocarpus jacquini Roxb. Pl. Corom. 1: 2. pl. 1. 1795.

Gyrocarpus jacquini schiedeii Schlecht. Linnaea 19: 399. 1842.

Veracruz to Yucatán, Oaxaca, and Tepic. Central America, Colombia, and Venezuela; tropical Africa, Asia, and Australia.

Large or medium-sized tree, sometimes 20 meters high, with thick branches; leaves alternate, long-petiolate, often 30 cm. wide or larger, entire or palmately lobed; flowers small, unisexual, in broad cymes; calyx lobes accrescent in fruit and becoming 10 to 12 cm. long and about 1 cm. wide. "Palo hediondo" (Oaxaca, Guerrero, Morelos); "quitlacotli," "quitlacotli" (Nahuatl); "xkis" or "cils" (Yucatán, Maya); "babá" (Oaxaca, Reko); "palo del zopilote" (Oaxaca); "volador" (Yucatán, Venezuela, Colombia); "talalate," "gallito," "caballitos" (Nicaragua).

The wood is white and very soft and light, a cubic foot weighing about 23 pounds. It is said to take paint and varnish well, and in some places is used for making toys and light boxes. In India the seeds are strung as necklaces and rosaries.

¹ The genus was named for Francisco Hernández; see p. 10.

48. PAPAVERACEAE. Poppy Family.

Shrubs or small trees with colored juice; leaves alternate, entire, dentate, or lobate; flowers perfect; petals 4 or 6, sometimes none; stamens numerous; fruit a 1-celled capsule.

Herbaceous representatives of several other genera occur in Mexico.

Leaves very spiny; sepals 3. Petals large, yellow-----1. **ARGEMONE**.

Leaves not spiny; sepals 2.

Petals large, yellow; leaves entire, coriaceous-----2. **DENDROMECON**.

Petals none; leaves lobed or dentate, membranaceous-----3. **BOCCONIA**.

1. ARGEMONE L. Sp. Pl. 508. 1753.

1. *Argemone fruticosa* Thurb.; A. Gray, Mem. Amer. Acad. n. ser. 5: 306. 1855.

Coahuila; type from La Peña.

Shrub, 45 to 75 cm. high; leaves 2.5 to 4 cm. long, sessile, shallowly lobed, very glaucous, the lobes tipped with slender yellow spines; flowers pale yellow, 7 to 8 cm. broad.

Several other species of the genus are found in Mexico, but they are all herbs. They are known by the vernacular names "chicalote" and "cardo santo."

2. DENDROMECON Benth. Trans. Hort. Soc. Lond. II. 1: 407. 1834.

1. *Dendromecon rigidum* Benth. Trans. Hort. Soc. Lond. II. 1: 407. 1834.

Northern Baja California. California.

Shrub, 0.5 to 2.5 meters high; leaves lanceolate or lance-elliptic, 3.5 to 7 cm. long, acute, nearly sessile, very thick and conspicuously veined; flowers solitary, terminal, 4 to 5 cm. broad; capsule very slender, linear, about 6 cm. long.

3. BOCCONIA L. Sp. Pl. 505. 1753.

Shrubs or small trees with yellow or reddish juice, the stems simple or sparsely branched; leaves often very large; flowers small, in large panicles; capsule small, stipitate, dehiscent to the base; seeds solitary or few.

In Mexican literature the species are much confused, since all are similar in general appearance and have the same properties. The following references to the chemical properties of the plants may be cited: E. Armendáñez. Análisis de la *Bocconia*, Estudio 4: 471; Mariano Lozano y Castro, Estudio químico de la corteza de *Bocconia*, Estudio 4: 281, 344; Villada, Estudios relativos á la *Bocconia arborea* y los alcaloides de las Papaveráceas, Naturaleza II. 2: 207-212.

Leaves entire or dentate-----1. **B. integrifolia**.

Leaves pinnatifid.

Lobes of the leaves narrow, long-attenuate-----2. **B. arborea**.

Lobes broad, rounded or acute.

Lobes acute or acutish, conspicuously dentate-----3. **B. frutescens**.

Lobes rounded at apex, entire or sinuate-dentate-----4. **B. latisepala**.

1. *Bocconia integrifolia* Humb. & Bonpl. Pl. Aequin. 1: 119. pl. 35. 1808.

Bocconia integrifolia mexicana DC. Reg. Veg. Syst. 2: 91. 1821.

Veracruz. Central America to Peru (type locality); Jamaica.

Branched shrub, 1 to 2 meters high; leaves oblong or oblanceolate, 15 to 25 cm. long, tomentose beneath or glabrous and glaucous.

2. *Bocconia arborea* S. Wats. Proc. Amer. Acad. 25: 141. 1890.

Durango and Sinaloa to Puebla and Oaxaca; type from Lake Chapala, Jalisco. Guatemala.

Tree, 4 to 8 meters high, the trunk sometimes 60 cm. in diameter, covered with corky bark; leaves clustered at the ends of the branches, 10 to 45 cm. long or larger, with few or numerous narrow lobes, glabrous above, beneath pale and tomentose or glabrous. "Chicalote," "chicalote de árbol" (Tepic); "llora-sangre" (Michoacán, Oaxaca, etc.); "palo amarillo" (Michoacán); "árbol de Judas," "palo de Judas" (Durango, *Patoni*); "sauco" (Durango, *Palmer*); "enguande," "inguande," "engüemba" (Michoacán, Tarascan, *Ramírez*); "mano de león" (Oaxaca); "cocoxihuitl" (Jalisco, *Ramírez*); "tlacoxihuitl" (Jalisco, Michoacán, *Ramírez*); "guachilli" (*Ramírez*); "ahuacachilli" (Morelos); "palo del diablo" (Durango, Sinaloa); "palmilla" (Sinaloa).

The bark yields a yellow dye which was used by the early inhabitants of Mexico for coloring plumes and other objects. The plant contains several alkaloids similar to those obtained from the poppy plant (*Papaver somniferum* L.). These, when injected beneath the skin, cause local anesthesia, and for this purpose they have been used by surgeons in the City of Mexico, while performing operations. The wood is useless for timber or fuel, but is sometimes employed in tanning.

The species is illustrated by Hernández,¹ and described in a chapter headed "De Enguamba." He states that the plant grows about Uruapam, and that an oil extracted from the fruit is employed for dissolving tumors and cleansing ulcers. On page 158 of the Thesaurus Hernández figures and describes another plant under the heading "De Cocoxihuitl, seu herba acri." The figure may represent either *Bocconia arborea* or *B. frutescens*. Hernández's description is based upon a plant in the gardens of the King of Texcoco, where, he says, he "studied the plant for some days." He gives the meaning of the Nahuatl name as "hot-herb," but it may be that it should be translated rather "yellow-herb," an allusion to the color of the juice. He gives the following account of the names and medicinal properties of the plant: "The plant is hot and dry in the fourth degree, and possesses a certain astringency. The shoots, deprived of the bark, dissipate films and ulcers of the eyes. The juice relieves wind on the stomach, cures eruptions (as does the fruit also), and alleviates pains of cold origin. The leaves, crushed and applied as a poultice, heal old wounds and dissolve warts. Some call this tree *Quauh chilli*, because of its acrid and burning flavor, like that of the peppers called *Chilli* by the Mexicans. It grows in temperate or hot regions, as well as in gardens. Some call it also *Totolinyzochtl*, or pigeon-flower, and some *Tlacoxihuitl*, [rod-herb]."

3. *Bocconia frutescens* L. Sp. Pl. 505. 1753.

Bocconia frutescens cernua Moc. & Sessé; DC. Reg. Veg. Syst. 2: 90. 1821.

Tamaulipas, San Luis Potosí, and Veracruz. Central America to Peru; West Indies.

Shrub or tree, 1 to 7.5 meters high, the stems with large white pith, covered with smooth pale bark; leaves 12 to 40 cm. long or larger, petiolate, usually with numerous lobes, tomentose or sometimes glaucous beneath; flowers purplish; fruit usually glaucous. "Gordolobo" (Veracruz); "cuatlataya" (*Ramírez*); "calderón" (Tamaulipas); "llora-sangre" (Veracruz); "guacamayo," "tabaquillo" (Costa Rica); "palo amarillo," "palo amargo" (Cuba); "palo de pan

¹ Thesaurus 97. 1651.

cimarrón," "pan cimarrón" (Porto Rico); "curarador," "trompeto," "sarno," "mata-chande," "sarcillejo" (Colombia); "sangre de toro" (Guatemala); "sancho amargo" (Argentina, Uruguay); "yagrumo macho" (Santo Domingo). Probably some of the other names listed for *B. arborea* are applied also to this species.

The plant contains an alkaloid, protopine. The yellow or orange juice is very bitter and acrid and has a disagreeable odor. It is used for treating ulcers, skin eruptions, chilblains, bronchitis, and chronic ophthalmia, and to remove warts, and is said to have vermifuge and purgative properties. The leaves, too, are sometimes heated and applied as a poultice to wounds. In Colombia an infusion of the roots is valued as a remedy for jaundice and dropsy. In Jamaica, it is stated, the leaves are rubbed on house floors to keep away insects, and in Colombia the oil extracted from the seeds is used to destroy vermin on the head and skin.

Robelo gives as vernacular names in Mexico "cocojegüite" (from *cocoxihuitl*), "clacojegüite" (from *tlacoxihuitl*), and "guachichile" or "guachichil" (from *cuau-chilli*, "tree-chile"). He states that the plants were used in pre-conquest days to adorn the temples.

4. *Bocconia latisepala* S. Wats. Proc. Amer. Acad. 25:141. 1890.

Nuevo León; type from Guajuco.

Plants 1 to 2 meters high, with numerous stems; leaves 14 to 30 cm. long, with few broad lobes, pale beneath. "Mala mujer."

This plant is said to be a herbaceous annual, but it is so closely similar to the other species, all of which are fruticose, that it seems best to include it here.

49. CAPPARIDACEAE. Caper Family.

Shrubs or trees; leaves alternate, stipulate or estipulate, simple and entire or palmately compound; flowers mostly perfect, often large and showy; sepals 4 to 8, free or connate; petals 4 or rarely none; stamens 6 to many; fruit capsular or baccate.

Many herbaceous representatives of the family occur in Mexico.

Leaves compound.

Fruit an inflated capsule; leaves glaucous.....1. **ISOMERIS.**

Fruit baccate; leaves green.

Petals 4; fruit long-stipitate.....5. **CRATAEVA.**

Petals none; fruit sessile.....7. **FORCHAMMERIA.**

Leaves simple. Fruit baccate.

Petals none.....7. **FORCHAMMERIA.**

Petals present.

Petals blue; leaves 1 cm. long or shorter.....6. **SETCHELLANTHUS.**

Petals never blue; leaves much more than 1 cm. long.

Sepals connate. Fruit large, with hard pericarp, sessile.

2. **MORISONIA.**

Sepals distinct or nearly so.

Stamens numerous; sepals all similar in size.....3. **CAPPARIS.**

Stamens 9 to 12; inner sepals smaller than the outer.

4. **ATAMISQUEA.**

1. **ISOMERIS** Nutt.; Torr. & Gray, Fl. N. Amer. 1: 124. 1838.

1. *Isomeris arborea* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 124. 1838.

Baja California and western Sonora. California, the type from San Diego.

Shrub, 1 to 2 meters high, or sometimes herbaceous, ill-scented, the wood hard and yellow, the young branches glaucous; leaflets 3, oblong, 2 to 3 cm.

long, obtuse or acutish; flowers racemose, 1.5 cm. long, yellow; calyx 4-lobed; stamens 6; fruit acute or attenuate, 4 to 6 cm. long.

The Coahuilla Indians of southern California eat the green pods after cooking them with hot stones in a hole in the ground.

2. MORISONIA L. Sp. Pl. 503. 1753.

1. *Morisonia americana* L. Sp. Pl. 503. 1753.

Sinaloa to Oaxaca. Lesser Antilles; northern South America.

Shrub or small tree, sometimes 7 meters high, with sparse stellate or lepidate pubescence; leaves long-petiolate, oblong or ovate-oblong, 12 to 25 cm. long, obtuse or acute, very thick, lustrous, nearly glabrous; flowers in lateral corymbs, rather large, white; petals 4; fruit baccate, many-seeded, globose, 3.5 to 6 cm. in diameter, brownish and rough outside. "Chicozapote" (Oaxaca); "árbol del diablo" (Colima, Colombia); "chico" (Sinaloa); "cacao cimarrón," "rabo de mico" (Colombia).

In the West Indies aperitive and antihysterical properties are attributed to the infusion of the flowers, which is used also as a remedy for intestinal parasites; and the pulp of the fruit is said to be used in reducing inflammation.

3. CAPPARIS L. Sp. Pl. 503. 1753.

REFERENCE: Eichler in Mart. Fl. Bras. 13¹: 267-288. pl. 60-65. 1865.

Shrubs or trees, glabrous or pubescent, the pubescence often stellate or lepidote; leaves simple, petiolate, usually thick and leathery; flowers usually large and white; sepals 4; petals 4; fruit baccate, variable in form.

The fruits of some Australian species are eaten by the natives. *Capparis spinosa* L., of the Mediterranean Region, produces the capers ("alcaparras") of commerce. These are the flower buds and young fruits preserved in vinegar with some salt. Capers are the basis of an important industry in some parts of southern Europe. It is stated that in Provence 1,760,000 pounds are harvested annually.

Indument none or of simple hairs.

Sepals rounded.

Leaf blades obtuse or rounded at base, usually emarginate at apex. Plants glabrous; fruit torulose, smooth-----1. *C. flexuosa*.

Leaf blades subcordate or emarginate at base, rounded or acute at apex.

Plants glabrous; leaves mostly 4 to 8.5 cm. wide; fruit smooth; stamens not longer than the petals-----2. *C. baducca*.

Plants usually more or less pubescent; leaves 1.5 to 4 cm. wide; fruit verrucose; stamens much longer than the petals----3. *C. verrucosa*.

Sepals acute.

Petioles 3 to 8 mm. long-----4. *C. oxysepala*.

Petioles 13 to 50 mm. long-----5. *C. longipes*.

Indument of scales or of branched hairs.

Sepals valvate in bud.

Leaves linear. Fruit stipitate-----6. *C. angustifolia*.

Leaves elliptic or oblong.

Fruit stipitate-----7. *C. cynophallophora*.

Fruit sessile-----8. *C. odoratissima*.

Sepals open in bud.

Indument of the leaves chiefly or wholly of stellate hairs.

Leaf blades oblanceolate, densely stellate-pubescent on the upper surface.

9. *C. asperifolia*.

Leaf blades elliptic or lanceolate, soon glabrous on the upper surface.

10. *C. incana*.

Indument of the leaves chiefly of scales.

Stipe of the fruit 2.5 cm. long, slender.....11. *C. indica*.

Stipe 1.5 cm. long or shorter, very stout.....12. *C. pringlei*.

1. *Capparis flexuosa* L. Sp. Pl. ed. 2. 722. 1762.

Morisonia flexuosa L. Amoen. Acad. 5: 398. 1760.

? *Capparis brevisiliqua* DC. Prodr. 1: 251. 1824.

Tamaulipas to Yucatán, Colima, and Sinaloa. Widely distributed in tropical America; type from Jamaica.

Shrub or tree, 2.5 to 8 meters high, glabrous; leaves oblong to obovate, 3 to 6.5 cm. long, short-petiolate, rounded or retuse at apex; flowers white or pale rose, fragrant, the stamens white, very long; fruit siliquiform, 7 to 15 cm. long, torulose, the seeds imbedded in scarlet pulp. "Xpayumak" or "xbayumak" (Yucatán, Maya); "pan y agua," "guayabo de loro" (Venezuela); "burro," "palo de burro" (Porto Rico); "mostaza" (Cuba, Santo Domingo).

This species has been known generally as *C. cynophallophora* L.¹ The root has a flavor resembling that of horse-radish. In the West Indies an infusion of it has been used for dropsy and as an emmenagogue and a decoction of the leaves for cutaneous diseases. Sedative and antispasmodic properties are attributed to the fruit, and diuretic and emmenagogue properties to the bark. For an illustration of a fruiting branch see Contr. U. S. Nat. Herb. 8: pl. 23.

2. *Capparis baducca* L. Sp. Pl. 504. 1753.

Capparis frondosa Jacq. Enum. Pl. Carib. 25. 1760.

Tamaulipas and Veracruz. Central America, West Indies, and northern South America.

Shrub or small tree, 2 to 7.5 meters high; leaves long-petiolate, elliptic or ovate, 11 to 30 cm. long, very thick; flowers greenish white or purplish; fruit 3 to 5 cm. long, purple brown. "Tinto," "naranjuelo," "fruta de burro" (Colombia); "palo de burro," "sapo" (Porto Rico); "ajito" (Venezuela).

The fruit is reputed poisonous. Medical properties similar to those of *C. flexuosa* are attributed to the plant.

3. *Capparis verrucosa* Jacq. Stirp. Amer. 159. pl. 99. 1763.

Capparis palmeri Rose, Contr. U. S. Nat. Herb. 1: 301. 1895.

Sinaloa to Chiapas. Central America, West Indies, Colombia, and Venezuela.

Shrub or small tree, 1 to 6 meters high; leaves nearly sessile, oblong or obovate-oblong, 3.5 to 8.5 cm. long; flowers large, white, with long stamens; fruit oblong, 2.5 to 6 cm. long, densely tuberculate. "Limoncillo" (Guerrero); "coquito" (Oaxaca); "ajito" (Venezuela); "palo de burro" (Porto Rico).

4. *Capparis oxysepala* C. Wright; Radlk. Sitzungsab. Math. Phys. Acad. Wiss. München 14: 172. 1884.

Guerrero and Yucatán. Nicaragua (type locality).

Plants glabrous or nearly so; leaves short-petiolate, oval-oblong to oval-obovate, 7 to 15 cm. long, acutish to rounded at apex, bright green, lustrous; flowers large, racemose, long-pedicellate.

5. *Capparis longipes* Standl.

Capparis discolor Standl. Contr. U. S. Nat. Herb. 20: 182. 1919. Not *C. discolor* Donn. Smith, 1897.

Known only from the type locality, banks of the Río Petatlán, Guerrero.

Tree, 8 to 10 meters high; flowers white, with the odor of orange blossoms. "Naranjillo."

¹ See Fawcett and Rendle, Journ. Bot. Brit. & For. 52: 142-144. 1914.

6. *Capparis angustifolia* H. B. K. Nov. Gen. & Sp. 5: 96. pl. 438. 1821.

Type from Cañada de Zopilote, between Mexico and Acapulco.

Plants lepidote-pubescent; leaves short-petiolate, rounded or subcordate at base; flowers white.

7. *Capparis cynophallophora* L. Sp. Pl. 504. 1753.

Capparis jamaicensis Jacq. Enum. Pl. Carib. 23. 1760.

Yucatán. Southern Florida, West Indies, Central America, and Venezuela; type from Jamaica.

Slender shrub or tree, 1.8 to 15 meters high; leaves petiolate, elliptic, 5.5 to 9 cm. long, acute, thick, green and lustrous on the upper surface, scaly beneath; flowers white, changing to purplish, fragrant, the filaments purplish, the anthers yellow; fruit slender, sometimes 30 cm. long or longer. "Carbonero" (Cuba); "burro," "bejuco inglés," "palo de burro prieto" (Porto Rico); "olivo" (Santo Domingo).

Known in the Bahamas as "wild orange."

8. *Capparis odoratissima* Jacq. Pl. Hort. Schönbr. 1: pl. 110. 1797.

Oaxaca. Central America to Venezuela (type locality).

Shrub or small tree; leaves obovate, petiolate, 5 to 8 cm. long, rounded at the apex, green above, covered with brown or yellowish scales beneath; flowers corymbose. "Naranjillo" (Oaxaca).

9. *Capparis asperifolia* Presl, Reliq. Haenk. 2: 86. 1836.

?*Capparis cuneiformis* Sessé & Moc. Pl. Nov. Hisp. 87. 1887.

Capparis langlassei Briq. Ann. Cons. Jard. Genève 17: 392. 1914.

Michoacán and Guerrero; type from Acapulco.

Tree, 4 to 6 meters high; leaves short-petiolate, acute, about 9 cm. long, densely stellate-pubescent on both surfaces; flowers white, racemose.

10. *Capparis incana* H. B. K. Nov. Gen. & Sp. 5: 94. 1821.

Capparis pauciflora Presl, Reliq. Haenk 2: 86. 1836.

Capparis karwinskiana Schlecht. Linnaea 10: 237. 1836.

?*Capparis umbellata* Sessé & Moc. Pl. Nov. Hisp. 87. 1887.

Tamaulipas to Yucatán, Oaxaca, and Guerrero; type collected between Mescala and Estola.

Shrub or tree, the pubescence of grayish or rusty stellate hairs; leaves petiolate, 4.5 to 8 cm. long, acuminate or attenuate, thin; flowers white; fruit globose or oblong, 2.5 cm. long or shorter, densely pubescent. "Vara blanca" (Tamaulipas).

Perhaps not distinct from *C. ferruginea* L., of the West Indies.

11. *Capparis indica* (L.) Fawc. & Rendle, Journ. Bot. Brit. & For. 52: 144. 1914.

Breynia indica L. Sp. Pl. 503. 1753.

Capparis breynia L. Syst. Nat. ed. 10. 1071. 1759.

Capparis amygdalifolia Jacq. Enum. Pl. Carib. 24. 1760.

Capparis amygdalina Lam. Encycl. 1: 608. 1785.

Sinaloa to Oaxaca. Central America, West Indies, Colombia, and Venezuela.

Shrub or small tree, 2 to 7.5 meters high; leaves linear to obovate, 5 to 8 cm. long, petiolate, acute or obtuse; flowers white; fruit slender, torulose, 6 to 25 cm. long. "Colorín" (Michoacán, Guerrero); "mangle de la sierra" (Sinaloa); "escremento" (Nicaragua); "auso," "tinto" (Colombia).

Reputed to have medicinal properties similar to those of *C. flexuosa*.

12. *Capparis pringlei* Briq. Ann. Cons. Jard. Genève 17: 300. 1914.

Oaxaca; type from Tomellín Canyon.

Small tree.

DOUBTFUL SPECIES.

CAPPARIS FURFURACEA Ruiz & Pav.; DC. Prodr. 1: 252. 1824. Described from Mexico.

4. *ATAMISQUEA* Miers, Trav. Chile 2: 529. 1826.1. *Atamisquea emarginata* Miers, Trav. Chile 2: 529. 1826.

Dry plains and hillsides, Baja California and Sonora. Argentina.

Densely branched shrub, 1 to 6 meters high, ill-scented, with brittle branches; leaves linear or oblong-linear, 1 to 3.5 cm. long, short-petiolate, emarginate at the apex, green on the upper surface, scaly beneath; flowers small, solitary or fasciculate, sweet-scented; sepals and petals each 4; fertile stamens 6; fruit oval or subglobose, about 8 mm. long.

5. *CRATAEVA* L. Sp. Pl. 444. 1753.

Shrubs or trees; leaves deciduous, very long-petiolate, the leaflets 3; flowers racemose or corymbose, the stamens long-exserted; petals 4; stamens 8 to 20; fruit baccate, large, long-stipitate.

Leaflets glabrous-----1. *C. tapia*.
Leaflets puberulent beneath-----2. *C. palmeri*.

1. *Crataevia tapia* L. Sp. Pl. 444. 1753.

Tamaulipas to Sinaloa and southward nearly throughout the lower parts of Mexico. West Indies, Central America, and South America.

Glabrous tree, usually 6 to 9 meters high, but sometimes as much as 18 meters; bark grayish brown; leaflets ovate, elliptic, or oval, 5.5 to 15 cm. long, thin, acute or acuminate, paler beneath; flowers green or purplish; fruit subglobose, 2.5 to 5.5 cm. in diameter. "Zapotillo amarillo" (Colima); "Tres Marias" (Yucatán); "xkolocmax" (Yucatán, Maya); "cascarón" (Tabasco); "palo de guaco" (Panama); "manzana de playa" (Nicaragua); "zorrocloco" or "sorrocloco" (Colombia); "toco" (Trinidad, Venezuela).

The bark has a disagreeable odor; it is reputed to have tonic, stomachic, anti-dysenteric, and febrifuge properties. The roots are very acrid, and their juice applied to the skin produces blisters. The leaves are sometimes used as poultices.

It may be that *C. gynandra* L. (if that species is distinct from *C. tapia*) also occurs in Mexico, but the specimens seen afford no convincing evidence to that effect.

2. *Crataeva palmeri* Rose, Contr. U. S. Nat. Herb. 1: 301. 1895.

Sinaloa and Durango to Guerrero; type from Armeria, Colima.

Shrub or small tree, with purplish flowers, the stamens long-exserted; fruit 3.5 to 5 cm. long.

Very similar to *C. tapia* except for the presence of pubescence.

6. *SETCHELLANTHUS* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 378. 1909.1. *Setchellanthus caeruleus* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 378. 1909.

Known only from the type locality, Coscomate, Oaxaca.

Shrub; leaves ovate to suborbicular, 1 cm. long or shorter, subsessile, obtuse, silvery-strigose; flowers solitary, blue, about 2 cm. long; stamens shorter than the sepals.

7. *FORCHAMMERIA* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 93. 1854.

Trees, glabrous or pubescent; leaves simple or compound, petiolate; flowers small, racemose or paniculate; stamens numerous.

Leaves trifoliolate-----1. *F. trifoliata*.

Leaves simple.

Leaves glabrous, lanceolate, ovate, or oblanceolate to oblong.

Leaves obtuse-----2. *F. pallida*.

Leaves acute or acuminate-----5. *F. lanceolata*.

Leaves hirtellous, especially beneath, linear.

Leaf blades emarginate at base; fruiting pedicels 3 to 5 mm. long; fruit 7 to 12 mm. broad-----3. *F. watsoni*.

Leaf blades usually attenuate at base; fruiting pedicels 10 to 15 mm. long; fruit 12 to 15 mm. broad-----4. *F. macrocarpa*.

1. *Forchammeria trifoliata* Radlk. Field Mus. Bot. 1: 399. 1898.

Yucatán.

Tree, 6 to 9 meters high; leaves long-petiolate; leaflets obovate-oblong, 7 to 13 cm. long, thick, glabrous; flowers in rather large panicles. "Tres Marias."

2. *Forchammeria pallida* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 94. 1854.

Forchammeria apiocarpa Radlk. Meth. Bot. Syst. 54. 1883.

Colima to Oaxaca; type collected between Tehuantepec and Mazatlán.

Tree, 4.5 to 6 meters high, the trunk 12 to 20 cm. in diameter; leaves narrowly oblong or oblanceolate, 6 to 11 cm. long, usually rounded at apex; flowers green, in short or long racemes; fruit subglobose, 1.5 to 2 cm. long, somewhat glaucous.

3. *Forchammeria watsoni* Rose, Contr. U. S. Nat. Herb. 1: 302. 1895.

Baja California, Sonora, and Sinaloa; type from Guayamas, Sonora.

Shrub or tree, 3 to 7.5 meters high, often with a broad spreading crown; leaves 6 to 12 cm. long, very thick, with conspicuous venation, the margins revolute; flowers racemose; fruit globose-obovoid. "Palo San Juan" (Baja California).

4. *Forchammeria macrocarpa* Standl. Contr. U. S. Nat. Herb. 20: 183. 1919.

Known only from the type locality, San Luis Tultitlanapa, Puebla.

Leaves 9 to 17 cm. long, acute or acutish.

5. *Forchammeria lanceolata* Standl. Contr. U. S. Nat. Herb. 20: 183. 1919.

Known only from the type collection, from somewhere in Mexico.

Shrub, 3 to 4.5 meters high; leaves mostly lanceolate, 6 to 8 cm. long, 1.5 to 3 cm. wide, obtuse at base; fruit about 12 mm. long.

50. MORINGACEAE. Horseradish Tree Family.

1. MORINGA Juss. Gen. Pl. 348. 1789.

1. *Moringa oleifera* Lam. Encycl. 1: 398. 1783.

Gullandina moringa L. Sp. Pl. 381. 1753.

Moringa pterygosperma Gaertn. Fruct. & Sem. 2: 314. 1791.

Moringa moringa Millsp. Field Mus. Bot. 1: 490. 1902.

Common in cultivation in Mexico and often growing without cultivation. Native of Africa and the East Indies; widely cultivated and naturalized in tropical America.

Tree, 3 to 6 meters high or larger, with whitish bark, the roots thick, soft; leaves alternate, twice or thrice pinnate; flowers paniculate, sweet-scented, the 5 petals white or yellowish white, tinged with crimson outside near the base; perfect stamens 5; fruit a long 3-angled capsule; seeds winged. "Paraíso blanco" (Yucatán); "paraíso de España" (Campeche); "perlas del Oriente" (Guerrero, Oaxaca); "árbol de las perlas," "chinto borrego" (Oaxaca); "acacia" (Tamaulipas); "paraíso francés," "palo jeringa" (Cuba); "marango" (El Salvador, Nicaragua, Costa Rica); "angela" (Porto Rico); "narango," "marenque," "paraíso extranjero," "teberinto" (El Salvador).

The usual English name is "horseradish tree." The roots have the odor and flavor of horseradish (*Armoracia rusticana* Gaertn. Mey. & Schreb.), for which they are sometimes substituted; a decoction of them is used in Nicaragua for dropsy, and their juice is applied as a rubefacient or counter-irritant. The wood is said to yield a blue dye. The leaves and young branches are relished by stock and are sometimes cut for fodder. In India the young leaves, pods, and flowers are cooked and eaten. The leaves are sometimes applied as a poultice to sores, and they are said to have purgative properties. The seeds yield the "ben" oil of commerce, which is used for lubricating watches and other delicate machinery. The oil is odorless and never becomes rancid, consequently it is useful in the manufacture of perfumes. It is very acrid and has purgative properties, but its use is somewhat dangerous if taken internally. It is sometimes applied externally for cutaneous diseases.

51. CRASSULACEAE. Orpine Family.

REFERENCE: Britton & Rose, N. Amer. Fl. 22: 7-74. 1905.

The species listed below are scarcely to be regarded as true shrubs, and other Mexican species probably have equal claims to a place here. Many herbaceous representatives of the family occur in Mexico.

1. *SEDUM* L. Sp. Pl. 430. 1753.

Very succulent erect plants; leaves alternate, entire; flowers small, perfect; calyx 4 or 5-lobed; petals 4 or 5; stamens 8 or 10; fruit of 4 or 5 follicles.

Leaves terete.....1. *S. bourgaei*.

Leaves flat, at least on the upper side.

Petals yellow or purplish red.

Petals purplish red.....2. *S. oxypetalum*.

Petals yellow.....3. *S. dendroideum*.

Petals white.

Leaves linear.....4. *S. frutescens*.

Leaves oblong to spatulate.

Leaves very turgid, narrowly oblong.....5. *S. lenophylloides*.

Leaves flat, obovate or spatulate.

Flowers pedicellate.....6. *S. tortuosum*.

Flowers sessile.....7. *S. retusum*.

1. *Sedum bourgaei* Hemsl. Diag. Pl. Mex. 11. 1878.

Mexico to Michoacán; type from San Nicolás, Valley of Mexico.

Low shrub, much branched; leaves 1 to 2 cm. long; flowers white or pink, cymose.

2. *Sedum oxypetalum* H. B. K. Nov. Gen. & Sp. 6: 45. 1823.

Mountains and lava beds of the State of Mexico.

Shrub, often a meter high, with very thick stems, the bark exfoliating in thin yellowish sheets; leaves spatulate, 1 to 1.5 cm. long, rounded at apex; flowers in leafy cymes.

3. *Sedum dendroideum* Moc. & Sessé; DC. Mém. Crass. 37. pl. 9. 1828.

Hidalgo, Veracruz, Mexico, and Puebla, on cliffs.

Branched shrub, a meter high or less, often forming dense masses; leaves 2 to 4 cm. long. "Siempreviva," "texiote," "texiotl" (Mexico).

The juice is astringent and is used for hardening the gums, and for hemorrhoids, chilblains, dysentery, etc. Applied to the forehead, it is believed to stop nosebleed.

4. *Sedum frutescens* Rose, Contr. U. S. Nat. Herb. 13: 298. 1911.

Morelos.

Low shrub; leaves 2 to 6 cm. long, acute, bright green.

5. *Sedum lenophylloides* Rose, Contr. U. S. Nat. Herb. 13: 298. 1911.
Tamaulipas and Nuevo León; type from Monterrey.
Low shrub, about 30 cm. high; leaves 1 to 1.5 cm. long, pale, often purplish.
6. *Sedum tortuosum* Hemsl. Diag. Pl. Mex. 10. 1878.
Described from Mexico, the locality not known.
Low glabrous shrub with thick branches; leaves 2.5 cm. long.
7. *Sedum retusum* Hemsl. Diag. Pl. Mex. 51. 1880.
San Luis Potosí.
Low glabrous shrub; leaves sessile, 1 to 1.5 cm. long.

52. HYDRANGEACEAE. Hydrangea Family.

REFERENCE: Small & Rydberg, N. Amer. Fl. 22: 159-178. 1905.

Trees or shrubs, rarely scandent; leaves opposite, estipulate, entire or dentate; flowers perfect, often large and showy; sepals and petals 4 or 5 each; stamens 8 to many; fruit a capsule.

Capsule ovoid, the beaks arising gradually from the body.

Filaments not appendaged; sepals and petals each 5; stamens 10.

4. FENDLERELLA.

Filaments appendaged under the anthers; sepals and petals each 4; stamens 8.

5. FENDLERA.

Capsule urceolate or obovoid, the beak or beaks rising abruptly from the body.

Petals valvate, very small; stamens 8; inflorescence involucrate.

1. HYDRANGEA.

Petals convolute or imbricate, large; stamens 12 to 60; inflorescence not involucrate.

2. DEUTZIA.

Capsule subglobose; petals imbricate.

Capsule obovoid or obconic; petals convolute.

3. PHILADELPHUS.

1. HYDRANGEA L. Sp. Pl. 397. 1753.

1. *Hydrangea oerstedii* Briq. Ann. Cons. Jard. Genève 20: 407. 1919.

Cornidia radiata Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1856: 42. 1856. Not
Hydrangea radiata Walt. 1788.

Reported from Veracruz and the Sierra Madre. Costa Rica and Panama.

Scandent shrub; leaves oblong or oblong-elliptic, about 12 cm. long and 6 cm. wide, leathery, petiolate, obtuse, entire or nearly so, almost glabrous; flowers small, pink, cymose, the inflorescence covered with large rounded bracts before expansion; petals 2.5 mm. long.

The identification of the Mexican specimens is doubtful, but they probably belong here. They have been reported as *Hydrangea peruviana* Moric. and as *Cornidia peruviana* (L.) Small.

Hydrangea opuloides Koch. (*H. hortensia* DC.), the common cultivated hydrangea, native of China and Japan, is grown in Mexico under the name "hortensia."

2. DEUTZIA Thunb. Nov. Gen. 1: 19. 1781.

Shrubs, the pubescence of stellate hairs; leaves deciduous, shallowly dentate, petiolate; flowers small, white, cymose.

Most of the species of the genus are natives of eastern Asia, and some are cultivated for their showy flowers. The Mexican species have been placed in a separate genus, *Neodeutzia*, by Small, but they differ in no important respect from the Old World forms.

Petals 5 to 6 mm. long.

1. D. mexicana.

Petals 3 to 4 mm. long.

Tomentum of the lower surface of the leaves of similar, very closely appressed hairs-----2. *D. pringlei*.

Tomentum of unequal, loose, and spreading hairs-----3. *D. occidentalis*.

1. *Deutzia mexicana* Hemsl. Diag. Pl. Mex. 9. 1878.

Neodeutzia mexicana Small, N. Amer. Fl. 22: 162. 1905.

Veracruz; type from Orizaba.

Shrub, 2 to 5 meters high; leaves ovate, 2.5 to 5 cm. long, white-pubescent beneath.

2. *Deutzia pringlei* C. Schneid. Mitt. Deutsch. Dendr. Ges. 1904: 186. 1904.

Neodeutzia ovalis Small, N. Amer. Fl. 22: 162. 1905.

Neodeutzia pringlei Small & Rydb. N. Amer. Fl. 22: 555. 1918.

Known only from the type locality, San José Pass, San Luis Potosí.

Shrub, 3 meters high; leaves oval or oblong, 1.5 to 2.5 cm. long, rounded at apex, green on the upper surface, white beneath.

3. *Deutzia occidentalis* Standl. Proc. Biol. Soc. Washington 31: 134. 1918.

Neodeutzia occidentalis Rydb. N. Amer. Fl. 22: 555. 1918.

Puebla and Oaxaca; type from Barranca del Oro, Puebla.

Shrub, sometimes 4.5 meters high; leaves ovate-orbicular or ovate, 2.8 to 4.5 cm. long.

3. PHILADELPHUS L. Sp. Pl. 470. 1753.

Shrubs; leaves deciduous or somewhat persistent, entire or shallowly serrate; flowers white, large and showy.

Patoni gives the local name of one of the Durango species as "mirto." Many of the species which are natives of Asia and the United States are cultivated for their showy, often fragrant flowers. The native species, and perhaps some of the foreign ones, are grown in Mexican gardens. The usual English names for the plants are "syringa"¹ and "mock orange," the latter name probably given because of the sweet odor of the flowers in some species. *Philadelphus coronarius* L., an Old World species, has been reported from Mexican gardens, and may very likely be cultivated there. The name was applied by Sessé and Mocino² to a native species.

Petals acute; stamens about 15-----1. *P. mearnsii*.

Petals rounded or retuse at apex; stamens 25 to 60.

Styles and free portion of the ovary glabrous.

Leaves pilose on the upper surface with spreading hairs.

Style evident; bark of older stems yellowish-----2. *P. pumilus*.

Style nearly obsolete; bark of older stems dark gray.

3. *P. serpyllifolius*.

Leaves strigose on both surfaces.

Bark of the previous year's branches not exfoliating.

4. *P. asperifolius*.

Bark of the previous year's branches exfoliating-----5. *P. madrensis*.

Styles or free part of the ovary or both more or less hairy.

Inflorescence 1 to 3-flowered; petals more or less hairy.

Calyx strigose; petals without a reddish spot at base--6. *P. mexicanus*.

Calyx densely white-sericeous; petals sometimes with a reddish spot at base-----7. *P. coulteri*.

¹ This name is also the Latin generic name of the lilac, *Syringa vulgaris* L., of the family Oleaceae.

² Pl. Nov. Hisp. 82. 1887.

Inflorescence 5 to 13-flowered; petals glabrous or pubescent below along the costa.

Branchlets grayish-strigose; leaves more or less strigose on both sides.

8. *P. karwinskyanus*.

Branchlets and leaves glabrous, or the leaves hairy along the veins.

9. *P. affinis*.

1. *Philadelphus mearnsii* W. H. Evans; Small & Rydb. N. Amer. Fl. 22: 174. 1905.

Known only from the type locality, on the boundary between Chihuahua and New Mexico.

Low shrub with exfoliating bark; leaves oblong, 1 cm. long or shorter, entire, acutish, strigose; petals 1 cm. long.

2. *Philadelphus pumilus* Rydb. N. Amer. Fl. 22: 173. 1905.

Baja California. California; type from San Jacinto Mountains.

Shrub, 1.2 to 1.8 meters high; leaves oblong or elliptic, 6 to 10 mm. long, obtuse, white-sericeous beneath.

The species has been reported from Baja California as *P. serpyllifolius* A. Gray.

3. *Philadelphus serpyllifolius* A. Gray, Pl. Wright. 1: 77. 1852.

Northern Chihuahua and Sonora. Western Texas (type locality) and southern New Mexico.

Shrub, 1 meter high or less, with spreading branches; leaves oblong or oval, 1 cm. long or shorter, entire.

4. *Philadelphus asperifolius* Koern.; Regel, Gartenflora 16: 73. 1867.

Known only from the type locality, Hacienda Santiaguillo.

Shrub, 2 to 3 meters high; leaves oval or oval-ovate, 1 to 3 cm. long, obtuse or acutish.

5. *Philadelphus madrensis* Hemsl. Kew Bull. Misc. Inf. 1908: 251. 1908.

Philadelphus palmeri Rydb. N. Amer. Fl. 22: 173. 1905.

Philadelphus purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 270. 1918.

In the mountains, Durango to Nuevo León and San Luis Potosí; type from the Sierra Madre of Durango.

Erect shrub with slender gray or brown branches; leaves lanceolate to oval-ovate, 1 to 3 cm. long, acute or obtuse.

6. *Philadelphus mexicanus* Schlecht. Linnaea 13: 418. 1839.

Veracruz to Morelos and Oaxaca; sometimes cultivated; type from Jalapa, Veracruz.

Shrub, sometimes scandent to a height of 6 meters; leaves lanceolate to broadly ovate, 3 to 7 cm. long, short-petiolate, acuminate, remotely denticulate; flowers showy, fragrant, cream-colored, 3 to 4 cm. broad. "Jazmín," "acuilotl" (Oaxaca); "jazmín del monte," "jeringuilla" (Valley of Mexico, *Cervantes*); "mosqueta."

This species has been introduced into cultivation in Europe. It or one of the related species is figured and described by Hernández¹ in a chapter entitled "De *Acuilotl*, seu *Volubili Aquatica*." His account is as follows: "*Acuilotl*, or water-vine, is so called by the Mexicans not without reason, for it grows in moist places, and spreads over the ground or climbs over near-by trees. There are two sorts, differing only in color of flowers, name, and size of leaves. The first has pure white flowers and slightly smaller leaves, and is called *Acuilotl*; in the second the flowers are pale and the leaves larger, and it is called *Cozticacuilotl*,

¹ Thesaurus 107. 1651.

because of the yellow color of the flowers. The stems of both are round, purplish, woody, brittle, and slender, with soft pith. In form and odor the flowers are not unlike the musk rose, a plant not wholly different from this one. The leaves are like those of the bramble, but less toothed, with nerves running lengthwise, and with almost the odor of cucumber. The flowering branches are employed for their perfume by the Indians, and for the garlands which they use so much; and a scented water of pleasant odor is distilled from them. The plant grows in temperate or rather cold places. The leaves are bitter and dry and hot in almost the third order, wherefore, if taken in wine in the quantity of a handful, they relieve colic, and if crushed and applied as a plaster, they ease strained members, and dissolve tumors beyond belief." Hernández also gives an illustration,¹ without description, of the "cozticacuilotl xochitl."

7. *Philadelphus coulteri* S. Wats. Proc. Amer. Acad. 22: 472. 1887.

Nuevo León to Hidalgo; type from Zimapán, Hidalgo.

Shrub, 1 to 3 meters high; leaves lanceolate or ovate, 3 to 5 cm. long, acute or acuminate, green above, white beneath, denticulate; flowers very fragrant, white, about 4.5 cm. broad, with a red or purple spot at the base of each petal.

8. *Philadelphus karwinskyanus* Koehne, Gartenflora 1896: 486. 1896.

Veracruz and Oaxaca; type from Totolapa, Oaxaca.

Tall shrub; leaves ovate, 2 to 6 cm. long, acute or acuminate, denticulate or entire; petals about 1 cm. long.

9. *Philadelphus affinis* Schlecht. Linnaea 13: 419. 1839.

Hidalgo, Veracruz, and Oaxaca; type from Hacienda del Carmen.

Shrub, sometimes 4 meters high; leaves lance-ovate to rounded-ovate, 3.5 to 7 cm. long, acuminate, green on both sides, remotely denticulate; flowers large and showy.

4. **FENDLERELLA** Heller, Bull. Torrey Club 25: 626. 1898.

Low, densely branched shrubs with exfoliating bark; leaves small, 3-nerved, entire, deciduous; flowers small, white, in small dense cymes.

Leaves green beneath, thinly strigose, not at all tomentose-----1. *F. utahensis*.

Leaves densely white-tomentose beneath.

Petals copiously pilose outside-----2. *F. lasiopetala*.

Petals glabrous-----3. *F. mexicana*.

1. *Fendlerella utahensis* (S. Wats.) Heller, Bull. Torrey Club 25: 626. 1898.

Whipplea utahensis S. Wats. Amer. Nat. 7: 300. 1873.

Fendlerella cymosa Greene; Woot. & Standl. Contr. U. S. Nat. Herb. 16: 129. 1913.

Mountains of Chihuahua and Coahuila. Nevada to New Mexico; type from Utah.

Densely branched shrub, 1 meter high or less; leaves linear-oblong to elliptic, 0.5 to 2.5 cm. long, acute or obtuse.

2. *Fendlerella lasiopetala* Standl. Proc. Biol. Soc. Washington 33: 67. 1920.

Known only from the type locality, San Lorenzo Canyon, southeast of Saltillo, Coahuila.

Leaves elliptic or oval-elliptic, 1.5 cm. long or shorter, acute or acutish.

3. *Fendlerella mexicana* T. S. Brandeg. Zoe 5: 246. 1908.

Known only from the type locality, Cerro de Paxtle, Puebla.

Leaves elliptic or ovate, about 1 cm. long, with revolute margins.

¹ Thesaurus 374. 1651.

5. **FENDLERIA**¹ Engelm. & Gray; A. Gray, Pl. Wright. 1: 77. 1852.

REFERENCE: Rehder, Journ. Arn. Arb. 1: 203-206. 1920.

Erect shrubs with striate branches; leaves small, deciduous, entire, 3-nerved, sessile or nearly so; flowers large, white, solitary or clustered.

Leaves linear, strongly revolute, glabrous or nearly so on the upper surface.

1. **F. linearis.**

Leaves narrowly lanceolate to ovate-oblong.

Leaves sparsely strigose or nearly glabrous beneath, glabrous above, not revolute.-----2. **F. rupicola.**

Leaves tomentose and strigose beneath, scabrous above, revolute.

3. **F. wrightii.**1. **Fendleria linearis** Rehder, Journ. Arn. Arb. 1: 205. 1920.

Known only from the type locality, in the Sierra Madre near Monterrey, Nuevo León.

Leaves 1.5 to 2.5 cm. long, 1 to 1.5 mm. wide, strigose beneath; petals 7 to 8 mm. long; capsule about 8 mm. long.

2. **Fendleria rupicola** A. Gray, Pl. Wright. 1: 77. 1852.

Sonora. Western Texas and southern New Mexico; type from New Braunfels, Texas.

Shrub, 1 to 2 meters high; leaves oblong or elliptic, 1 to 4 cm. long; petals 1.5 to 2 cm. long.

3. **Fendleria wrightii** (A. Gray) Heller, Bull. Torrey Club 24: 537. 1897.*Fendleria rupicola wrightii* A. Gray, Pl. Wright. 1: 77. 1852.

Chihuahua. Western Texas to Colorado and Arizona; type from San Pedro River, Texas.

Shrub, very similar to the preceding species; leaves 1 to 2 cm. long; petals usually only 1.2 to 1.5 cm. long.

53. **PTEROSTEMONACEAE. Pterostemon Family.**1. **PTEROSTEMON** Schauer, Linnaea 20: 736. 1847.

Pubescent shrubs; leaves alternate, petiolate, dentate, the stipules minute or obsolete; flowers perfect, showy, white, cymose; fruit a capsule.

Calyx densely pilose with long stiff white hairs; leaf blades somewhat narrowed to the obtuse or broadly cuneate base.-----1. **P. mexicanus.**Calyx puberulent or minutely pilose; leaf blades rounded or broadly rounded at base.-----2. **P. rotundifolius.**1. **Pterostemon mexicanus** Schauer, Linnaea 20: 726. 1847.

Hidalgo; type from Zimapan.

Shrub with dark branches; leaves obovate-orbicular, 2 to 3 cm. long, densely pilose beneath; flowers about 1 cm. long.

2. **Pterostemon rotundifolius** Ramírez, Estudio 4: 453. pl. 18. 1893.

Puebla and Oaxaca; type from between Jaltepetongo and Guandulain, Oaxaca.

Shrub, 1.5 to 3 meters high; leaves suborbicular, 2 to 3 cm. long, soon glabrate beneath.

¹ August Fendler (1813-1883), a native of Prussia, came to the United States in 1834. Later he visited Prussia, but soon returned to North America and settled in St. Louis, where he made the acquaintance of Engelmann. In 1847 he followed the Santa Fe Trail to New Mexico, where he made a large collection of plants, upon which a report was published by Gray. Later he botanized in Panama and Venezuela, where he obtained important collections, and finally settled in Trinidad, where he died.

54. ESCALLONIACEAE. Escallonia Family.

1. **PHYLLONOMA** Willd.; Roem. & Schult. Syst. Veg. 6: 210. 1820.

REFERENCE: Rusby, N. Amer. Fl. 22: 191. 1905.

1. **Phyllonoma laticuspis** (Turcz.) Engl. in Engl. & Prantl, Pflanzenfam. 3^{2a}: 87. 1890.

Dulongia laticuspis Turcz. Bull. Soc. Nat. Moscou 31¹: 454. 1858.

Durango to Chiapas; type from Oaxaca.

Shrub or small tree with slender branches, glabrous; leaves alternate, estipulate, petiolate, lanceolate, 4 to 8 cm. long, long-acuminate, serrate; flowers very small, in small cymes borne upon the upper surface of the leaf; fruit small, baccate. "Hierba de la viruela" (Oaxaca).

The plant has a high reputation as a remedy for smallpox. This species has been reported from Mexico as *P. ruscifolia*.

55. GROSSULARIACEAE. Gooseberry Family.

REFERENCE: Coville & Britton, N. Amer. Fl. 22: 193-225. 1908.

Usually erect shrubs, spiny or unarmed; leaves alternate, petiolate, deciduous or persistent, lobed or toothed; flowers small, racemose, perfect; sepals and petals each 5; stamens 5, opposite the sepals; fruit a globose 1-celled berry, several or many-seeded.

The fruit of all the Mexican species is edible, but it varies greatly in quality.

Plants without spines; pedicels jointed below the ovary.....1. **RIBES**.

Plants with spines; pedicels not jointed.....2. **GROSSULARIA**.

1. RIBES L. Sp. Pl. 201. 1753.

Unarmed (in the Mexican species) shrubs; leaves palmately veined, usually lobed, commonly deciduous; racemes few to many-flowered; pedicel often bearing a pair of bractlets below the joint; fruit never spiny.

The best-known plant of the genus is *Ribes vulgare* Lam., the garden currant, which is cultivated for its sour red fruit. It is a native of Europe. The native American currants all have edible fruit which, however, is usually of sweetish and insipid flavor. The plants seem to be little used in medicine. A decoction of the roots of *R. americanum* Mill. is said to be employed by the Omaha and Winnebago Indians for renal and uterine affections.

Ovary with sessile glands; leaves not lobed, evergreen....1. **R. viburnifolium**.

Ovary without glands or with stipitate glands; leaves lobed, deciduous.

Anthers without a cup-shaped apical gland.

Calyx tube glabrous, yellow, 3 or more times as long as thick.

Flowers sessile or nearly so.....10. **R. chihuahuense**.

Flowers pedicellate.....11. **R. fontinale**.

Calyx tube pubescent, not yellow, or if so less than twice as long as thick.

Axis of the raceme straight and stiff, 1 cm. long or shorter; leaves without glands.....12. **R. tortuosum**.

Axis of the raceme flexuous, elongate; leaves usually with glands.

Leaves with sessile scattered amber-colored waxlike glands on both surfaces.....13. **R. nelsoni**.

Leaves with stipitate glands.

Ovary glabrous.....14. **R. brandegei**.

Ovary with gland-tipped hairs.

Flowers pink or purple, 8 to 10 mm. long; pedicels 2 to 5 mm. long.

15. **R. malvaceum**.

Known only from the type locality, mountains of Santa Rosa, near Guana-juato.

Leaves ovate-orbicular; 2 to 5 cm. wide, 3 or 5-lobed, sparsely glandular on both sides; sepals purplish, the petals white; fruit bluish black.

6. *Ribes orizabae* Rose, Contr. U. S. Nat. Herb. 8: 339. 1905.

Known only from the type locality, Orizaba, Veracruz.

Leaves broadly ovate or suborbicular, 3 or 5-lobed, glabrous above, glandular-pubescent beneath; racemes 8 to 12-flowered; pedicels 5 to 8 mm. long; ovary glabrous.

7. *Ribes affine* H. B. K. Nov. Gen. & Sp. 6: 60. 1823.

Ribes multiflorum H. B. K. Nov. Gen. & Sp. 6: 60. 1823. Not *R. multiflorum* Willd. 1813.

Ribes kunthii Berland. Mém. Soc. Phys. Hist. Nat. Genève 3²: 60. 1826.

Ribes mexicanum Spreng. Syst. Veg. 4: Cur. Post. 100. 1827.

Ribes altamirani Jancz. Bull. Acad. Cracovie 1906: 10. 1906.

Hidalgo and Querétaro; type from Morán, Hidalgo.

Shrub, 1 to 3 meters high; leaves 4.5 cm. wide or smaller, broadly ovate or orbicular, 3 or 5-lobed, pubescent; racemes pendulous, 6 to 12-flowered, shorter than the leaves; pedicels 5 to 8 mm. long; fruit bluish black, glabrous, 8 mm. in diameter.

8. *Ribes rugosum* Coville & Rose, Contr. U. S. Nat. Herb. 8: 300. 1905.

Ribes grande Rose, Contr. U. S. Nat. Herb. 8: 339. 1905.

Mexico and Puebla; type from Santa Fé, Valley of Mexico.

Shrub, 1.5 to 3.5 meters high; leaves 3 to 5 cm. wide, suborbicular, 3 or 5-lobed, glabrous above, pubescent beneath; flowers greenish or pinkish; racemes drooping, 7 to 12-flowered; pedicels 3 to 6 mm. long; fruit bluish black, glabrous. "Capulincillo," "ciruelillo" (Mexico, Reiche).

9. *Ribes ciliatum* Humb. & Bonpl.; Roem. & Schult. Syst. Veg. 5: 500. 1819.

Ribes jorullense H. B. K. Nov. Gen. & Sp. 6: 61. 1823.

High mountains, Colima to Oaxaca, and Veracruz.

Shrub, 3 to 5 meters high; leaves 3 to 9 cm. wide, suborbicular, 3 or 5-lobed, glabrous above, pubescent beneath; flowers greenish white, fragrant; racemes drooping, about 10-flowered; fruit glabrous, 8 mm. in diameter. "Capulincillo" (Valley of Mexico); "ciruelillo" (Mexico, Hidalgo); "saracuacho" (Mexico).

Roots reputed to have emetic properties.

10. *Ribes chihuahuense* Britton, Torreyia 7: 102. 1907.

Known only from the type locality, near the city of Chihuahua.

Leaves 2 to 2.5 cm. long, ovate or suborbicular, glabrous, the lobes few-toothed; racemes 3 to 5-flowered, slightly longer than the leaves, the flowers sessile or nearly so.

11. *Ribes fontinale* Britton; Coville & Britton, N. Amer. Fl. 32: 205. 1908.

Known only from the type locality, Samalayuca, Chihuahua.

Leaves 3 cm. wide or smaller, usually 3-lobed, the lobes entire or few-toothed; racemes 4 to 7-flowered, 3 to 4 cm. long.

12. *Ribes tortuosum* Benth. Bot. Voy. Sulph. 17. 1844.

Ribes palmeri Vasey & Rose, Proc. U. S. Nat. Mus. 11: 529. 1889.

Baja California; type from San Quentín.

Shrub, 1.2 meters high or less, with short stiff branches; leaves 1.5 to 3 cm. wide, very shallowly 5-lobed, finely puberulent on both sides; fruit red, 6 to 8 mm. in diameter, glabrous.

13. *Ribes nelsoni* Coville & Rose, Contr. U. S. Nat. Herb. 8: 297. 1905.

Chihuahua; type from Colonia García.

Shrub, 1 to 2 meters high; leaves 6 cm. wide or smaller, with 3 or 5 acute lobes, serrate-dentate; flowers pale yellow; racemes drooping, 6 to 10-flowered.

14. *Ribes brandegei* Eastw. Proc. Calif. Acad. III. 2: 242. 1902.

Mountain slopes, Baja California; type from Sierra de Laguna.

Erect shrub, 2.5 meters high; leaves 3 to 5 cm. wide, 3-lobed, sparsely glandular-pubescent on both sides; sepals rose-purple, the petals white; racemes 3 to 10-flowered; fruit glabrous.

15. *Ribes malvaceum* Smith in Rees, Cycl. 30: *Ribes* no. 13. 1815.

Northern Baja California. California.

Erect shrub; leaves shallowly 3 or 5-lobed, 2.5 to 5 cm. wide, tomentose and glandular-pubescent beneath; flowers pink or purple, the racemes longer than the leaves; fruit viscid-pubescent, 1 cm. or less in diameter.

16. *Ribes indecorum* Eastw. Proc. Calif. Acad. III. 2: 243. 1902.

Mountains of Baja California, at an altitude of 840 to 900 meters. Southern California, the type collected near San Diego.

Shrub, 1.8 to 2.5 meters high, the young shoots glandular-pubescent; leaves reniform-orbicular, obtusely 3 or 5-lobed, 2 to 5 cm. wide, stipitate-glandular on the upper surface; ovary with simple and gland-tipped hairs; fruit about 7 mm. in diameter.

2. GROSSULARIA Mill. Gard. Dict. ed. 7. 1759.

Spiny erect shrubs; leaves deciduous, palmately veined; racemes few-flowered; bractlets, if present, minute, at the base of the pedicel; ovary sometimes spiny.

The cultivated gooseberry is *Grossularia reclinata* (L.) Mill., a native of northern Europe. The native American species have edible fruit, which is extremely sour until maturity, when it becomes sweet.

Lobes of the calyx twice as long as the tube or longer; petals red throughout.

1. *G. madrensis*.

Lobes of the calyx less than twice as long as the tube; petals yellow or greenish, sometimes with purple margins.

Calyx 10 to 12 mm. long-----2. *G. microphylla*.

Calyx 5 to 6 mm. long-----3. *G. quercetorum*.

1. *Grossularia madrensis* Coville & Rose; Coville & Britton, N. Amer. Fl. 22: 217. 1908.

Ribes madrense Coville & Rose, Smiths. Misc. Col. 50: 32. 1907.

Known only from the type locality, Quebrada Honda, Durango.

Erect shrub with slender spines; leaves 3 cm. wide or less, 3 or 5-lobed, glandular-pubescent; peduncles 1 or 2-flowered; petals dark red; fruit glabrous.

2. *Grossularia microphylla* (H. B. K.) Coville & Britton, N. Amer. Fl. 22: 219. 1908.

Ribes microphyllum H. B. K. Nov. Gen. & Sp. 6: 62. 1823.

Veracruz to Michoacán; type from El Guarda.

Shrub, 1 to 3 meters high; leaves 2.5 cm. wide or smaller, 3 or 5-lobed, somewhat pubescent; flowers reddish yellow; fruit glabrous, 8 mm. in diameter.

3. *Grossularia quercetorum* (Greene) Coville & Britton, N. Amer. Fl. 22: 220. 1908.

Ribes quercetorum Greene, Bull. Calif. Acad. 1: 83. 1885.

Baja California. California; type from El Paso de Robles.

Shrub, 1 to 1.5 meters high; leaves 1 to 2 cm. wide, deeply lobed; fruit glabrous, 8 mm. in diameter.

56. CUNONIACEAE. Cunonia Family.**1. WEINMANNIA L. Syst. Nat. ed. 10. 1005. 1759.**

REFERENCE: Britton, N. Amer. Fl. 22: 179-180. 1905.

Weinmannia fagaroides H. B. K., of Ecuador, is said to furnish wood of good quality. Its bark is rich in tannin and is used for tanning leather. The species

of Madagascar are large trees with durable wood. Their bark contains much tannin and yields a black dye.

1. *Weinmannia pinnata* L. Syst. Nat. ed. 10. 1005. 1759.

Weinmannia glabra L. f. Suppl. Pl. 228. 1781.

Weinmannia intermedia Schlecht. & Cham. Linnaea 5:555. 1830.

Mountains of Hidalgo, Veracruz, and Oaxaca. West Indies, Central America, and South America; type from Jamaica.

Shrub or small tree, copiously pubescent; leaves opposite, stipulate, pinnate, the rachis winged, the leaflets 9 to 25, oval or oblong, 1 to 2 cm. long, crenate; flowers small, in long racemes; sepals 4 or 5; petals 4 or 5; stamens 8 or 10; fruit a small capsule. "Lorito" (Costa Rica); "oreganillo" (Porto Rico); "encinillo" (Colombia).

The bark is astringent, and a gum often exudes from it. It is said that the bark has been used as an adulterant of quinine.

57. HAMAMELIDACEAE. Witch-hazel Family.

1. LIQUIDAMBAR L. Sp. Pl. 999. 1753.

REFERENCE: P. Wilson, N. Amer. Fl. 22: 189. 1905.

The balsam derived from *Liquidambar orientalis* Mill., of western Asia, is the official *Styrax* of the U. S. Pharmacopoeia; it is known also as storax. It is used in medicine as a stimulating expectorant and very feeble germicide.

1. *Liquidambar styraciflua* L. Sp. Pl. 999. 1753.

Liquidambar macrophylla Oerst. Amér. Centr. 16. 1863.

Liquidambar styraciflua mexicana Oerst. Amér. Centr. 16. 1863.

Mountains, Veracruz and Puebla to Chiapas. Guatemala; eastern United States; type from Virginia.

Large or small tree, sometimes 45 meters high, with a trunk 1.5 meters in diameter, the crown broad or narrow; bark thick, deeply furrowed, grayish, the young branches usually with corky wings; leaves about 15 cm. wide, with 5 deep acute lobes, bright green; flowers unisexual, the staminate racemose, the pistillate in globose heads, the heads becoming spiny and conelike in fruit; perianth none; fruit a capsule, opening at the apex, containing few winged seeds; wood hard, weak, light brown, its specific gravity about 0.59. "Xochiquahuitl," "xochiocotzoquahuitl," "xochiocotzotl" (the gum) (Nahuatl); "maripenda" (Michoacán, Tarascan); "nabá" (Chiapas, Morelet); "ocotzotl," "ocozotl," or "ocozol" (Veracruz); "ocozote" (Oaxaca, Reko); "estoraque" (Oaxaca, Guatemala); "liquidámbar" (Oaxaca, Guatemala, Honduras, Nicaragua); "yaga-bito," "yaga-bizigui" (Oaxaca, Zapotec).

The wood of the sweet-gum takes a good polish but warps badly. It is used in the United States for furniture, shingles, paving blocks, etc., and in Mexico for boxes, chests, and other articles. For interior finish of houses it is very popular, for it is of fine appearance when polished. The leaves (which are beautifully colored in autumn, before falling) contain tannin.

The resin or balsam obtained from the tree appears to be little known in the United States, but in Mexico and Central America it has been much used from the earliest times. It has been employed also in Europe in medicine, under the names "liquidambar" and "copalm balsam." The balsam is a transparent yellowish liquid with peculiar agreeable balsamic odor and bitter warm acrid taste; upon exposure to the air it hardens. The gum is sometimes chewed in the southern United States to sweeten the breath. A sirup prepared from the bark has been used as a remedy for diarrhoea and dysentery, especially in children.

The method of gathering the balsam in Honduras, and the uses made of it there, are detailed in the following account by W. V. Wells:¹ "The owners

¹ Explorations and adventures in Honduras, pp. 321-322. 1857.

of cattle estates send their mayordomos into the woods to collect the gum, which is found exuding from the pores of the tree, and often collecting, like that of the peach, in some knot or bruise along its smooth surface. The gum trickles from the incision in transparent tears down the conduits made by the natives, until, from a spout inserted in some convenient place, a pint or more is collected. By climbing to the lower branches a purer quality is said to be obtained.

"A rim of plantain leaves, bound tightly around the trunk and left for several days, is found filled with the precious distillation. I afterwards went with Julio, the mayordomo of Lepaguare, about two leagues to one of these trees, where he procured from the leafy troughs at least a pint. The trunk of the liquid amber-tree is clammy to the touch, so that numerous living bees, attracted by the sweet, glutinous substance sweating from the pores, are found sticking helplessly to the bark. The gum, when bottled, becomes of the consistency of sirup. In the *caballeria* of Don Francisco Zelaya there were at least two gallons used for no other purpose than to heal the wounds of horses, mules and cattle. * * * I was assured that it never failed to effect a speedy cure for flesh-wounds in horses, and that in the mountains, when the mahogany-cutters or hunters wounded themselves, they applied at once to this tree for *remedios*. It is sometimes mixed into a stiff gum with other substances, and chewed by the Indians as a preservative of the teeth."

One of the earliest references to the sweet-gum tree is that by Bernal Diaz del Castillo¹ who, describing the meals taken by the Mexican emperor, says: "After he had dined, they presented to him three little canes highly ornamented, containing liquid amber, mixed with an herb they call tobacco, and when he had sufficiently viewed and heard the singers, dancers, and buffoons, he took a little of the smoke of one of these canes." The balsam and gum were much used for flavoring tobacco and also as incense in houses and temples. As for medicinal uses, the tree was employed in catarrhal, stomachic, and other affections, and was reputed to have stimulant properties. The following account of the tree by Hernández,² accompanied by a figure, is given in a chapter entitled "*De Xochiocotzo Quahuatl, seu Arbore Liquidambari Indici*": "*Xochiocotzo Quahuatl* is a large tree, with leaves almost like those of a maple, divided into three points and two notches, toothed, on one side whitish and on the other darker. The bark of the trunk is partly yellow and partly green. It grows in plains and in hot, or sometimes in temperate places, like *Hoeyacocotla*, *Quahuchinac*, and *Xicotepec*. Its nature is hot and dry, and its odor pleasant. If the bark of this tree is cut, there flows from it what is called Indian Liquidambar by the Spaniards, and by the Mexicans *Xochiocotzol*, in the sweetness of its odor very like *Styrax*. Its nature is hot in the third order, and dry, and added to tobacco it strengthens the head, belly, and heart, induces sleep, and alleviates pains in the head that are caused by colds. Alone, it dissipates humors, relieves pains, and cures eruptions of the skin. From the same tree, either spontaneously or from incisions, there is distilled an oil, no whit inferior to the famed liquor, either in sweetness of odor or in medicinal virtues, albeit some assert that the oil is distilled from the first liquor, put in a suitable place, or expressed, so that the thinner part of it may distil; and they assert that it is hot and moist, not accurately, however.

¹ True history of the conquest of Mexico, translation by Keatinge, p. 140. 1800.

² Thesaurus 56. 1651. See also M. G. Lozada, *El Liquidámbar*, *Naturaleza* 1: 70.

It relieves wind in the stomach and dissipates tumors beyond belief, it aids digestion, strengthens the belly, heals uterine affections, and others similar to those, either alone or mixed with other drugs. There are some who prepare a kind of balsam from the twigs steeped in water, but this is meaner and less suitable for the aforesaid remedies, and not fit for any except the meaner uses."

58. PLATANACEAE. Plane-tree Family.

REFERENCE: Gleason, N. Amer. Fl. 22: 227-229. 1908.

1. PLATANUS L. Sp. Pl. 999. 1753.

Large trees with thin peeling bark; pubescence of stellate hairs; leaves alternate, long-petiolate, palmately nerved, dentate or lobate, with large stipules; flowers small, green, unisexual, monoecious, in large dense globose heads; sepals 3 or 4; petals small, alternate with the sepals; stamens alternate with the petals; fruit of nutlets, each surrounded by stiff erect hairs.

The species of this genus are known by the English names of "buttonwood," "sycamore," and "plane-tree." They are excellent shade trees and especially to be recommended for street planting. They are little attacked by insects and usually have broad crowns, with tough branches not easily broken by the wind. The native species are planted as shade trees in Mexico.

Heads 1 or 2 or rarely 3 on each peduncle, sessile.

Leaves whitish-tomentose beneath-----1. *P. mexicana*.

Leaves green and glabrate beneath-----2. *P. glabrata*.

Heads 3 to 6 on each peduncle.

Leaves with 5 deep narrow lobes, truncate or often deeply cordate at the base.

Heads slender-stalked; leaves rather closely grayish-tomentose at first but soon glabrate-----3. *P. wrightii*.

Heads sessile or on very short stalks; leaves loosely yellow-tomentose.

4. *P. racemosa*.

Leaves not lobed, or with 3 lobes, or rarely with 2 very small additional lobes, these often very shallow.

Heads stalked-----5. *P. chiapensis*.

Heads sessile.

Leaves rounded and conspicuously decurrent at base, loosely white-tomentose beneath the lobes usually entire-----6. *P. lindemiana*.

Leaves truncate or subcordate at base, scarcely or not at all decurrent, with a very close sparse tomentum beneath, not whitish, the lobes coarsely dentate-----7. *P. oaxacana*.

1. *Platanus mexicana* Moric. Pl. Amer. Rar. 12. 1830.

Along watercourses, Tamaulipas, Nuevo León, San Luis Potosí, and Veracruz.

Large tree, 15 to 20 meters high, the trunk 1.5 meters in diameter, with broad crown; leaves long-petiolate, 7 to 20 cm. wide, with 5 or more acuminate lobes; fruit heads brownish, about 3 cm. in diameter. "Aya" (Veracruz, *Schiede*); "álamo" (Tamaulipas, Veracruz); "álamo blanco" (San Luis Potosí, Nuevo León, Tamaulipas).

Sometimes planted as a shade tree. The wood is used for general carpenter work and for dishes and spoons.

2. *Platanus glabrata* Fernald, Proc. Amer. Acad. 36: 493. 1901.

Coahuila, Nuevo León, and San Luis Potosí; type from Monclova, Coahuila.

Leaves 5 to 20 cm. wide, usually green on both surfaces, acutely lobed and dentate. "Álamo" (San Luis Potosí).

3. *Platanus wrightii* S. Wats. Proc. Amer. Acad. 10: 349. 1875.

Northern Chihuahua and Sonora; sometimes planted as a shade tree. Southern Arizona (type locality) and New Mexico.

Tree with broad crown, sometimes 24 meters high, with a trunk diameter of 1.5 meters, the bark brownish, scaling off in thin sheets; leaves 15 to 20 cm. wide, with 3 to 7 long narrow lobes, these entire or sparsely dentate; wood light brown, its specific gravity about 0.47.

4. *Platanus racemosa* Nutt. N. Amer. Sylv. 1: 47. 1842.

Baja California. California (type locality).

Large tree, sometimes 38 meters high, with a trunk diameter of 2.7 meters; leaves deeply lobed, 15 to 25 cm. wide; wood hard, coarse-grained, light brown, weak and not durable, its specific gravity about 0.49.

5. *Platanus chiapensis* Standl. Contr. U. S. Nat. Herb. 20: 212. 1919.

Chiapas; type from Zinacantan.

Tree, 15 meters high; leaves with 3 short acute lobes, or merely coarsely and remotely dentate, 9 to 23 cm. long, fulvous-tomentose beneath.

6. *Platanus lindeniana* Mart. & Gal. Bull. Acad. Brux. 10¹: 342. 1843.

Veracruz and Puebla to Chiapas; type from Jalapa.

Tree, 30 to 40 meters high; leaves 9 to 20 cm. long or larger, with 3 long narrow lobes. "Álamo" (Veracruz).

This may be the species reported from Uruapam by Sessé and Mocino¹ as *P. orientalis*. That name belongs to an Old World species.

7. *Platanus oaxacana* Standl. Contr. U. S. Nat. Herb. 20: 213. 1919.

Known only from the type locality, San Miguel Alborrados, Oaxaca, altitude 1,950 meters.

Leaves 12 to 20 cm. wide.

59. CROSSOSOMATACEAE. Crossosoma Family.

REFERENCE: Small, N. Amer. Fl. 22: 231-232. 1908.

1. CROSSOSOMA Nutt. Journ. Acad. Phila. II. 1: 150. 1848.

Shrubs or small trees with rough astringent bark; leaves alternate, thick, small, entire; flowers perfect, solitary, white or purplish; sepals and petals 5 each; stamens usually 15 or more; fruit a cluster of 2 to 5 follicles.

Petals broadly obovate or orbicular-obovate; follicles many-seeded.

1. *C. californicum*.

Petals spatulate or oblong; follicles few-seeded.

Body of the follicle oblong-cylindric, rugose.....2. *C. bigelovii*.

Body of the follicle ovoid, reticulate.....3. *C. parviflorum*.

1. *Crossosoma californicum* Nutt. Journ. Acad. Phila. II. 1: 150. 1848.

Guadalupe Island, Baja California. Islands off the coast of southern California; type from Santa Catalina Island.

Shrub or small tree with rough scaly bark; leaves oblong, obovate, or spatulate, 2.5 to 9 cm. long, sessile or nearly so; petals white, 1.5 to 1.8 cm. long.

2. *Crossosoma bigelovii*² S. Wats. Proc. Amer. Acad. 11: 122. 1876.

¹ Pl. Nov. Hisp. 163. 1887.

² John Milton Bigelow (1804-1878) was appointed in 1850 surgeon of the Mexican Boundary Commission, and in 1853 surgeon and botanist of the expedition under Lieutenant Whipple, which explored the route for a railroad along the thirty-fifth parallel. He made large collections of plants, which were reported upon by Torrey and Gray.

Erect shrub, the branches sometimes spinelike; leaves 0.5 to 1.5 cm. long; petals white or purplish, 1 to 1.4 cm. long.

3. *Crossosoma parviflorum* Robins. & Fern. Proc. Amer. Acad. 30: 114. 1894.

Sonora. Arizona, the type from the Grand Canyon.

Shrub, 1 to 2.5 meters high; leaves elliptic-oblong, 8 to 13 mm. long, pale green; petals white, 6 mm. long.

60. ROSACEAE. Rose Family.

REFERENCE: Rydberg, N. Amer. Fl. 22: 239-533. 1908-1918.

Shrubs or trees; leaves usually alternate, simple or compound, commonly stipulate; flowers usually perfect, often large and showy; sepals normally 5; petals as many as the sepals or wanting; stamens usually numerous; fruit of achenes, follicles, or small drupes.

Many herbaceous plants of the family are natives of Mexico.

Leaves compound or deeply lobed and with linear lobes.

Petals none; flowers in long spikelike racemes. Leaves pinnate, with 9 to 19 leaflets; very low shrub-----5. **ACAENA**.

Petals present; flowers never in spikelike racemes.

Leaves 2 or 3 times pinnate, with very numerous minute divisions. Plants unarmed; flowers small, white, corymbose-paniculate.

9. **CHAMAEBATIA**.

Leaves once pinnate or digitate or merely lobed.

Leaves merely pinnate-lobed; flowers mostly solitary; plants unarmed.

Bractlets present on the calyx; pistils numerous-----7. **FALLUGIA**.

Bractlets none; pistils few-----8. **COWANIA**.

Leaves pinnate or digitate; flowers often racemose, corymbose, or paniculate; plants usually armed with spines.

Fruit of numerous drupelets borne on a receptacle; leaves often palmate; petals usually white; stipules free from the petiole.

11. **RUBUS**.

Fruit globose or urceolate, with numerous achenes inside; leaves pinnate; petals pink or red; stipules united to the petiole.

12. **ROSA**.

Leaves simple, entire or dentate, or with short, broad lobes.

Leaves entire. Flowers white.

Fruit of usually 3 follicles; leaves flat; flowers racemose-----1. **SPIRAEA**.

Fruit an achene; leaves clavate or filiform; flowers paniculate.

6. **ADENOSTOMA**.

Leaves toothed or lobed.

Leaves digitately lobed; fruit of numerous fleshy drupelets. Flowers large, white-----11. **RUBUS**.

Leaves merely dentate or crenate or pinnately lobed; fruit dry.

Petals none; calyx tube long-tubular; fruit a single achene with a long plumose tail; flowers axillary, solitary or fasciculate.

10. **CERCOCARPUS**.

Petals present; calyx tube never tubular; fruit of follicles or of more than one achene; flowers terminal, often paniculate.

Fruit of achenes with long plumose tails; flowers ochroleucous or purple-----8. **COWANIA**.

Fruit of follicles without long plumose tails; flowers white.

Stipules none; seeds exalate; leaves deciduous--4. **SERICOTHECA**.

Stipules present, deciduous; seeds winged; leaves persistent.

Carpels wholly united into a 5-celled capsule; flowers solitary or in small clusters-----

2. **LINDLEYELLA.**

Carpels free above, wholly distinct at maturity; flowers corymbose.

3. **VAUQUELINIA.**

1. **SPIRAEA** L. Sp. Pl. 489. 1753.

Many of the species of this genus, especially those of Asiatic origin, are cultivated for ornament, and some are grown in Mexican gardens.

1. **Spiraea hartwegiana** Rydb. N. Amer. Fl. 22: 246. 1908.

Spiraea parvifolia Benth. Pl. Hartw. 36. 1840. Not *S. parvifolia* Raf. 1838.

Puebla and Oaxaca; type from "Puerta del Dio."

Shrub with grayish or reddish brown branches; leaves spatulate, 7 to 15 mm. long, entire, glabrous; flowers small, white, racemose; petals 5, 2 mm. long; fruit of 5 follicles.

2. **LINDLEYELLA** Rydb. N. Amer. Fl. 22: 259. 1908.

1. **Lindleyella mespiloides** (H. B. K.) Rydb. N. Amer. Fl. 22: 259. 1908.

Lindleya mespiloides H. B. K. Nov. Gen. & Sp. 6: 240. 1823.

Lindleyella schiedeana Rydb. N. Amer. Fl. 22: 259. 1908.

Coahuila to Tamaulipas and Oaxaca; type from between La Puente de la Madre de Dios and Magdalena.

Shrub, 2 to 3 meters high; leaves oblanceolate to broadly obovate, 1 to 4 cm. long, short-petiolate, glabrous, crenulate; flowers solitary or clustered, white, 2 to 3 cm. broad; petals 5; stamens 15 to 25. "Barreta" (Zacatecas).

3. **VAUQUELINIA** Correa; Humb. & Bonpl. Pl. Aequin. 1: 140. 1808.

Shrubs or small trees; leaves coriaceous, serrate or dentate, the stipules small, deciduous; flowers small, white, corymbose; petals 5; stamens 15 to 25; fruit a woody capsule.

Leaves finely tomentose beneath.

Leaf blades lanceolate or narrowly lanceolate, tapering to the apex, white beneath-----

1. **V. californica.**

Leaf blades narrowly oblong, not tapering to the apex, obtuse, greenish beneath-----

2. **V. australis.**

Leaves glabrous beneath, at least when fully expanded.

Leaf blades linear or linear-lanceolate, coarsely salient-dentate, acute or attenuate at base-----

3. **V. corymbosa.**

Leaf blades lanceolate, oblong, broadly oblong, or ovate, truncate to acutish at base.

Leaf blades 3 to 5 cm. long, 0.6 to 1.1 cm. wide, finely serrulate; petioles 3 to 6 mm. long; inflorescence few-flowered-----

4. **V. pauciflora.**

Leaf blades 5.5 to 10.5 cm. long, 1.3 to 3 cm. wide, coarsely serrate; petioles 6 to 25 mm. long; inflorescence many-flowered.

Leaf blades 3 to 5 times as long as broad, obtuse or acutish at base.

5. **V. karwinskyi.**

Leaf blades about twice as long as broad, truncate or very obtuse at base.

6. **V. latifolia.**

1. **Vauquelinia californica** (Torr.) Sarg. Gard. & For. 2: 400. 1889.

Spiraea californica Torr. in Emory, Notes Mil. Recon. 140. 1848.

Vauquelinia torreyi S. Wats. Proc. Amer. Acad. 11: 147. 1876.

Reported from Sonora and Baja California. Arizona; type from mountains near the Gila.

Shrub or small tree, up to 6 meters high, the trunk sometimes 18 cm. in diameter, the branches stiff and crooked; bark thin, reddish brown, scaly; leaves 4 to 8 cm. long; corymbs 5 to 8 cm. wide; wood hard, close-grained, dark brown, its specific gravity about 1.13.

2. *Vauquelinia australis* Standl. Proc. Biol. Soc. Washington 31: 132. 1918.

Known only from the type locality, Cerro de Paxtle, Puebla.

Leaves 3.5 to 6 cm. long, serrulate, lustrous on the upper surface; corymbs about 4 cm. broad; petals 3.5 mm. long.

3. *Vauquelinia corymbosa* Correa; Humb. & Bonpl. Pl. Aequin. 1: 140. 1808.

Vauquelinia angustifolia Rydb. N. Amer. Fl. 22: 260. 1908.

Chihuahua and Coahuila to Hidalgo; type from Actopan, Hidalgo. Western Texas.

Tree, up to 10 meters high; with brown bark; leaves 5 to 10 cm. long or larger, long-petiolate. "Guauyul," "guayule," "palo prieto," "árbol prieto," "palo verde" (Durango, *Patoni*).

The wood or bark is said to be used for dyeing goat skins yellow. *Patoni* states that the name "guayule" belongs properly to this plant rather than to *Parthenium argentatum*, to which it is now generally applied, and that it is doubtful how it came to be applied to the latter plant. *V. angustifolia* differs from the typical form in having less salient teeth, but the two forms are connected by specimens intermediate in character.

4. *Vauquelinia pauciflora* Standl. Proc. Biol. Soc. Washington 31: 132. 1918.

Known only from the type locality, Guadalupe Canyon, northeastern Sonora.

Tree; branches dark gray, leafy at the tips; leaves lustrous on the upper surface.

Rydberg has applied the name *V. torreyi* S. Wats. to this species, but that is evidently only a new name for *Spiraea californica* Torr. It may be that *V. pauciflora* is only a form of *V. californica*.

5. *Vauquelinia karwinskyi* Maxim. Act. Hort. Petrop. 6: 236. 1879.

Vauquelinia potosina Painter; Standl. Proc. Biol. Soc. Washington 31: 131. 1918.

San Luis Potosí and probably elsewhere; type from Santiaguillo.

Shrub or small tree with dark brown branches; leaves long-petiolate, lustrous on the upper surface.

6. *Vauquelinia latifolia* Rydb., sp. nov.

Coahuila and Tamaulipas; type from mountains near Miquihuana, Tamaulipas, altitude 2,100 to 2,700 meters. (*Nelson* 4481; U. S. Nat. Herb. no. 332669).

Shrub, 1 to 2.5 meters high; leaves petiolate, ovate to ovate-oblong, 5 to 6.5 cm. long, 2.5 to 3 cm. wide, obtuse or acute, rounded at base, coarsely serrate, thick-coriaceous, glabrous, lustrous, often glaucescent beneath; corymbs many-flowered, dense, glabrous, 4 to 5 cm. broad, the flowers about 6 mm. long.

4. *SERICOTHECA* Raf. Sylva Tell. 152. 1839.

Small or large shrubs; leaves estipulate, dentate; flowers small, white, paniculate, the panicles often large and showy; petals 5; stamens about 20; fruit of 5 small follicles.

Teeth of the leaves lanceolate or triangular-ovate, ending in a long mucro; stamens shorter than the calyx lobes.

Leaves glabrous on the upper surface-----4. *S. fissa*.

Leaves velvety-pubescent on the upper surface-----5. *S. velutina*.

Teeth of the leaves rounded or rounded-ovate, with a short mucro; stamens usually equaling the calyx lobes.

Leaves glandular-atomiferous and slightly hairy on the veins beneath, not at all tomentose-----3. *S. schaffneri*.

Leaves tomentose and villous beneath.

Leaf blades abruptly contracted at the base, scarcely decurrent.

1. *S. pachydisca*.

Leaf blades cuneate at the base and decurrent on the winged petioles.

2. *S. dumosa*.

1. *Sericotheca pachydisca* Rydb. N. Amer. Fl. 22: 263. 1908.

Known only from the type locality, Tacubaya, Valley of Mexico.

Shrub with brown branches; leaves 2 to 3 cm. long, short-petiolate, with few coarse teeth; panicles 10 to 15 cm. long.

2. *Sericotheca dumosa* (Nutt.) Rydb. N. Amer. Fl. 22: 263. 1908.

Spiraea dumosa Nutt.; Hook. Lond. Journ. Bot. 6: 217. 1847.

Holodiscus dumosus Heller, Cat. N. Amer. Pl. 4. 1898.

Chihuahua and Baja California. Northward to Wyoming; type from the Platte River.

Shrub, 1 to 2 meters high, often forming large clumps; leaves 2 to 5 cm. long, obtuse or acute; panicles 5 to 20 cm. long, very showy.

The fruit of this and other species is said to have been eaten by the Coahuilla Indians of California and the Tewa of New Mexico.

3. *Sericotheca schaffneri* Rydb. N. Amer. Fl. 22: 264. 1908.

Northern Mexico; type from San Luis Potosí. Arizona.

Low shrub; leaves 1 to 3 cm. long, ovate or rounded-oval, obtuse; panicles 5 to 7 cm. long.

4. *Sericotheca fissa* (Lindl.) Rydb. N. Amer. Fl. 22: 265. 1908.

Spiraea fissa Lindl. Bot. Reg. 26: Misc. 73. 1840.

Spiraea argentea Benth. Pl. Hartw. 82. 1841. Not *S. argentea* L. f. 1781.

? *Holodiscus loeseneri* Dammer, Repert. Sp. Nov. Fedde 15: 385. 1919.

Michoacán to Oaxaca and Veracruz. Guatemala to Costa Rica.

Shrub, 2.5 to 3.5 meters high; leaves 2 to 5 cm. long, acute; panicles 5 to 15 cm. long.

On the Pico de Orizaba the species ascends to 3,300 meters.

5. *Sericotheca velutina* Rydb. N. Amer. Fl. 22: 265. 1908.

Southern Mexico; type from Sierra de San Felipe, Oaxaca. Guatemala.

Shrub, 1 meter high or more; leaves 1.5 to 3 cm. long; panicles 5 to 10 cm. long.

DOUBTFUL SPECIES.

SPIRAEA MEXICANA Schiede; Regel, Ind. Sem. Hort. Petrop. 1857: 58. 1858.
Described from cultivated plants of Mexican origin.

5. *ACAENA* Mutis; L. Mant. Pl. 145. 1775.

Low shrubs, or often herbaceous almost throughout; leaves pinnate, stipulate; flowers small, spicate or racemose, the calyx covered with barbed prickles; petals none; stamens 3 to 5; fruit a solitary achene.

Upper leaflets 1.5 to 2 cm. long, the lower gradually reduced.

1. *A. agrimonioides*.

Upper leaflets 0.8 to 1.5 cm. long, the lower scarcely reduced--2. *A. elongata*.

1. *Acaena agrimonioides* H. B. K. Nov. Gen. & Sp. 6: 231. 1823.

Known only from the type locality, near Tianguillo.

Stems purplish; leaflets 9 to 13, sessile, acute, coarsely serrate.

2. *Acaena elongata* L. Mant. Pl. 200. 1771.

Mountains, Veracruz to Mexico and Colima. Southward to Colombia.

Low shrub with brownish or purplish bark; leaflets 9 to 19, oval or elliptic, serrate, glabrous and lustrous on the upper surface; stamens purple; fruit covered with barbed spines.

6. *ADENOSTOMA* Hook. & Arn. Bot. Beechey Voy. 129. 1832.

Erect shrubs; leaves often fasciculate, filiform or clavate; flowers very small, white, paniculate; petals 5; stamens 10 to 15; fruit a single achene.

Leaves clavate, fascicled; bracts not scarious; stamens usually 15.

1. *A. fasciculatum*.

Leaves filiform, scattered; bracts with scarious margins; stamens usually 10.

2. *A. sparsifolium*.**1. *Adenostoma fasciculatum* Hook. & Arn. Bot. Beechey Voy. 139. 1832.**

Adenostoma brevifolium Nutt.; Rydb. N. Amer. Fl. 22: 396. 1913.

Baja California, abundant in the mountains at 300 to 1,800 meters. California; type from Monterey Bay.

Shrub, 0.5 to 6 meters high, the branches brown or gray; leaves 4 to 10 mm. long, acute or obtuse, lustrous; petals about 1.5 mm. long. "Chamiso" (Baja California).

2. *Adenostoma sparsifolium* Torr. in Emory, Notes Mil. Recon. 140. 1848.

Baja California, on mountain slopes at 1,000 to 1,750 meters. California; type from Warner Pass.

Shrub or tree, 1 to 10 meters high, forming dense thickets, the branchlets green, the bark of old branches reddish brown, often peeling in thin sheets; leaves 5 to 12 mm. long, gland-dotted; flowers sometimes pinkish. "Palo amarillo" (Baja California); "hierba del pasmo," "chamiso" (California).

Often known in California as "greasewood." A decoction of the plant is used locally for chills and fevers and as a tonic. The Coahuilla Indians of California employed the wood for arrow points and rabbit sticks; a decoction of the twigs as a purgative and vomitive in the case of pains in the stomach and intestines; the powdered twigs mixed with grease as a salve; and a decoction of the plant as a remedy for sick cattle.

7. *FALLUGIA* Endl. Gen. Pl. 1246. 1840.**1. *Fallugia paradoxa* (D. Don) Endl.; Torr. in Emory, Notes Mil. Recon. 140. 1848.**

Sieversia paradoxa D. Don, Trans. Linn. Soc. Bot. 14: 576. 1825.

Geum cercocarpoides DC.; Seringe in DC. Prodr. 2: 554. 1825.

Fallugia mexicana Walp. Repert. Bot. 2: 46. 1843.

Chihuahua, Durango, and Coahuila. Western Texas to Utah and Arizona.

Shrub, 1 to 2 meters high, the bark whitish, shredded; leaves 1 to 2 cm. long, divided into 3 to 7 linear revolute lobes; flowers white, usually solitary, long-pedunculate, the 5 petals 1.5 to 2 cm. long; stamens numerous; achenes with feathery purplish tails 3 to 5 cm. long. "Pofil" (New Mexico).

A very handsome shrub when in either flower or fruit; of some value as a forage plant. It is sometimes known in the southwestern United States as "Apache-plume." The Tewa Indians of New Mexico employed the smaller branches, tied in bundles, as brooms, and the larger ones for arrow shafts. They also, like the Hopi of Arizona, employed an infusion of the leaves for washing the hair to promote its growth, probably, according to Hough, because of the hairy fruit.

8. COWANIA D. Don, Trans. Linn. Soc. Bot. 14: 574. 1825.

Erect shrubs or small trees; leaves dentate, pinnatifid, or entire, coriaceous, viscid, gland-dotted, the margins usually revolute; flower solitary; petals 5; stamens numerous; achenes 1 to 12, each with a long feathery tail.

Leaves entire-----1. *C. ericaefolia*.

Leaves dentate or pinnatifid.

Petals purple or rose; leaves 5 to 9-dentate; sepals cuspidate-acuminate.

2. *C. plicata*.

Petals white or yellowish; leaves 3 or 5-cleft; sepals rounded at apex.

Calyx tube campanulate, abruptly contracted at base; lobes of the leaves entire-----3. *C. mexicana*.

Calyx tube funnelform, gradually narrowed at base; lobes of the leaves cleft or dentate-----4. *C. stansburiana*.

1. *Cowania ericaefolia* Torr.; A. Gray, Pl. Wright. 2: 106. 1853.

Western Texas; type collected on rocks along the Rio Grande below Presidio del Norte; doubtless also in Chihuahua, although no Mexican specimens have been seen.

Shrub, 1 meter high or less, with dark brown bark; leaves linear-subulate, 4 to 6 mm. long; petals white or yellowish, 6 to 8 mm. long.

2. *Cowania plicata* D. Don; Sweet, Brit. Flower Gard. II. pl. 400. 1838.

Cowania purpurea Zucc. Abh. Akad. Wiss. München 4²: 7. 1845.

Greggia rupestris Engelm. in Wislitz. Mem. North. Mex. 114. 1848.

Rocky hillsides, Coahuila, San Luis Potosí, Zacatecas, and Guanajuato.

Shrub, 0.5 to 2 meters high, with shredded bark; leaves obovate, 6 to 20 mm. long, white-tomentose beneath; petals 10 to 12 mm. long.

3. *Cowania mexicana* D. Don, Trans. Linn. Soc. Bot. 14: 575. 1825.

Geum dryadoides DC.; Seringe in DC. Prodr. 2: 554. 1825.

Durango and Guanajuato; reported from Jalisco.

Shrub, 1 to 2 meters high, with brownish bark; leaves usually 3-cleft, 5 to 10 mm. long; petals cream-colored, about 8 mm. long. "Romero cedro" (Guanajuato, Jalisco); "chivatillo" (Durango, *Paton*); "romerillo cimarrón" (*Seemann*).

4. *Cowania stansburiana* Torr. in Stansb. Expl. Great Salt Lake 386. 1852.

Dry hillsides, Chihuahua and Sonora. Colorado to southern California; type from Great Salt Lake, Utah.

Shrub, 1 to 3.5 meters high, with gray shredded bark; leaves 8 to 15 mm. long, viscid; petals white or pale yellow, 8 to 10 mm. long; tails of the fruit 4 to 5 cm. long.

Before the advent of European races the Indians of Utah and Nevada obtained material for clothing from this shrub. The thin, silky inner bark was removed in strips and woven or braided together. The bark was used also for sandals, ropes, and mats. The Gosiute Indians are said to have used the plant medicinally, but in what manner is not stated.

9. CHAMAEBATIA Benth. Pl. Hartw. 308. 1848.

1. *Chamaebatia australis* (T. S. Brandeg.) Abrams, Bull. Torrey Club 34: 263. 1907.

Chamaebatia foliolosa australis T. S. Brandeg. Bot. Gaz. 27: 447. 1899.

Northern Baja California; type from La Grulla. Southern California.

Low shrub, glandular-pubescent, with blackish branches; leaves 3 to 6 cm. long, 2 or 3 times pinnatifid into very numerous minute segments; flowers white, cymose-paniculate, the 5 petals 4 to 5 mm. long; stamens numerous.

10. *CERCOCARPUS* H. B. K. Nov. Gen. & Sp. 6: 232. 1823.

Shrubs or small trees, leaves entire or dentate, thick; flowers axillary, solitary or fasciculate, inconspicuous; fruit with long feathery tails.

Patoni gives the vernacular name of a Durango species as "lentisco." Because of their very hard, tough wood the plants are commonly known in the United States by the name of "mountain mahogany." The wood of *C. ledifolius* Nutt. was used by the Gosiute Indians of Utah for bows. The Tewa of New Mexico drink an infusion of the leaves of *C. montanus* Raf. (known as "palo duro") with salt, as a laxative.

Leaves coriaceous, the veins very prominent beneath, impressed above.

Leaves crenate-----4. *C. pringlei*.

Leaves serrate or dentate.

Leaf blades oval or elliptic, acute or subobtuse at the apex, the lateral veins mostly 12 to 20 on each side-----1. *C. macrophyllus*.

Leaf blades obovate to orbicular, rounded at apex, the lateral veins 5 to 10 on each side.

Leaves not conspicuously white-tomentose beneath, the lateral veins 7 to 10 on each side-----2. *C. fothergilloides*.

Leaves conspicuously white-tomentose beneath, the lateral veins 5 to 8 on each side-----3. *C. mojadensis*.

Leaves not coriaceous, the veins neither very prominent nor impressed.

Leaf blades 2 to 6 cm. long, dentate at least at and above the middle.

Pubescence of the hypanthium and young leaves spreading.

5. *C. rotundifolius*.

Pubescence of the hypanthium and young leaves appressed.

6. *C. betuloides*.

Leaf blades usually less than 2 cm. long, dentate only at the apex or entire.

Pubescence of the hypanthium and young leaves appressed; hypanthium tube less than 6 mm. long-----9. *C. breviflorus*.

Pubescence of the hypanthium and young leaves spreading; hypanthium tube 6 to 7 mm. long.

Pubescence of short hairs-----7. *C. eximius*.

Pubescence of long, shaggy hairs-----8. *C. paucidentatus*.

1. *Cercocarpus macrophyllus* C. Schneid. Handb. Laubh. 1: 530. 1905.

In the mountains, Jalisco to Veracruz and Guerrero; type from Orizaba, Veracruz.

Shrub, 2 to 4 meters high; leaves 4 to 11 cm. long, very thick, green above, tomentose beneath, dentate; tails of the fruit 5 to 6 cm. long.

2. *Cercocarpus fothergilloides* H. B. K. Nov. Gen. & Sp. 6: 233. 1823.

Mexico and Puebla; probably extending to Oaxaca; type from near the City of Mexico.

Shrub or small tree, 1 to 5 meters high; leaves 2.5 to 4.5 cm. long, dentate, lustrous on the upper surface. "Ramón," "zunu-ña" (Oaxaca).

3. *Cercocarpus mojadensis* C. Schneid. Handb. Laubh. 1: 530. 1905.

Coahuila and Zacatecas; type from Sierra Mojada, Coahuila.

Shrub or small tree; leaves 2 to 4 cm. long, dentate, white-tomentose beneath; tails of the fruit 3 to 4 cm. long.

4. *Cercocarpus pringlei* (C. Schneid.) Rydb. N. Amer. Fl. 22: 420. 1913.

Cercocarpus mojadensis pringlei C. Schneid. Mitt. Deutsch. Dendr. Ges. 14: 126. 1905.

Oaxaca; type from La Hoya Canyon.

Tree, up to 8 meters high; leaves 3 to 6.5 cm. long, white-tomentose beneath.

5. *Cercocarpus rotundifolius* Rydb. N. Amer. Fl. 22: 421. 1913.

Baja California; common in canyons at 1,440 to 1,700 meters. Southern California; type from Los Angeles County.

Shrub, 3 to 5.5 meters high, with dark branches, sometimes forming dense thickets; leaves rounded-oval or suborbicular, 1 to 3 cm. long; tails of the fruit 6 to 7 cm. long.

6. *Cercocarpus betuloides* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 427. 1840.

Northern Baja California. California; type from Santa Barbara.

Shrub or tree, 3 to 10 meters high, the trunk sometimes 25 cm. in diameter; bark thin, separating into irregular scales; leaves oval or obovate, 1.5 to 5 cm. long; wood close-grained, reddish brown, its specific gravity about 0.93.

The wood is sometimes used for tool handles, and is useful for fuel.

7. *Cercocarpus eximius* (C. Schneid.) Rydb. N. Amer. Fl. 22: 422. 1913.

Cercocarpus breviflorus eximius C. Schneid. Handb. Laubh. 1: 530. 1905.

Dry rocky hillsides, Chihuahua and Sonora. Arizona and New Mexico; type from Capitan Mountains, New Mexico.

Shrub or small tree, 1 to 7 meters high, the trunk sometimes 20 cm. in diameter, with very hard wood; bark thin, scaly; leaves obovate or elliptic, rounded at the apex; tails of the fruit 4 to 5 cm. long.

8. *Cercocarpus paucidentatus* (S. Wats.) Britton, Trans. N. Y. Acad. 14: 31. 1894.

Cercocarpus parvifolius paucidentatus S. Wats. Proc. Amer. Acad. 17: 353. 1882.

Cercocarpus treleasei C. Schneid. Handb. Laubh. 1: 530. 1905.

San Luis Potosí to Hidalgo; type from San Miguelito, San Luis Potosí.

Shrub with gray bark; leaves 5 to 10 mm. long; tails of the fruit about 3 cm. long.

9. *Cercocarpus breviflorus* A. Gray, Pl. Wright. 2: 54. 1853.

Chihuahua, Coahuila, and Sonora; type from Fronteras, Sonora. Arizona to western Texas.

Shrub, 1 to 2 meters high, with dark gray, fissured bark; leaves elliptic, acute, 8 to 15 mm. long.

11. RUBUS L. Sp. Pl. 492. 1753.

Erect, prostrate, or scandent shrubs, usually armed with prickles or bristles; leaves persistent or deciduous, petiolate, simple or palmately or pinnately compound; flowers usually racemose or paniculate, large and showy; fruit of numerous small juicy drupes, these united and falling off like a cap or sometimes united to the receptacle, rarely falling off separately.

The genus contains the cultivated blackberries ("zarzamoras"), dewberries, and raspberries ("frambuesas"), some of which are grown in Mexico, although not very extensively. The native species are known in Mexico as "zarzamora"; the Tarascan name is said to be "situni"; the name "coatlamitl"¹ is reported from the Valley of Mexico. The fruit of all the native species is edible, and is used extensively in Mexico.

The root bark of the wild blackberries is official in the U. S. Pharmacopoeia. The decoction has long been a favorite domestic astringent remedy for diarrhoea.

¹The name should probably be "coatlantli" ("serpent's tooth"). The Nahuatl name for the fruit is "coatlanxocotl."

Sessé and Mocifio report¹ from Mexico *Rubus occidentalis* and *R. hispidus*, both United States species, *R. fruticosus*, a European species, and *R. pentaphyllus*. The descriptions given are too brief for identification.

The tropical American species of *Rubus* seem to have attracted little attention from the early writers, but they are mentioned by Oviedo (Lib. VIII, Cap. XXVI), who says of the "zarzamoras:" "Although these can not be counted as trees in Spain, they are so here, where they have thicker trunks and stems and are much taller than in Castile, and for their size must be termed trees."

Leaves simple. Plants unarmed.

Flowers paniculate; drupelets capped by a hard pubescent cushion.

26. *R. parviflorus*.

Flowers mostly solitary; drupelets without a cushion.

Leaves concolorous, the terminal lobe broadly ovate, usually broader than long-----27. *R. neomexicanus*.

Leaves dark green above, paler beneath, the terminal lobe triangular, usually longer than broad-----28. *R. trilobus*.

Leaves compound.

Stipules broad, free or nearly so. Stems creeping-----1. *R. pumilus*.

Stipules narrow, linear-lanceolate or subulate, more or less adnate to the petioles.

Fruit cup-shaped, falling off from the dry receptacle.

Inflorescence racemose; fruit red; leaves pinnate-----5. *R. strigosus*.

Inflorescence corymbose; fruit black or purple; leaves palmate.

Fruit hemispheric; sepals inclosing the fruit-----4. *R. pringlei*.

Fruit oblong; sepals reflexed in fruit.

Leaves glabrate on the upper surface; fruit 8 to 15 mm. thick.

2. *R. glaucus*.

Leaves puberulent on the upper surface; fruit 6 to 8 mm. thick.

3. *R. eriocarpus*.

Fruit not cup-shaped, the carpels remaining on the fleshy receptacle and falling with it or falling off separately.

Plants with prostrate biennial stems; leaflets coarsely toothed, deciduous.

Leaves glabrous beneath or nearly so, except on the veins.

25. *R. humistratus*.

Leaves copiously pubescent beneath.

Fruit sparsely pilose-----23. *R. cymosus*.

Fruit glabrous-----24. *R. oligospermus*.

Plants with usually erect or scandent perennial stems; leaflets finely and closely dentate, often evergreen.

Drupelets few, falling off separately.

Plants scandent; branches of the inflorescence unarmed; sepals obtuse.

Stems tomentose, unarmed; leaflets stellate-puberulent on the upper surface, velvety-tomentose beneath-----21. *R. scandens*.

Stems inconspicuously pilose, prickly; leaflets glabrous above, puberulent beneath on the veins-----22. *R. fagifolius*.

Plants erect; branches of the inflorescence prickly; sepals acute or acuminate-----11. *R. corifolius*.

Drupelets united with the receptacle or, if falling separately, numerous.

Stems and petioles densely hispid with long eglandular bristles.

6. *R. trichomallus*.

¹ Pl. Nov. Hisp. 85. 1887.

Stems and petioles not hispid or, if so, the bristles gland-tipped.

Stems and petioles with gland-tipped hairs.

Leaflets sparsely hairy beneath or glabrate---7. *R. verae-crucis*.

Leaflets densely pubescent beneath-----8. *R. adenotrichos*.

Stems and petioles without gland-tipped hairs, the inflorescence sometimes glandular-hairy.

Stems climbing or trailing; inflorescence conspicuously prickly.

Leaflets lance-ovate, long-acuminate-----17. *R. nelsonii*.

Leaflets broadly ovate or oval.

Leaflets oval, rounded or obtuse-----20. *R. alnifolius*.

Leaflets ovate, short-acuminate or acute.

Teeth of the leaflets broadly ovate; inflorescence with gland-tipped hairs-----18. *R. palmeri*.

Teeth of the leaflets lanceolate, directed upward; inflorescence without gland-tipped hairs.

19. *R. sapidus*.

Stems not climbing or trailing; inflorescence usually not prickly.

Drupelets pubescent; inflorescence prickly.

Leaflets cordate at base, soft-pubescent.

9. *R. philyrophyllus*.

Leaflets not cordate at base, sparsely pubescent.

10. *R. liebmannii*.

Drupelets glabrous; inflorescence slightly or not at all prickly.

Petals at least twice as long as the sepals.

Leaflets closely serrate with numerous sharp lanceolate teeth; drupelets few-----11. *R. coriifolius*.

Leaflets dentate with numerous small, rather distant teeth; drupelets numerous-----12. *R. schiedeanus*.

Petals slightly if at all exceeding the sepals.

Leaflets regularly dentate with rather short teeth, never cordate at base.

Inflorescence glandular and tomentose; leaflets pilose on the upper surface-----13. *R. macrogongylus*.

Inflorescence not glandular; leaflets finely stellate-pubescent on the upper surface---14. *R. smithii*.

Leaflets closely and irregularly or doubly serrate with lanceolate antrorse teeth.

Inflorescence copiously glandular-pubescent; inflorescence lax-----15. *R. uhdeanus*.

Inflorescence very sparsely or not at all prickly; inflorescence dense-----16. *R. abundus*.

1. *Rubus pumilus* Focke, Abh. Nat. Ver. Bremen 4: 155. 1874.

Chihuahua to Mexico, in mountain woods; type from San Andrés.

Stems creeping and rooting, sparsely prickly, with shredded bark; leaves reniform, simple, 3 to 4 cm. wide, often 3-lobed; flowers white; fruit red, 1 cm. broad.

2. *Rubus glaucus* Benth. Pl. Hartw. 173. 1845.

Morelos to Chiapas. Southward to Ecuador, the type locality.

Shrub, 1 to 3 meters high, the stems glaucous; leaves pinnate, the 3 leaflets ovate, 6 to 15 cm. long, white-tomentose beneath; flowers white; fruit dark purple, 1.2 to 2 cm. long.

3. *Rubus eriocarpus* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1852: 162. 1853.

Veracruz and Puebla; type from Chinantla, Oaxaca. Central America.

Shrub, 1 to 3 meters high, the stems glaucous, prickly; leaflets 3, 6 to 10 cm. long, finely serrate, long-acuminate, white-tomentose beneath; flowers white; fruit about 1 cm. long, the drupelets tomentose.

4. *Rubus pringlei* Rydb. N. Amer. Fl. 22: 443. 1913.

Mexico and Hidalgo to Oaxaca and Chiapas. Guatemala; type from Volcán de Agua.

Shrub, 1 to 2 meters high; leaflets 3, prickly, 4 to 6 cm. long; flowers white; fruit 2 cm. long, red or purple, with a bloom.

5. *Rubus strigosus* Michx. Fl. Bor. Amer. 1: 297. 1803.

Batidaea arizonica Greene, Leaflets 1: 241. 1906.

Rubus arizonicus Rydb. N. Amer. Fl. 22: 446. 1913.

Mountains of Chihuahua. Widely distributed in the United States, Canada, and Alaska.

Shrub, 0.3 to 1 meter high; leaflets 5 or 7, 3 to 6 cm. long, white-tomentose beneath; flowers white; fruit 1 cm. broad.

The fruit of this red raspberry is of good quality and is much used in regions where it is abundant. Some of the horticultural raspberries are forms of this species improved by cultivation.

6. *Rubus trichomallus* Schlecht. Linnaea 13: 268. 1839.

Rubus urticaefolius Focke, Abh. Nat. Ver. Bremen 4: 149. 1874. Not *R. urticaefolius* Poir. 1804.

Veracruz and Chiapas; type from Hacienda de la Laguna, Veracruz. Central America and Colombia.

Stems several meters high, pubescent; leaflets 3 or 5, ovate, 7 to 12 cm. long; flowers white; fruit reddish or almost black.

7. *Rubus verae-crucis* Rydb. N. Amer. Fl. 22: 450. 1913.

Veracruz; type from San Miguel del Soldado.

Erect shrub, 5 to 7 meters high; leaflets 3 or 5, lanceolate, 5 to 10 cm. long; petals white, 1 cm. long.

8. *Rubus adenotrichos* Schlecht. Linnaea 13: 267. 1839.

Veracruz, Morelos, Oaxaca, and Chiapas; type from Jalapa, Veracruz. Guatemala to Costa Rica.

Shrub, up to 9 meters high, the stems covered with reddish gland-tipped bristles; leaflets 3 or 5, 5 to 10 cm. long; petals white or pink, 1 cm. long; fruit red or black, 1 cm. thick.

9. *Rubus philyrophyllus* Rydb. N. Amer. Fl. 22: 451. 1913.

Rubus tiliaceus Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1852: 161. 1853.

Not *R. tiliaceus* Smith, 1815.

Rubus tiliacefolius Focke, Abh. Nat. Ver. Bremen 4: 159. 1874. Not *R. tiliacefolius* Weihe, 1825.

Known only from the type locality, Chinantla, Oaxaca.

Leaflets 3, 8 cm. long or shorter, short-acuminate.

10. *Rubus liebmanni* Focke, Abh. Nat. Ver. Bremen 4: 158. 1874.

Mexico and Oaxaca; described from cultivated plants grown from seed gathered on Mount Zempoaltepec, Oaxaca.

Shrub, 2 to 3 meters high; leaflets 3, 4 to 10 cm. long, green; flowers rose-colored; fruit black, 1 cm. long.

11. *Rubus coriifolius* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1852: 157. 1853.

Michoacán to Veracruz, Morelos, and Chiapas; type from Jalapa, Veracruz.

Shrub, 1.5 to 3.6 meters high; leaflets elongate-ovate, 5 to 10 cm. long, acuminate; flowers white or rose; fruit red or nearly black.

12. *Rubus schiedeanus* Steud. Nom. Bot. ed. 2. 2: 479. 1841.

Rubus dumetorum Schlecht. Linnaea 13: 267. 1839. Not *R. dumetorum* Weihe, 1824.

Veracruz and Oaxaca; type from Jalapa, Veracruz. Guatemala.

Shrub, 1.5 to 7.5 meters high; leaflets 3 or 5, 4 to 10 cm. long, glabrous above, puberulent beneath; flowers white; fruit black.

13. *Rubus macrogongylus* Focke, Repert. Sp. Nov. Fedde 9: 236. 1911. Veracruz. Guatemala.

Leaflets 3 or 5, oblong, acuminate; fruit black.

14. *Rubus smithii* Rydb. N. Amer. Fl. 22: 453. 1913.

Rubus poliophyllus Focke; Donn. Smith, Bot. Gaz. 18: 202. 1893. Not *R. poliophyllus* Kuntze, 1879.

Mexico. Guatemala; type from San Rafael.

Leaflets 3 or 5, oval or elliptic, 8 cm. long or shorter, abruptly acuminate; flowers white; fruit black.

15. *Rubus uhdeanus* Focke, Abh. Nat. Ver. Bremen 4: 159. 1874.

Mexico and Morelos.

Leaflets 3, pale beneath, 9 cm. long or shorter; petals white or pinkish, 8 mm. long; fruit black, about 1 cm. long.

16. *Rubus abundus* Rydb. N. Amer. Fl. 22: 454. 1913.

Rubus floribundus H. B. K. Nov. Gen. & Sp. 6: 219. 1823. Not *R. floribundus* Weihe, 1821.

Veracruz and Oaxaca. Central America to Bolivia; type from Andes of Loja, Ecuador.

Leaflets 3 or 5, 10 cm. long or shorter; flowers white or rose; fruit black, subglobose.

17. *Rubus nelsoni* Rydb. N. Amer. Fl. 22: 455. 1913.

Known only from the type locality, Mount Zempoaltepec, Oaxaca.

Stem reclining, 2 to 4 meters long; leaflets 3 or 5, 3 to 7 cm. long; flowers white; fruit dark purple, subglobose.

18. *Rubus palmeri* Rydb. N. Amer. Fl. 22: 456. 1913.

Durango, Sinaloa, Tepic, and Jalisco; type from San Ramón, Durango.

Stems reclining, 2 to 4 meters long; leaflets 3 or 5, 10 cm. long or shorter; flowers white; fruit black, of good flavor. "Guismora," "huismora" (Durango); "mora" (Sinaloa).

19. *Rubus sapidus* Schlecht. Linnaea 13: 269. 1839.

Veracruz; type from Jalapa.

Leaflets 3 or 5, dark green, 7 cm. long or shorter, acuminate; petals white, 1 cm. long; fruit globose.

20. *Rubus alnifolius* Rydb. N. Amer. Fl. 22: 457. 1913.

Known only from the type locality, San Miguel, Veracruz.

Stems decumbent or reclining; leaflets 3, oval, coriaceous, 3 to 5 cm. long; fruit dark purple, 1.5 to 2 cm. long.

21. *Rubus scandens* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1852: 154. 1853.

Veracruz; type from Mirador.

Stems climbing, often 6 meters long; leaflets 3 or 5; flowers white or pinkish; fruit dark purple.

22. *Rubus fagifolius* Schlecht. & Cham. Linnaea 5: 571. 1830.

Veracruz; type from Papantla.

Stems climbing, sometimes 5 meters long; leaflets 3 or 5, 12 cm. long or shorter, coriaceous; flowers white; fruit red, of 4 to 6 large drupelets.

23. *Rubus cymosus* Rydb. N. Amer. Fl. 22: 470. 1913.

Known only from the type locality, Tlalpam, Valley of Mexico.

Stems decumbent, prickly; leaflets 5, ovate, 5 to 8 cm. long; flowers white; fruit dark purple, globose, 1 cm. long.

24. *Rubus oligospermus* Thornber; Rydb. N. Amer. Fl. 22: 470. 1913.

Rubus scolocaulon T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 498. 1919.

Baja California and Sonora to San Luis Potosí and Jalisco. Southern Arizona; type from Santa Catalina Mountains.

Stems trailing, glabrous, 1 to 6 meters long; leaflets 3 or 5, 5 cm. long or shorter; flowers white.

This has been reported from Mexico as *R. trivialis* Michx.

25. *Rubus humistratus* Steud. Nom. Bot. ed. 2. 2: 478. 1841.

Rubus humifusus Schlecht. Linnaea 13: 270. 1839. Not *R. humifusus* Weihe & Nees, 1821.

Southern Mexico; type from Jalapa, Veracruz.

Stems prostrate, 1 to 2 meters long; leaflets 3, ovate, 3 to 6 cm. long; flowers white.

26. *Rubus parviflorus* Nutt. Gen. Pl. 1: 308. 1818.

Rubacer parviflorum Rydb. Bull. Torrey Club 30: 274. 1903.

Mountains of Chihuahua. Northward to Alaska and Ontario; type from Lake Huron.

Shrub, a meter high or less, unarmed, glandular-pubescent; leaves petiolate, reniform, 5 to 10 cm. wide, 3 or 5-lobed; flowers paniculate, the petals white, 1.5 to 3 cm. long; fruit thimble-shaped, red, 1.5 to 2 cm. wide, juicy, edible.

Known in the United States as "thimbleberry." The fruit is often gathered, but is of rather poor quality. It collapses when picked. The flowers are very showy and handsome.

27. *Rubus neomexicanus* A. Gray, Pl. Wright. 2: 55. 1853.

Oreobatus neomexicanus Rydb. Bull. Torrey Club 30: 275. 1903.

Northern Sonora. Arizona and New Mexico; type from Santa Rita, New Mexico.

Shrub, 1 to 3 meters high, with flaky bark; leaves cordate-reniform, 3 to 9 cm. wide, pubescent, long-petiolate; flowers white, the petals 2 to 2.5 cm. long; fruit 1.5 cm. broad, red.

28. *Rubus trilobus* Seringe in DC. Prodr. 2: 566. 1825.

Rubus mexicanus Kuntze, Meth. Sp. 102. 1879.

Oreobatus trilobus Rydb. N. Amer. Fl. 22: 428. 1913.

Veracruz, Puebla, Oaxaca, and Chiapas. Guatemala.

Shrub; leaves cordate, 3-lobed; petals white, 2 cm. long; fruit purple, 1.5 cm. broad.

DOUBTFUL SPECIES.

RUBUS MADRENSIS Jones, Contr. West. Bot. 12: 14. 1908. Described from Chihuahua.

12. *ROSA* L. Sp. Pl. 491. 1753.

Erect shrubs, armed with prickles; leaves pinnate; flowers solitary or corymbose, large and showy; hypanthium enlarged and fleshy in fruit, bearing numerous achenes on the inner surface.

Many species of roses ("rosas") of European or Asiatic origin are cultivated in Mexico for their beautiful flowers. The fruits of some of the North American species are sweet and palatable when frosted, and they were eaten by the Indians, especially in winter, when food was scarce. Among the Tewa Indians of New Mexico a salve made from the petals is used for sore mouth, and a decoction of the fruit was employed by the Omaha as a wash for sore eyes. Some of the tribes smoked the inner bark, either alone or mixed with tobacco.

Leaflets mostly 5 to 10 mm. long; fruit densely spiny-----1. *R. minutifolia*.

Leaflets mostly 1.5 cm. long or larger; fruit not spiny.

Leaflets glabrous beneath, without glands, thick-----2. *R. montezumae*.

Leaflets pubescent beneath, or with stalked glands, thin.

Rachis of the leaves, as well as the fruit, without large stalked glands.

3. *R. fendleri*.

Rachis of the leaves, and usually the fruit, with long-stalked glands.

Leaflets densely pubescent beneath, not glandular-ciliate.

4. *R. californica*.

Leaflets glabrous beneath but with numerous stalked glands, glandular-ciliate-----5. *R. serrulata*.

1. *Rosa minutifolia* Parry, Bull. Torrey Club 9: 97. 1882.

Baja California, abundant in places along arroyos and on mesas, up to an altitude of 300 meters; type from Bahía de Todos Santos.

Shrub, 0.5 to 1.5 meters high, the stems covered with stellate hairs; leaflets 3, 5 to 8 mm. long; petals deep rose purple to white, 1 to 1.5 cm. long.

2. *Rosa montezumae* Humb. & Bonpl.; Redouté, Roses 1: 55. 1817.

Rosa mexicana Willd. (Spreng. Syst. Veg. 2: 555. 1825, as synonym); Crép.

Bull. Soc. Bot. Belg. 11: 82. 1872.

Mountains of Mexico and Hidalgo; type from the mountains of the Valley of Mexico.

Shrub, 1 to 2 meters high; leaflets 3 to 7, oval, acute, 1 to 2 cm. long; petals pink, 1.5 to 1.8 cm. long; fruit red. "Garambullo," "uña de gato," "rosa de Moctezuma," "cinorrodón," "agabanzo," "escaramujo" (Valley of Mexico); "trompillo" (Hidalgo, Villada).

The fruit is used in domestic medicine.

3. *Rosa fendleri* Crép. Bull. Soc. Bot. Belg. 15: 91. 1876.

Mountains of northern Chihuahua. Northward to Montana and South Dakota; type from New Mexico.

Shrub, 1 meter high or less; leaflets 5 or 7, 1 to 3 cm. long; petals pink, 1.5 cm. long; fruit red.

4. *Rosa californica* Cham. & Schlecht. Linnaea 2: 35. 1827.

Baja California. California; type from San Francisco.

Shrub, 1 to 3 meters high; leaflets 5 or 7, 1 to 2 cm. long; petals pink, 1.5 to 2.5 cm. long.

5. *Rosa serrulata* Raf. Ann. Gén. Phys. 5: 218. 1820.

Rosa mexicana S. Wats. Proc. Amer. Acad. 15: 354. 1882. Not *R. mexicana* Willd. 1825.

Coahuila and Nuevo León. Eastern United States; type from New York.

Shrub, 1 meter high or less; leaflets usually 5, 1 to 4 cm. long; petals pink, 1.5 to 2.5 cm. long.

61. MALACEAE. Apple Family.

Trees or shrubs, sometimes armed with spines; leaves alternate, stipulate, dentate or lobate; flowers perfect, solitary, racemose, corymbose, or cymose, often large and showy; petals 5; stamens usually numerous; fruit a pome, this consisting of the much enlarged, fleshy calyx tube, inclosing the papery or leathery seedlike carpels.

Several important cultivated fruit trees belong to this family, chief of which are the following: The apple, *Malus sylvestris* Mill. ("manzano," the tree, "manzana," the fruit; "belehui," Oaxaca, Zapotec, *Reko*; "tnutiniumi," Oaxaca, Mixtec, *Reko*); the pear, *Pyrus communis* L. ("peral"); the quince, *Cydonia oblonga* Mill. ("membrillo"); and the loquat, *Eriobotrya japonica* Lindl. ("níspero"). All these are natives of the Old World. Bustamente states¹

¹ In his edition of Andrés Cavo's *Los Tres Siglos de México*, p. 6. 1852.

that the first apple trees were brought to Mexico by Gregorio López, and planted in Jalisco about 1522. Clavigero relates that the Jesuits planted apple trees in Baja California in the 18th century.

Carpels of the fruit hard and bonelike; plants usually armed with spines.

1. **CRATAEGUS.**

Carpels of the fruit thin and papery; plants without spines.

Fruit large, 2 cm. in diameter or larger.....2. **PHOTINIA.**

Fruit small, 1 cm. in diameter or smaller.

Leaves oblong or lanceolate, 8 to 10 cm. long, dentate...3. **HETEROMELES.**

Leaves rounded or oval, 5 cm. long or shorter, entire or obscurely dentate.

4. **AMELANCHIER.**

1. **CRATAEGUS** L. Sp. Pl. 475. 1753.

REFERENCE: Eggleston, Bull. Torrey Club 36: 501-514. 1909.

Shrubs or small trees with dark brown, scaly bark, nearly always armed with long stout spines; leaves dentate or lobate, petiolate, deciduous; flowers white, corymbose, strong-scented, the odor often very disagreeable; fruit usually globose or pyriform; wood hard and tough.

The species (in the United States called "hawthorn" and "red haw") are known in Mexico under the name "tejocote" or "texocotl." Buelna gives the Otomí names as "dopri," "dopini," and "vipeni." The fruit is highly valued and is a common article in the markets. It is eaten raw or more commonly made into jelly or preserves. The trees are often cultivated. The fruit is reputed to have pectoral properties, although, apparently without sufficient basis. The roots are used in domestic medicine because of their supposed diuretic and antidyenteric properties. The wood, which is hard and compact, is used for various purposes.

Mexican specimens of the genus are reported by Sessé and Mocino¹ as *Crataegus crus-galli* and *Mespilus pyracantha*.

Branchlets, corymbs, and lower surface of leaves glabrous. Fruit red.

1. **C. baroussana.**

Branchlets, corymbs, and lower surface of leaves tomentose.

Leaf blades broadly ovate, tomentose on both sides. Stamens about 10; styles 4 or 5; calyx lobes serrate; fruit red.....2. **C. greggiana.**

Leaf blades mostly elliptic, lanceolate, or obovate.

Stamens 5 to 10. Styles 3 or 4; calyx lobes serrate; fruit red, with 3 or 4 nutlets.....3. **C. rosei.**

Stamens about 20.

Calyx lobes serrate. Styles usually 2 or 3; fruit yellow, with 2 or 3 nutlets.....4. **C. pubescens.**

Calyx lobes entire.

Leaf blades oblanceolate or obovate.....5. **C. stipulosa.**

Leaf blades mostly lanceolate or elliptic.

Styles 2 or 3; leaves glabrous on the upper surface. Fruit yellow, with 2 or 3 nutlets.....6. **C. parryana.**

Styles 3 to 5; leaves tomentose on the upper surface.

Leaf blades 3 to 9 cm. long; styles usually 3 or 4. Fruit orange.....7. **C. mexicana.**

Leaf blades 1.5 to 5 cm. long; styles usually 4 or 5...8. **C. nelsoni.**

1. **Crataegus baroussana** Eggleston. Torreya 7: 35. 1906.

Coahuila; type from mountains near Saltillo.

¹ Pl. Nov. Hisp. 84, 85. 1887.

Tree, 3.5 to 5.5 meters high; leaves elliptic-oval, 3 to 7 cm. long, serrate and shallowly lobed, bright green; fruit about 1 cm. in diameter.

2. *Crataegus greggiana* Eggleston, Bull. Torrey Club 36: 511. 1909.

Coahuila; type from Saltillo.

Tree, 4.5 to 6 meters high, the trunk 15 to 30 cm. thick; spines 7 cm. long or shorter; leaves 4 to 7 cm. long, coarsely serrate.

3. *Crataegus rosei* Eggleston, Bull. Torrey Club 36: 509. 1909.

Chihuahua to San Luis Potosí and Durango; type from Álvarez, San Luis Potosí.

Shrub or small tree, 3 to 9 meters high, the trunk up to 37 cm. in diameter; leaves 2.5 to 4 cm. long, serrate, lustrous; fruit often 1.5 cm. in diameter.

Wood white, tough, and durable; used for tool handles.

4. *Crataegus pubescens* (H. B. K.) Steud. Nom. Bot. ed. 2. 433. 1841.

Mespilus pubescens H. B. K. Nov. Gen. & Sp. 6: 213. pl. 565. 1824.

Crataegus pubescens botterii Eggleston, Bull. Torrey Club 26: 506. 1909.

Veracruz, Hidalgo, and Oaxaca; type from Morán, Hidalgo.

Tree, sometimes 10 meters high; leaves 3 to 8 cm. long, finely serrate or on young branches deeply lobate; fruit about 12 mm. long.

5. *Crataegus stipulosa* (H. B. K.) Steud. Nom. Bot. ed. 2. 433. 1841.

Mespilus stipulosa H. B. K. Nov. Gen. & Sp. 6: 213. 1824.

Chiapas. Guatemala to Ecuador (type locality).

Tree; leaves 4 to 8 cm. long, acute or obtuse, tomentose beneath, finely serrate; fruit sometimes 2.5 cm. in diameter.

6. *Crataegus parryana* Eggleston, Bull. Torrey Club 36: 510. 1909.

Known only from the type locality, Álvarez, San Luis Potosí.

Shrub or small tree, up to 4.5 meters high. "Tejocote ameco."

7. *Crataegus mexicana* Moc. & Sessé; DC. Prodr. 2: 629. 1825.

Crataegus subserrata Benth. Pl. Hartw. 10. 1839.

Crataegus hypolasia Koch, Hort. Dendr. 167. 1853.

Crataegus mexicana microsperma Eggleston, Bull. Torrey Club 36: 508. 1909. San Luis Potosí to Jalisco, Oaxaca, and Veracruz.

Tree about 6 meters high; spines often very large and stout; leaves thick, lustrous, serrate or shallowly lobate; fruit 1 to 2 cm. in diameter. "Manzanita tejocotera" (Oaxaca).

8. *Crataegus nelsoni* Eggleston, Bull. Torrey Club 36: 512. 1909.

Known only from the type locality near San Cristóbal, Chiapas, altitude 2,100 to 2,640 meters.

Spines stout, 4 to 6 cm. long; leaves lustrous, serrate and shallowly lobate.

2. *PHOTINIA* Lindl. Trans. Linn. Soc. Bot. 13: 103. 1821.

1. *Photinia mexicana* (Baill.) Hemsl. Biol. Centr. Amer. Bot. 1: 380. 1880.

Chamaemeles mexicana Baill. Adansonia 9: 148. 1869.

In forests, mountains of Veracruz and Oaxaca; type from Veracruz.

Tree, about 9 meters high; leaves oblong, elliptic, or oval, 5 to 12 cm. long, petiolate, rounded to acutish at apex, shallowly crenate, thick, bright green, lustrous; flowers cymose-paniculate, brown-tomentose; fruit subglobose, usually 3 to 4 cm. in diameter, rough, tomentose when young; seeds dark reddish brown, 1.5 cm. long. "Peral silvestre" (Oaxaca).

The fruit somewhat resembles a small pear. It is said to be of good flavor. This plant is probably the one reported by Sessé and Mociño¹ as *Crataegus indica*.

¹ Pl. Nov. Hisp. 84. 1887.

3. **HETEROMELES** M. Roemer, Fam. Nat. Syn. 3: 105. 1837.

1. **Heteromeles salicifolia** (Presl) Abrams, Bull. N. Y. Bot. Gard. 6: 381. 1910.
Crataegus arbutifolia Ait. Hort. Kew. 3: 202. 1811. Not *C. arbutifolia* Lam. 1783.

Photinia arbutifolia Lindl. Trans. Linn. Soc. Bot. 13: 103. 1821.

Heteromeles arbutifolia M. Roemer, Fam. Nat. Syn. 3: 105. 1847.

Photinia salicifolia Presl, Epim. Bot. 204. 1849.

Baja California, ranging from sea level up to 1,680 meters. California; type from Monterey.

Shrub or tree, 2 to 9 meters high, sometimes with a trunk 45 cm. in diameter; bark thick, light gray, shallowly fissured; leaves persistent, oblong, acute, 8 to 10 cm. long, dentate; flowers small, white, in large panicles; fruit red or yellow, about 1 cm. long, astringent; wood hard, close-grained, reddish brown, its specific gravity about 0.93.

The tree is known in California as "tollon," "Christmas-berry," and "California holly." It is often used for Christmas decorations. The fruit is edible.

4. **AMELANCHIER** Medic. Phil. Bot. 1: 155. 1789.

Shrubs or small trees; leaves petiolate, persistent or deciduous, entire or denticulate; flowers racemose, solitary, or clustered, white, rather showy; fruit a small, juicy pome.

Leaves small, 0.7 to 1.8 cm. wide, the lateral nerves not very conspicuous beneath; calyx usually glabrous outside; inflorescence commonly short and umbelliform-----1. **A. denticulata**.

Leaves large, usually 2.3 cm. wide, the lateral nerves coarse and very conspicuous beneath; calyx densely white-tomentose outside; inflorescence elongate, racemose-----2. **A. nervosa**.

1. **Amelanchier denticulata** (H. B. K.) Koch, Dendrol. 1: 183. 1869.

Cotoneaster denticulata H. B. K. Nov. Gen. & Sp. 6: 169. pl. 556. 1823.

Nagelia denticulata Lindl. Bot. Reg. 31: Misc. 40. 1845.

Crataegus minor Sessé & Moc. Pl. Nov. Hisp. 84. 1887.

Chihuahua and Coahuila to Mexico and Oaxaca; type from Actopan, Hidalgo.

Erect shrub, 1 to 3.5 meters high, densely branched, the branches gray or brown; leaves 1 to 2.5 cm. long, entire or denticulate; flowers about 1 cm. broad; fruit red, dark purple, or black, 8 to 10 mm. long. "Membrillito" (Veracruz); "membrillo cimarrón," "tlaxisqui," "tlaxistle" (Valley of Mexico); "membrillo" (Oaxaca); "madronillo" (Coahuila).

The fruit is edible. The stems, according to Herrera, are made into canes, known as "varitas de Apizaco," which are notable for their flexibility. In the typical form of the species the calyx is tomentose outside, but in most of the specimens the calyx is glabrous. The northern (glabrous) form may be a distinct species, but there seem to be some intermediate specimens. *Crataegus inermis* Sessé & Moc.¹ is perhaps another synonym of this species.

2. **Amelanchier nervosa** (Decaisne) Standl.

Cotoneaster nervosa Decaisne, Nouv. Arch. Mus. Paris 10: 177. 1874.

Chiapas and Oaxaca.

Leaves 3 to 4.5 cm. long, very thick, bright green on the upper surface, white or gray-tomentose beneath, usually entire.

¹ Pl. Nov. Hisp. 84. 1887.

62. AMYGDALACEAE. Almond Family.

Trees or shrubs; leaves alternate, entire or serrate, persistent or deciduous, stipulate; flowers perfect, often showy, usually solitary, cymose, corymbose, or racemose; petals 5; stamens numerous; fruit a drupe.

Style subterminal; leaves often serrate-----1. **PRUNUS.**

Style basilar; leaves entire.

Stamens 3 to 10.

Petals none or minute-----2. **LICANIA.**

Petals 5-----3. **HIRTELLA.**

Stamens 15 to many.

Anthers linear, elongate-----4. **LECOSTEMON.**

Anthers short, didymous or rounded.

Calyx tube elongate; inflorescence racemose or paniculate; ovary adnate to the throat of the calyx-----5. **COUEPIA.**

Calyx tube campanulate; inflorescence cymose; ovary sessile in the bottom of the calyx-----6. **CHRYSOBALANUS.**

1. PRUNUS L. Sp. Pl. 473. 1753.

REFERENCE: Koehne, Bot. Jahrb. Engler 52: 279-333. 1915.

Trees or shrubs; leaves serrate or entire, the teeth often gland-tipped; flowers solitary, corymbose, umbellate, or racemose; fruit glabrous or pubescent.

Several important fruit trees of this genus are cultivated in Mexico, chief of which are the following: The peach, *Prunus persica* (L.) Sieb. & Zucc., "durazno," "melocotón," "prisco," "albérchigo," "pahsh" (Mixe, *Belmar*), "ñhcanzà," "ixi" (Otomí, *Buelna*); the apricot, *P. armeniaca* L., "chabacano," "albaricoque," "damasco"; the almond, *P. communis* (L.) Fritsch, "almen-dro" (the tree), "almendra" (the fruit); various plums, *P. domestica* L., *P. insititia* L., etc., "ciruelo," "ciruelo de España"; and cherries, *P. cerasus* L., "cerezo," (the tree), "cereza" (the fruit), "guindo." All these were doubtless introduced into Mexico by the Spaniards at an early date. It is of interest to note that peaches were probably introduced into the United States directly from Mexico. Havard remarks¹ upon the subject as follows:

"The Indians certainly exhibited commendable promptness and industry, after the advent of the whites, in introducing such fruits as were shown to be desirable. Thus the Peach brought to Mexico soon after the conquest was, according to the testimony of Du Pratz, found in general cultivation among the Indians of Louisiana when the French settled that province in 1698, and had become abundant in Georgia at the time of the settlement of the English in 1732. Wm. Bartram describes the carefully planted Orange groves of the Indians which he noticed in 1773. The early introduction and propagation of these two plants by the Indians led to the erroneous impression that they were of American origin."

Flowers solitary, fascicled, or umbellate; ovary often pubescent.

Flowers umbellate; fruit large, 1.8 to 2.5 cm. long, glabrous--1. **P. mexicana.**

Flowers solitary or fasciculate; fruit usually less than 1 cm. long.

Ovary glabrous-----2. **P. apodantha.**

Ovary pubescent.

Leaves entire or nearly so.

Leaves oval or obovate-----3. **P. minutiflora.**

Leaves linear-oblongate-----4. **P. fasciculata.**

¹ V. Havard, Food plants of the North American Indians, Bull. Torrey Club 22: 98-123. 1895.

Leaves serrate or serrulate.

Leaf blades orbicular or broadly ovate, finely serrate; flowers pedicellate-----5. *P. fremontii*.

Leaf blades oblong or obovate, serrate; flowers subsessile.

6. *P. microphylla*.

Flowers racemose; ovary glabrous.

Racemes terminating short leafy branches; leaves finely serrulate.

Leaf blades mostly 4 to 6 cm. long, obtuse or acute; racemes 4 to 6 cm. long-----7. *P. virens*.

Leaf blades mostly 6.5 to 10 cm. long, abruptly acuminate or long-acuminate; racemes usually 7 to 15 cm. long-----8. *P. capuli*.

Racemes axillary, naked; leaves entire or coarsely serrate or dentate.

Leaves serrate or dentate, or rarely entire, the fruit then 1.5 to 2 cm. long.

Leaves entire-----9. *P. lyoni*.

Leaves serrate or dentate.

Leaf blades suborbicular or rounded-ovate; racemes equaling or longer than the leaves-----10. *P. ilicifolia*.

Leaf blades lance-oblong; racemes much shorter than the leaves.

11. *P. prionophylla*.

Leaves entire.

Calyx persistent beneath the fruit. Leaves barbate beneath.

12. *P. rhamnoides*.

Calyx deciduous.

Calyx villous within at the base; petals barbate above the base.

13. *P. cortapico*.

Calyx glabrous within; petals glabrous.

Racemes all or mostly in clusters of 2 to 4-----14. *P. samydoides*.

Racemes solitary.

Leaf blades without glands beneath; branches tuberculate by the elevated lenticels-----15. *P. tuberculata*.

Leaf blades with 2 or more glands beneath near the base; branches smooth or nearly so.

Glands 3 or 4 beneath, 2 of them near the base close to the costa, the others near the lateral veins--16. *P. tetradenia*.

Glands 2, at the base of the blade near the costa.

Petioles 5 to 10 mm. long; petals 2.3 to 2.7 mm. long; anthers 1 to 1.2 mm. long; stigma 1.3 to 1.5 mm. broad.

17. *P. erythroxylon*.

Petioles 12 to 22 mm. long; petals 1.5 to 2 mm. long; anthers 0.6 to 0.8 mm. long; stigma 0.4 to 1 mm. broad.

18. *P. brachybotrya*.

1. *Prunus mexicana* S. Wats. Proc. Amer. Acad. 17: 353. 1882.

Coahuila and Nuevo León; type from Lerios, Coahuila. Southern United States.

Small tree; leaves lanceolate or ovate, 5 to 12 cm. long; flowers white, 2 cm. broad; fruit purplish red, with a bluish bloom, sometimes 2.5 cm. in diameter.

This species has often been confused with *P. americana* Marsh. and *P. nigra* Ait., both natives of the United States. Those two species are the source of many of the cultivated plums. In the wild state the fruit is of fair quality, but it is greatly improved by cultivation. There is reason to believe that these wild plums were cultivated by the Indians, although, as Havard remarks, the Indian orchards were perhaps only the result of seeds accidentally dropped about villages and camping grounds.

2. *Prunus apodantha* Blake, Contr. Gray Herb. n. ser. 52: 68. 1917.

Known only from the type locality, Río Hondo, State of Mexico.

Shrub, 60 cm. high; leaves oval, 1.5 to 3 cm. long, 1 to 1.5 cm. wide, obtuse, crenate-serrate, pilose beneath; petals 3.3 mm. long.

3. *Prunus minutiflora* Engelm. Bost. Journ. Nat. Hist. 6: 185. 1850.

Reported from Chihuahua. Western Texas; type collected between San Antonio and New Braunfels.

Shrub 30 to 60 cm. high, densely branched; leaves 1 to 2 cm. long, pubescent beneath or glabrate; fruit 8 to 12 mm. long.

4. *Prunus fasciculata* (Torr.) A. Gray, Proc. Amer. Acad. 10: 70. 1874.

Emplectocladus fasciculatus Torr. in Frém. Rep. Exped. Rocky Mount. 10. pl. 5. 1850.

Amygdalus fasciculata Greene, Fl. Franc. 49. 1891.

Baja California, on dry slopes. Southern California (type locality) to Utah and Arizona.

Densely branched shrub, 1 to 2.5 meters high, with gray bark; leaves 1 to 1.5 cm. long; flowers very small, the petals white, linear; fruit 10 to 12 mm. long, densely pubescent, with very thin flesh.

5. *Prunus fremontii* S. Wats. Bot. Calif. 2: 442. 1880.

Amygdalus fremontii Abrams, Bull. N. Y. Bot. Gard. 6: 385. 1910.

Northern Baja California. Southern California, the type from San Diego County.

Shrub, sometimes 4.5 meters high, with stiff spinescent branches; leaves about 1 cm. long, thin, deciduous; flowers white, about 1 cm. broad.

6. *Prunus microphylla* (H. B. K.) Hemsl. Biol. Centr. Amer. Bot. 1: 368. 1888.

Amygdalus microphylla H. B. K. Nov. Gen. & Sp. 6: 243. pl. 564. 1823.

San Luis Potosí to Hidalgo; type collected between Pachuca and Morán, at an altitude of 2,340 meters.

Shrub, about a meter high, densely branched; leaves 1 to 1.5 cm. long; flowers small, white.

7. *Prunus virens* (Woot. & Standl.) Standl.

Prunus salicifolia acutifolia S. Wats. Proc. Amer. Acad. 22: 411. 1887.

Padus virens Woot. & Standl. Contr. U. S. Nat. Herb. 16: 132. 1913.

In mountain canyons, Chihuahua and Sonora to Durango and San Luis Potosí. Southern Arizona to western Texas; type from Organ Mountains, New Mexico.

Tree, usually about 7 meters high, with smooth, thin, reddish brown bark, the top broad and spreading, dense; leaves ovate or ovate-oblong, bright green; flowers small, white; fruit black, about 1 cm. in diameter, sweet, edible.

Perhaps not sufficiently distinct from *P. capuli*.

8. *Prunus capuli* Cav. Anal. Hist. Nat. (Madrid) 2: 110. 1800.

Prunus salicifolia H. B. K. Nov. Gen. & Sp. 6: 190. pl. 563. 1823.

Cerasus capollin DC.; Seringe in DC. Prodr. 2: 539. 1825.

Sonora to Chiapas and Veracruz. Guatemala to Peru; type from Ecuador.

Shrub or usually a tree, sometimes 15 meters high, with a trunk nearly a meter in diameter, the bark reddish brown or grayish, nearly smooth, the crown broad; leaves lanceolate to ovate, lustrous, nearly glabrous; flowers small, white; fruit red or black, 1 cm. in diameter or smaller. Generally known as "capulín," "capulí," or "capollín" (the name doubtless applied to other species also, and applied to this species in Peru and Ecuador); "tnun-

daya" (Oaxaca, Mixtec, *Reko*); "xeugua" (Michoacán, *León*); "cerezo" (Guatemala); "pa kshmuk" (Mixe, *Belmar*); "detze," "ghohto" (Otomi *Buelna*).

The wood is of good quality and is much used for general carpentry and cabinet work. The large juicy fruit is highly esteemed, and for this reason the trees are sometimes planted about houses. In early times, at least, an intoxicating drink was made from the fruit. The juice or the fruits are sometimes mixed with cornmeal to make a kind of cake known as "capultamal" or "capoltamalli." The bark, leaves, or seeds, when crushed in contact with water, develop hydrocyanic acid, and under proper conditions they may poison animals which eat them; the same is true of other members of the genus. The distilled water of the leaves is substituted in Mexico for cherry laurel water, and has the same antispasmodic properties. A decoction of the bark is employed for dysentery and is reputed also, without sufficient basis apparently, to have febrifuge properties. The bark of *Prunus serotina* Ehrh. of the United States, a closely similar species, is official in the U. S. Pharmacopoeia. It has tonic properties and the power of calming irritation and diminishing nervous excitability. It has been employed extensively for the hectic fever which accompanies scrofula and tuberculosis. The fruit of the same species has been much used for flavoring spirituous liquors and various nonintoxicating beverages.

The fruit of *Prunus capuli* is mentioned by the earliest Spanish visitors to Mexico. Bernal Diaz del Castillo, in relating the hardships of the siege of Mexico in 1521, when the Spaniards and their allies were often in the direst straits for want of food, says, "Corn we had sufficiency of, but we wanted refreshments for the wounded. What preserved us was the plant called *quillites*, cherries while in season, and tunas or Indian figs." Sahagún treats of the tree under the name "capulín." The juice of the leaves and young shoots, he states, was dropped into the eyes to heal inflammation, and the kernels of the seeds were roasted and eaten. Hernández also treats of the plant in a chapter,¹ accompanied by a figure, entitled "De *Capolin*, seu *Ceraso dulci indica*." "The fruits," he says, "are slightly acid and astringent, although when fully ripe they are sweet and lose a great part of their harshness; and by some persons they are considered in no wise inferior to our cherries. In nature they are hot, dry, and somewhat astringent. They are made into bread and wine in times of scarcity. They furnish a sad food, and one which is hurtful in a way to the heart; and they impart a black color to the teeth if they are eaten for a long time, but this can be removed easily with attention and dentifrices; and there are not lacking persons who prefer these to all the other spring fruits, even those of the Old World. The tree flowers in spring and bears fruit nearly all summer long. It thrives in temperate regions, such as Mexico, where these trees grow in the gardens and plains, cultivated or wild. The decoction of the bark, put in the sun for fifteen days, and drunk in a dose of a drachm, cures dysentery; and the powdered bark removes ulcers from the eyes, clears the vision, and relieves inflammation of the eyes; and it moistens the tongue if it be dry from burning fever, as does also the liquor or juice from the young shoots."

9. *Prunus lyoni* (Eastw.) Sarg. Pl. Wilson. 74. 1911.

Cerasus lyoni Eastw. Handb. Trees Calif. 54. 1905.

Prunus ilicifolia integrifolia Sudw. Gard. & For. 4: 51. 1891.

Prunus integrifolia Sarg. Man. Trees N. Amer. 531. 1905.

¹ Thesaurus 95. 1651.

Reported from northern Baja California. Southern California.

Tree, sometimes 12 meters high, with a trunk 45 cm. in diameter; bark thick, gray; leaves ovate or ovate-lanceolate, 5 to 8 cm. long, acute, leathery; fruit purple, rounded, 1.5 to 2 cm. in diameter.

10. *Prunus ilicifolia* (Nutt.) Walp. Repert. Bot. 2: 10. 1843.

Cerasus ilicifolia Nutt.; Hook. & Arn. Bot. Beechey Voy. 340. 1832.

Laurocerasus ilicifolia Roem. Syn. Rosifl. 92. 1847.

Baja California, on mesas and in canyons. California; type from Santa Barbara.

Shrub or, northward, a tree 10 meters high; bark thick, reddish brown, fissured; leaves 6 cm. long or shorter, with spiny teeth; fruit subglobose, purple or reddish yellow, about 1.5 cm. in diameter; wood hard, strong, its specific gravity about 0.98. "Isláy" (Baja California, California; sometimes written "yslay").

The fruit of the holly-leaf cherry is edible, but the flesh, although of good flavor, is very scant. It is gathered by the people of Baja California. The Coahuilla Indians of California made use of the seeds for food. These were gathered in large quantities and spread in the sun to dry. They were then cracked and the kernels extracted and crushed in a mortar, then leached in a sand basket through which water was poured. The meal thus obtained was made into atole.

11. *Prunus prionophylla* Standl. Contr. U. S. Nat. Herb. 20: 213. 1919.

Known only from the type locality, Ixtaccihuatl, at an altitude of 2,100 to 2,400 meters.

Leaves about 10 cm. long, persistent, acute, serrate.

12. *Prunus rhamnoides* Koehne, Bot. Jahrb. Engler 52: 283. 1915.

Jalisco and Durango. Guatemala; type from San Miguel Uspantán.

Tree, 7.5 to 15 meters high; leaves ovate or lanceolate, 5.5 to 9 cm. long, attenuate, bright green; flowers about 5 mm. broad. "Iza" (Durango).

The Mexican specimens are variable but do not seem essentially different from the type. Reputed poisonous to cattle.

13. *Prunus cortapico* Kerber; Koehne, Bot. Jahrb. Engler 52: 307. 1915.

Known only from Colima, the type locality.

Tree with lance-oblong leaves; racemes much shorter than the leaves. "Cortapico," "carretero."

14. *Prunus samydoides* Schlecht. Linnaea 13: 92. 1839.

Laurocerasus samydoides Roem. Syn. Rosifl. 3: 92. 1847.

Veracruz to Hidalgo; type from Hacienda de la Laguna, Veracruz.

Small tree; leaves oval-lanceolate, 9 cm. long or smaller, persistent, glabrous.

15. *Prunus tuberculata* Koehne, Bot. Jahrb. Engler 52: 308. 1915.

Known only from the type locality, Monte Pelado, Oaxaca.

Tree; leaves lance-oblong; racemes much shorter than the leaves.

16. *Prunus tetradenia* Koehne, Bot. Jahrb. Engler 52: 309. 1915.

Veracruz and Oaxaca; type collected between Misantla and Naolinco, Veracruz.

Shrub; leaves oblong-lanceolate to oval, 6 to 15 cm. long, acute, bright green.

17. *Prunus erythroxylon* Koehne, Bot. Jahrb. Engler 52: 309. 1915.

Colima and Michoacán; type from Mesa del Cerrero, near Colima.

Tree with hard wood; leaves oblong to oval, 14 cm. long or less, coriaceous; flowers about 8 mm. broad; fruit black.

Perhaps not sufficiently distinct from the next species.

18. *Prunus brachybotrya* Zucc. Abh. Akad. Wiss. München 2: 348. 1837.

Prunus laurifolia Schlecht. Linnaea 13: 91. 1839.

Prunus schiedeana Steud. Nom. Bot. ed. 2. 2: 404. 1841.

Laurocerasus mexicana Roem. Syn. Rosifl. 3: 90. 1847.

Laurocerasus brachybotrya Roem. Syn. Rosifl. 3: 91. 1847.

Veracruz to Oaxaca.

Tree, sometimes very large, with large, oblong to oval, bright green leaves.
"Cerezo" (Oaxaca).

DOUBTFUL OR EXCLUDED SPECIES.

Hemsley reported *Prunus demissa* (Nutt.) Walp. and *P. virginiana* L. from Mexico, but the reports are doubtless based on incorrect determinations.

PRUNUS FERRUGINEA (Seringe) Steud. Nom. Bot. ed. 2. 2: 400. 1841. *Cerasus ferruginea* Seringe in DC. Prodr. 2: 540. 1825. Described from Mexico. Said to have obovate leaves. Probably not of this genus.

2. LICANIA Aubl. Pl. Guian. 1: 119. 1775.

Trees, -glabrous or pubescent; leaves small or large, short-petiolate; flowers small, paniculate; fruit often very large.

Leaves 2 to 3 cm. wide, glabrous. Ovary glabrous-----1. *L. retifolia*.

Leaves 5.5 to 12 cm. wide, often pubescent.

Leaves oval or rounded-oval, 8.5 to 13 cm. long, broadly rounded or subcordate at base, tomentulose beneath when young; ovary glabrous.

2. *L. arborea*.

Leaves oblong to oblong-ob lanceolate, 16 to 35 cm. long or larger, rounded or acute at base, glabrous or nearly so beneath; ovary strigillose.

3. *L. platypus*.

1. *Licania retifolia* Blake, Contr. Gray Herb. 52: 66. 1917.

Known only from the type locality, Cerro de los Cajones, Michoacán or Guerrero, altitude 1,000 meters.

Tree, 5 to 8 meters high; leaves lanceolate or obovate, 4.3 to 10 cm. long, acute to rounded at apex, bright green; flowers small, greenish white.

2. *Licania arborea* Seem. Bot. Voy. Herald 118. pl. 25. 1853.

Licania seleriana Loes. Verh. Bot. Ver. Brand. 53: 55. 1911.

Guerrero and Oaxaca; reported from Morelos and Michoacán. Central America; type from Panama.

Tree, 4.5 to 6 meters high or larger; leaves short-petiolate, thick, pale beneath, the venation very conspicuous; panicles 15 to 20 cm. long, the flowers yellowish; fruit 2.5 cm. long or larger, containing a single large oily seed. "Cacahu-nanche," "cacahuate," "cacahoanantzín," "quirindol cacahuananche," "quirindal," "caña dulce," "cacahoananche" (Guerrero, Morelos, Oaxaca, etc.); "frailecillo," "palo de fraile," "totopostle" (Oaxaca); "alcornoque" (Costa Rica); "encina" (Guatemala, Honduras).

The seeds contain about 30 per cent of oil, and burn readily when ignited. They are often strung on sticks and used for illuminating purposes. The oil is extracted in large quantities and is used for making candles, soap, axle grease, etc. It has a peculiar odor and a disagreeable flavor, and a green color which it imparts to soap made from it.¹

¹ See J. C. Segura & M. D. Cordero, Reseña sobre el cultivo de algunas plantas industriales, pp. 33-40. 1884.

The writer has seen no authentic material of *L. seleriana*, but from the description it does not appear essentially different.

3. *Licania platypus* (Hemsl.) Fritsch, Ann. Naturhist. Hofmus. Wien 4: 53. 1889.

Moquilea platypus Hemsl. Biol. Centr. Amer. Bot. 1: 366. 1880.

Oaxaca. Central America; type from Granada, Nicaragua.

Tree, 10 to 15 meters high; leaves short-petiolate, rounded to short-acuminate at the apex; panicles large, many-flowered; fruit obovoid, 13 cm. long or larger, rough, edible. "Mesonzapote" (from *mezontli*, the crown of leaves left after cutting the heart of the *maguey*, and *zapote*); "caca de niño," "zapote amarillo," "zapote borracho," "zapote cabello" (Oaxaca); "zapote" (Costa Rica).

3. *HIRTELLA* L. Sp. Pl. 32. 1753.

1. *Hirtella americana* Aubl. Pl. Guian. 247. pl. 98. 1775.

Hirtella oblongifolia DC. Prodr. 2: 529. 1825.

? *Hirtella acavacensis* DC. Prodr. 2: 529. 1825.

Guerrero to Chiapas and Tabasco. Central America and South America; type from French Guiana.

Shrub, 2 to 4.5 meters high, with hirsute stems; leaves oblong, elliptic, or oblong-ovate, 5 to 10 cm. long, acute or acuminate, with an obtuse tip, short-petiolate; flowers small, in long loose racemes, the petals pink or purplish, the stamens long-exserted; fruit about 1 cm. long. "Icaquillo" (Tabasco, Oaxaca); "cajetillo" (Guerrero); "icaco de aura," "teta de yegua" (Cuba).

The bark is said to be astringent, and that of some species is used in Brazil for tanning.

DOUBTFUL SPECIES.

HIRTELLA CASTANEA D. C. Prodr. 2: 528. 1825. Based upon a drawing by Mocino and Sessé, believed to represent a Mexican plant. Probably the same as *H. triandra* Swartz.

4. *LECOSTEMON* Moc. & Sessé; DC. Prodr. 2: 539. 1825.

1. *Lecostemon terniflorum* Moc. & Sessé; DC. Prodr. 2: 539. 1825.

Described from Mexico, but not known from specimens.

Shrub; leaves oval or obvate-oval, rounded to acutish at apex; peduncles 3-flowered.

The plant is altogether doubtful, and nothing which closely resembles it has been collected recently. Other species are known from South America.

5. *COUEPIA* Aubl. Pl. Guian. 1: 519. 1775.

Trees or shrubs; leaves short-petiolate, coriaceous; flowers paniculate, small, tomentulose; fruit often large.

Stamens 18 to 21-----1. *C. polyandra*.

Stamens 10 to 15-----2. *C. dodecandra*.

1. *Couepia polyandra* (H. B. K.) Rose, Contr. U. S. Nat. Herb. 5: 196. 1899.

Hirtella polyandra H. B. K. Nov. Gen. & Sp. 6: 246. pl. 565. 1821.

Couepia kunthiana Benth.; Hemsl. Biol. Centr. Amer. Bot. 1: 367. 1880.

Sinaloa to Oaxaca; type from Acapulco, Guerrero.

Shrub or tree, 3 to 8 meters high; leaves oblong or oval, 5.5 to 13 cm. long, rounded or short-acuminate at apex, whitish-tomentose beneath; flowers about 1 cm. long, cream-colored, in short dense panicles; fruit obovoid, yellow, sometimes 7.5 cm. long, edible. "Zapotillo" (Tepic, Guerrero); "zapote amarillo" (Guerrero); "guayabito de tinta" (Sinaloa).

2. *Couepia dodecandra* (DC.) Hemsl. in Hook. Icon. Pl. 27: pl. 2620, 2621. 1899.

Hirtella dodecandra DC. Prodr. 2: 529. 1825.

Type from somewhere in Mexico; cultivated in Tabasco and British Honduras.

Tree, 4.5 to 6 meters high, leaves oblong, 5 to 15 cm. long, tomentose beneath; fruit ellipsoid, 5 to 6.5 cm. long, 1 or 2-seeded. "Pfo," "uspfo" (Tabasco).

Known in British Honduras as "baboon-cap." Fruit said to be edible.

6. *CHRYSOBALANUS* L. Sp. Pl. 513. 1753.

1. *Chrysobalanus icaco* L. Sp. Pl. 513. 1753.

Along the coast, Tamaulipas to Yucatán; Guerrero to Oaxaca. Widely distributed in tropical America and western Africa; type from Jamaica.

Low shrub, 1 to 1.5 meters high, or said sometimes to be a tree 9 meters high, with a trunk 30 cm. in diameter; bark thin, scaly, brownish gray; leaves persistent, broadly elliptic to orbicular, 5 to 7 cm. long, nearly sessile, leathery; flowers cymose, small, whitish; fruit globose or nearly so, 2 to 4 cm. in diameter, creamy white, pink, purple, or blue-black, the flesh white, sweet, juicy; wood hard, strong, close-grained, light brown, its specific gravity about 0.77. "Icaco," "hicaco," or "jicaco" (Chiapas, Veracruz, Yucatán, Oaxaca, Guerrero, Tamaulipas, Guatemala, Honduras, Porto Rico; the name of Antillean origin); "xicaco" (Oaxaca, *Seler*).

The English names are "cocoa-plum" and "pigeon-plum." The bark, leaves, and root are astringent and have been used for dysentery, etc. The leaves and fruit furnish a black dye. The seeds contain a large amount of oil, and by the Caribs they were strung on sticks and burnt like candles. The seeds are edible also. The fruit is highly valued in some parts of Mexico and elsewhere in tropical America and was a favorite food of the Caribs. It is astringent until perfectly ripe, when it is sweet and insipid. It is eaten raw but more often made into preserves, which are sold in Mexican markets. For an illustration of a fruiting branch see Contr. U. S. Nat. Herb. 8: pl. 26.

The "hicaco" is well described by Oviedo (Lib. VIII, Cap. IX). "The skin of the fruit," he writes, "has some resemblance to that on a monkey's face; for no matter how young a monkey is, it seems old because of its wrinkles, and likewise the *hicaco* fruit, no matter how fresh it may be, is always full of wrinkles."

63. *CONNARACEAE*. Connarus Family.

REFERENCE: Britton, N. Amer. Fl. 22: 233-236. 1908.

Shrubs or trees; leaves alternate, estipulate, odd-pinnate, the leaflets entire; flowers small, perfect, paniculate; fruit a 1-seeded follicle.

Calyx lobes imbricate, accrescent in age.....1. *ROUREA*.
Calyx lobes valvate, not accrescent.....2. *CNESTIDIUM*.

1. *ROUREA* Aubl. Pl. Guian. 1: 467. 1775.

1. *Rourea glabra* H. B. K. Nov. Gen. & Sp. 7: 41. 1824.

Rourea oblongifolia Hook. & Arn. Bot. Beechey Voy. 283. 1836.

Tamaulipas to Tepic and southward. Central America to Venezuela; West Indies; type from the Río Orinoco.

Scandent or erect shrub; leaflets 3 or 5, oblong to ovate-elliptic, 3 to 12 cm. long, acuminate, thick, lustrous, glabrous; panicles few or many-flowered, pubescent; petals white; fruit 1 to 1.7 cm. long, the seeds large, dark brown, with a large orange aril. "Chilillo" (Oaxaca, Tamaulipas, Veracruz); "chilillo de la Huasteca" (Guerrero, Tepic, Veracruz); "chilillo venenoso" (Tepic, Vera-

cruz); "palo de chilillo" (Puebla); "canjura" (El Salvador); "mata-negro" (Cuba); "bejuco de garrote," "Juan caliente" (Porto Rico).

The seeds, as well as other parts of the plant, are reported to be very poisonous, especially to carnivorous animals (they are even said to be harmless to other orders of animals), and they are used for poisoning coyotes. They are employed also as a remedy for cutaneous diseases. The roots contain long resistant fibers and are used as cordage. They are said also to dye skins a bright purple. The poisonous properties of Old World species of the genus are well known.

2. *CNESTIDIUM* Planch. *Linnaea* 24: 439. 1850.

1. *Cnestidium rufescens* Planch. *Linnaea* 23: 440. 1850.

Veracruz, Oaxaca, and Tabasco. Cuba; Central America, the type from Panama.

Subscandent shrub, 3 meters high or more; leaflets 5 to 9, ovate-oblong or oblong-obovate, 3 to 8 cm. long, obtuse or short-acuminate, velvety-pubescent beneath; fruit 1.5 cm. long, curved, brown-tomentose; seed lustrous, with a large fleshy aril.

64. *KRAMERIACEAE*. *Krameria* Family.

1. *KRAMERIA* Loebl. *Iter Hisp.* 195. 1758.

Low, erect or procumbent shrubs with usually sericeous or strigose pubescence; leaves alternate, estipulate, small, simple and entire or trifoliate; flowers showy, perfect, solitary and axillary or racemose; sepals 4 or 5; petals 5; stamens 4; fruit coriaceous, globose or nearly so, indehiscent, covered with numerous spines.

The dried roots of *Krameria triandra* Ruiz & Pavón, *K. ixina* L., and *K. argentea* Mart., all South American species, are official in the U. S. Pharmacopoeia. In commerce they are known as rhatany roots. They are used as a tonic and powerful astringent in the case of chronic diarrhoea, passive hemorrhages, etc. The Mexican species probably have the same properties, and their roots have been exported. The plants also yield a yellow or brownish red dye, and are employed locally in Mexico for coloring wool and skins. The roots of some species have been used in Europe for making ink, coloring wine, and manufacture of dentifrices. The names "encinilla" (Nuevo León) and "guachapurillo" (Sinaloa) are reported for species of doubtful determination. The name *Krameria ixina* has been applied to some of the Mexican species by Sessé and Mociño¹ and other writers.

Leaves 3-foliate.....1. *K. cytisoides*.

Leaves simple.

Fruit glabrous.....2. *K. palmeri*.

Fruit densely pilose or sericeous.

Leaves petiolate, 5 to 7 mm. wide.....3. *K. cuspidata*.

Leaves sessile, usually much less than 5 mm. wide.

Pedicels densely glandular.....4. *K. glandulosa*.

Pedicels not glandular.

Stems procumbent, chiefly herbaceous.

Flowers yellow; leaves sericeous.....5. *K. secundiflora*.

Flowers purple; leaves glabrate.....6. *K. prostrata*.

Stems erect, often woody throughout.

Spines of the fruit not barbed.....7. *K. ramosissima*.

Spines of the fruit barbed.

¹ Pl. Nov. Hisp. 18. 1887.

Barbs stout, all borne at the apex of the spine, in an umbrella-like whorl.

Upper petals, at least the middle one, with broad rounded blades-----8. *K. bicolor*.

Upper petals with narrow, linear or lanceolate blades.

Plants densely leafy, the branches not conspicuously spinose; fruit closely sericeous-----9. *K. grayi*.

Plants very sparsely leafy, the branches spinose; fruit with spreading or loosely ascending hairs---10. *K. paucifolia*.

Barbs of the spines scattered along the upper part of the spine.

Body of the fruit strongly compressed-----11. *K. parvifolia*.

Body of the fruit very slightly or not at all compressed.

Body of the fruit 4 to 5 mm. thick, the spines short and stout.
12. *K. revoluta*.

Body of the fruit 6 to 7 mm. thick, the spines long and slender.

13. *K. interior*.

1. *Krameria cytisoides* Cav. Icon. Pl. 4: 61. pl. 390. 1797.

Krameria cinerea Schauer, Linnaea 20: 725. 1846.

Krameria ehrenbergii Gandog. Bull. Soc. Bot. France 60: 455. 1913.

Coahuila and Tamaulipas to Hidalgo and Puebla.

Erect shrub, 0.8 to 1.8 meters high; leaflets oblong-ob lanceolate or obovate, 2 cm. long or shorter, sericeous; flowers purplish, the sepals about 2 cm. long. "Donapé."

Roots used for dyeing wool.

2. *Krameria palmeri* Rose, Contr. U. S. Nat. Herb. 1: 304. pl. 27. 1895.

Sinaloa and southern Sonora; type from Agiabampo, Sonora.

Dense shrub, 60 to 90 cm. high; leaves linear, 1 to 2 cm. long; fruit yellowish or purplish, about 8 mm. in diameter.

3. *Krameria cuspidata* Presl, Reliq. Haenk. 2: 103. 1836.

Tepic to Oaxaca.

Low shrub; flowers purplish, about 8 mm. long. "Viuxita" (Oaxaca).

4. *Krameria glandulosa* Rose & Painter, Contr. U. S. Nat. Herb. 10: 108. 1906.

Dry mesas and hillsides, Chihuahua to Baja California. Western Texas to Utah and California; type from El Paso, Texas.

Low, densely branched shrub; leaves sericeous, 1 to 2 cm. long; flowers rather showy, purplish, 6 to 8 mm. long.

5. *Krameria secundiflora* DC. Prodr. 1: 341. 1824.

Krameria pauciflora DC. Prodr. 1: 341. 1824.

Chihuahua and Coahuila to Oaxaca.

Plants woody only near the base and scarcely to be classed as shrubs; leaves linear or linear-lanceolate, 6 to 15 mm. long, acute; flowers yellowish, about 1 cm. long. "Zarzaparrilla" (San Luis Potosí); "raíz de cuculillo" (Jalisco).

The long black roots somewhat resemble those of the commercial sarsaparilla.

6. *Krameria prostrata* T. S. Brandeg. Zoe 5: 200. 1905.

Krameria diffusa Rose & Painter, Contr. U. S. Nat. Herb. 10: 107. 1906.

Sinaloa to Zacatecas, Morelos, and Guerrero; type from Cofradía, Sinaloa.

Similar in habit to the preceding species, but with purplish flowers, these 1 to 1.5 cm. long; leaves linear, 1 to 2 cm. long, acute, green.

7. *Krameria ramosissima* (A. Gray) S. Wats. Proc. Amer. Acad. 17: 326. 1882.

Krameria parvifolia ramosissima A. Gray, Pl. Wright. 1: 41. 1852.

Tamaulipas, and reported from Coahuila and Nuevo León. Western Texas (type locality).

Densely branched shrub, 30 to 60 cm. high; leaves linear, 6 mm. long or shorter; flowers purplish. "Calderona" (Tamaulipas).

8. *Krameria bicolor* S. Wats. Proc. Amer. Acad. 21: 417. 1886.

Chihuahua to Sinaloa and Jalisco; type from Hacienda San José, Chihuahua.

Shrub, 0.9 to 1.5 meters high, with greenish stems; leaves lanceolate or linear, sericeous; flowers purplish; fruit about 1 cm. in diameter.

9. *Krameria grayi* Rose & Painter, Contr. U. S. Nat. Herb. 10: 108. 1906.

Krameria canescens A. Gray, Pl. Wright. 1: 42. 1852. Not *K. canescens* Willd. 1825.

Chihuahua and Coahuila. Western Texas (type locality) to southern California.

Densely branched shrub, 30 to 90 cm. high; leaves linear, densely sericeous; flowers purple. "Chacate" (Ramírez).

10. *Krameria paucifolia* Rose, Contr. U. S. Nat. Herb. 10: 108. 1906.

Krameria canescens paucifolia Rose, Contr. U. S. Nat. Herb. 1: 66. 1890.

Baja California and Sonora; type from La Paz, Baja California.

Low shrub, forming dense masses, the branches often spinose; leaves linear or lanceolate, 5 to 15 mm. long; flowers purplish, 6 to 8 mm. long. "Mezquitillo" (Baja California).

11. *Krameria parvifolia* Benth. Bot. Voy. Sulph. 6. pl. 2. 1844.

Baja California (type locality) and Sonora. Southern California and Arizona.

Low rigid shrub with gray or brownish branches; leaves linear, 1.5 cm. long or shorter; flowers purple.

The Pima Indians of Arizona use the powdered root in the treatment of sores.

12. *Krameria revoluta* Berg, Bot. Zeit. 1856: 751. 1856.

Krameria collina T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 182. 1915.

Oaxaca; type collected near Tehuantepec.

Low shrub; leaves linear, 1 to 2 cm. long. sericeous; flowers purple.

13. *Krameria interior* Rose & Painter, Contr. U. S. Nat. Herb. 10: 108. 1906.

Known only from the type locality, San Juan Capistrano, Zacatecas.

Low shrub with shredded bark and purple flowers.

65. MIMOSACEAE. Mimosa Family.

Trees or shrubs, often armed with spines; leaves usually bipinnate, rarely pinnate; flowers usually small but often showy, capitate, spicate, or racemose; calyx usually 5-lobed or 5-parted; petals usually 5, free or connate; fruit a legume, but very variable in form.

In many members of this family the leaves are "sensitive," that is, they respond when touched or struck by folding their leaflets together. They also often act in the same way upon the approach of darkness or during excessively dry weather. A few herbaceous representatives of the family occur in Mexico.

Leaves pinnate-----15. INGA.

Leaves bipinnate.

Anthers tipped with a small gland. Stamens usually twice as many as the corolla lobes; flowers spicate.

Fruit breaking up into 1-seeded joints. Plants scandent---1. ENTADA.

Fruit continuous, not breaking up into joints.

Fruit septate between the seeds, sometimes spirally coiled.

2. PROSOPIS.

Fruit not septate, never coiled.

Plants unarmed, low shrubs or herbs. Fruit broadly oblong.

3. **NEPTUNIA.**

Plants usually armed with spines, trees or large shrubs.

Fruit thin, bivalvate-----4. **PIPTADENIA.**

Fruit thick and hard, indehiscent-----5. **GOLDMANIA.**

Anthers without glands.

Stamens as many as the corolla lobes or twice as many.

Fruit with a persistent continuous margin, the valves separating from it; plants usually armed with spines; flowers capitate or spicate.

6. **MIMOSA.**

Fruit without a persistent margin; plants unarmed; flowers capitate.

Seeds longitudinal or oblique; low shrubs or herbs-----7. **ACUAN.**

Seeds transverse; trees or large shrubs-----8. **LEUCAENA.**

Stamens more than twice as many as the corolla lobes.

Stamens free. Flowers capitate or spicate; plants spiny or unarmed.

9. **ACACIA.**

Stamens united.

Fruit elastically bivalvate. Plants unarmed; flowers capitate.

10. **CALLIANDRA.**

Fruit not elastically dehiscent.

Valves of the fruit separating from the persistent margin. Plants unarmed; flowers spicate or capitate-----11. **LYSILOMA.**

Valves of the fruit not separating from the margin.

Valves of the fruit thin, very broad, straight. Flowers capitate.

12. **ALBIZZIA.**

Valves thickened, often curved, twisted, or coiled.

Fruit coiled, very broad, indehiscent; flowers capitate; plants unarmed-----13. **ENTEROLOBIUM.**

Fruit not coiled, usually narrow and indehiscent; flowers capitate or spicate; plants usually spiny.

14. **PITHECOLLOBIUM.**

1. **ENTADA** Adans. Fam. Pl. 2: 318. 1763.

Scandent shrubs, often armed with spines; leaves bipinnate, the leaflets few, large; flowers small, spicate; fruit large, breaking up into 1-seeded joints.

Plants armed with very numerous recurved spines; fruit about 2 cm. wide.

1. **E. patens.**

Plants unarmed; fruit 5 to 6 cm. wide-----2. **E. polystachia.**

1. **Entada patens** (Hook. & Arn.) Standl.

Inga patens Hook. & Arn. Bot. Beechey Voy. 419. 1841.

Piptadenia patens Benth. Bot. Voy. Sulph. 89. 1844.

Mimosa gualanensis Robins. & Bartl. Proc. Amer. Acad. 43: 53. 1907.

Guerrero. Guatemala and Nicaragua; type from Nicaragua.

Leaflets 3 to 6 pairs, 1.5 to 5 cm. long, oval or orbicular, nearly glabrous; flowers yellowish white; fruit about 13 cm. long, glabrous, often somewhat constricted between the seeds.

The Guerrero plant has more numerous pinnae and leaflets than the Central American one, and may be distinct.

2. **Entada polystachia** (L.) DC. Mém. Legum. 12. 1825.

Mimosa polystachia L. Sp. Pl. 520. 1753.

Sinaloa to Oaxaca and Tabasco. Central America, West Indies, and northern South America.

Large scandent shrub; leaflets mostly oblong and 2 to 4 cm. long; flowers small, greenish, in dense spikes; fruit 5 to 6 cm. wide. "Bejuco de amole" (Guerrero, Tabasco); "bejuco de mondongo" (Tabasco, *Rovirosa*); "haba de la costa," "bejuco de panune," "bejuco de estribo" (Oaxaca, *Reko*); "bejuco de hierro" (Nicaragua); "guiamol" (El Salvador); "parra rosa" (Costa Rica); "bejuco de garza" (Colombia).

The tough stems are used as cordage. When macerated in water they are said to afford a substitute for soap. In Trinidad the roots are employed as a remedy for venereal diseases.

Entada scandens (L.) Benth. is reported from Tabasco, where it is said to be known as "haba," "haba de la costa," and "tacalote." The writer has seen no Mexican specimens, and it may be that the plant so referred to is really *E. polystachia*. *E. scandens* is distinguished by its much larger fruit and enormous seeds (these 5 to 6 cm. broad).

2. PROSOPIS L. Mant. Pl. 1: 10. 1767.

Spiny shrubs or trees; leaves bipinnate, the pinnae usually 1 or 2 pairs, the leaflets small and numerous; flowers small, spicate or capitate; fruit indehiscent, linear, sometimes constricted between the seeds, in some species spirally coiled.

The first two species, with spirally coiled fruit, are sometimes referred to a separate genus, *Strombocarpa*.

Fruit spirally coiled; flowers spicate or capitate.

Flowers capitate-----1. *P. cinerascens*.

Flowers spicate-----2. *P. pubescens*.

Fruit not coiled; flowers spicate.

Corolla dentate; fruit 7.5 cm. long or shorter-----3. *P. palmeri*.

Corolla deeply lobate; fruit usually much longer.

Leaflets commonly rounded at apex, broad in proportion to their length.

Leaflets glabrous, often ciliolate; fruit usually glabrous---4. *P. juliflora*.

Leaflets puberulent; fruit usually puberulent---4a. *P. juliflora velutina*.

Leaflets usually acutish at apex, linear, often very long.

4b. *P. juliflora glandulosa*.

1. *Prosopis cinerascens* A. Gray; Benth. Trans. Linn. Soc. Bot. 30: 381. 1875.

Strombocarpa cinerascens A. Gray, Pl. Wright. 1: 61. 1852.

Tamaulipas and Nuevo León; type from Azulfroa, Nuevo León. Southwestern Texas.

Shrub, about 30 cm. high, armed with long slender spines, pubescent; leaflets 8 to 12 pairs, oblong, 1.5 to 3 mm. long; fruit 1.5 to 4 cm. long.

2. *Prosopis pubescens* Benth. Lond. Journ. Bot. 5: 82. 1846.

Strombocarpa pubescens A. Gray, Pl. Wright, 1: 60. 1852.

Northern Baja California, Sonora, and Chihuahua, chiefly in alluvial soil of river valleys. Southern California to western Texas; type from California.

Shrub or tree, sometimes 10 meters high, with a trunk 30 cm. in diameter, the bark brownish, separating into thin flakes; spines stout, whitish; leaves deciduous, the leaflets 1 cm. long or shorter, pubescent; flowers greenish, the spikes 5 to 8 cm. long; fruit 3 to 5 cm. long, yellowish; wood very hard, brittle, close-grained, light brown, its specific gravity about 0.76. Known generally as "tornillo."

The screwpod mesquite is often abundant in river valleys, forming dense thickets of considerable extent. The wood is very durable and is used for fence posts, tool handles, etc., and in the Rio Grande Valley it is an important source of fuel. The fruits are edible like those of *P. juliflora*, and are used in

much the same way. They are so sweet that they can be eaten as picked, without any special preparation. The Indians of the Colorado River region obtained a fermented drink from the pods, and by boiling them they prepared a sirup. The Pimas of Arizona cooked the pods in a pit lined with the stems of *Tessaria borealis*, alternating them with layers of cocklebur (*Xanthium* sp.) leaves. The pit was covered with earth and left three or four days before being opened. The pods were then spread in the sun, dried, and stored. Later they were pounded into a fine flour, which was eaten in the form of pinole. The Pimas also used a decoction of the root bark as a dressing for wounds, and as the wound healed the dried and pulverized bark was substituted.

3. *Prosopis palmeri* S. Wats. Proc. Amer. Acad. 24: 48. 1889.

Baja California; type from Mulegé.

Shrub or tree, sometimes 7.5 meters high, with spreading crown; bark rough, splitting off in long strips; leaflets 4 to 7 mm. long; flowers bright yellow, fragrant; fruit almost terete at maturity, puberulent. "Palo de hierro."

4. *Prosopis juliflora* (Swartz) DC. Prodr. 2: 447. 1825.

Mimosa juliflora Swartz. Prodr. Veg. Ind. Occ. 85. 1788.

Mimosa rotundata Sessé & Moc. Pl. Nov. Hisp. 178. 1887.

Nearly throughout Mexico. West Indies, the type from Jamaica; Central America; widely distributed in South America; naturalized in Hawaii and the Philippine Islands.

Shrub or tree, sometimes 12 meters high with a trunk 1.2 meters in diameter, the bark thick, brown or blackish, shallowly fissured; leaflets mostly 5 to 10 mm. long, linear-oblong; flowers greenish yellow, sweet-scented; fruit mostly 10 to 20 cm. long, about 1 cm. wide, strongly compressed when young but thick at maturity, brown or yellowish; wood hard, close-grained, dark red or brown, with yellow sapwood, its specific gravity about 0.76. Known generally as "mezquite" (from the Nahuatl "mizquitl"), but the following additional names are reported: "Guisache" (Michoacán, Guerrero); "chúcata" (Michoacán, Tarascan); "tziritzequa" (Michoacán, *Ramírez*); "algarroba" (Colima, and in many other regions); "mezquite blanco," "mezquite amarillo," "mezquite Colorado," "chachaca" (*Alcocer*); "manca-caballo" (Panama); "acacia de Catarina" (Nicaragua); "aroma" (Philippines); "mezquite chino" (Tamaulipas); "mezquicopal" (the gum, *Robelo*, from the Nahuatl *mizqui-copalli*); "ttâhi" (Otomí, *Buelna*).

One of the best-known plants of Mexico and of the arid regions of the United States; in Mexico often planted as a shade tree. In the more arid regions the mesquite is usually a shrub, and it is only when fairly well supplied with water that it becomes a tree. It thrives best in river valleys, where it attains the greatest size, but on plains and mesas it is often abundant, frequently, indeed, being the most characteristic plant for many miles, and forming thickets or forests. The smaller trees are strikingly suggestive of peach trees, for which they are often mistaken by inexperienced eastern travellers viewing them for the first time from the train as they cross the State of Texas. The larger individuals are much like apple trees in habit. The wood is valuable for many purposes, such as railroad ties, carts, fence posts, charcoal, fuel, etc. In Texas it has been used for paving blocks for streets. The wood and bark are employed for tanning. In the northern part of its range the shrubby form develops enormous underground stems (known in Chihuahua as "cepas") which, in many places are the most important source of fuel. They require a great amount of labor to remove them from the earth, but they form excellent firewood. The smaller roots penetrate the soil to a great depth, sometimes, it is said, for as much as 15

to 23 meters. The Seri Indians of Tiburón Island use the root fiber for cordage, wetting the roots in water, and sometimes they manufacture a coarse fabric from the fiber. The wood of the roots is very hard, and the Pima of Arizona employed it for their war clubs and for plows.

The gum which exudes from the trunk ("goma de mezquite," "goma del país," "mizquicopalli") is amber-colored and translucent, similar to gum arabic, for which it is often substituted in Mexico. Dissolved in water it makes excellent mucilage, and its infusion is used for dysentery and as a gargle for throat affections; by the Pimas a solution of it was used for treating sore eyes and open wounds. It is sometimes employed in making candy. The flowers are much frequented by bees, and yield a good grade of light-colored honey. The Pima Indians sometimes eat the flower spikes, stripping off the flowers between the teeth. The same tribe employs the inner bark of the mesquite as a substitute for rennet, and a decoction of it as an emetic and cathartic.

The pods are, perhaps, the most important part of the plant. When chewed they are sweet, for they contain much sugar, the pulp being composed of 25 to 30 per cent of grape sugar. They are eaten by stock of all kinds and where the plants are abundant are important for forage. In Hawaii, where the mesquite is naturalized, the fruits have become an article of some commercial importance because of their use for stock feed. They are gathered in large quantities and ground into meal. It is of interest to note that in the early days of the Spanish occupation, when ships traded regularly every year between Acapulco and Manila, the mesquite was introduced into the Philippines and has now become naturalized there. It was even described from that country as a new species, *Prosopis vidaliana* Naves. The pods have long been an article of human food in North America, and are still so used to some extent, especially by the Indians. Among some of the tribes, as with the Pimas, they were the chief food staple. They are ground into a meal from which the seeds and coarser parts of the pods are removed. The Apaches and other tribes often made use of holes or depressions in the rocks as a mortar for grinding the pods, and these holes are now of common occurrence in the mountains where mesquite plants are found. The meal is made into cakes (known in Mexico as "mezquitamales") which are baked, or it is mixed with water to form a beverage known as "mezquitatole." The meal is also mixed with water and fermented to make a kind of beer.

The mesquite is discussed by Sahagún under the name "mizquitl." "From the bark," he writes, "they prepare a drink which takes the place of *pulque*," a statement whose accuracy is questionable. He reports that the juice of the leaves and young shoots is dropped into the eyes to relieve affections of those organs. Hernández¹ also treats of the plant in a chapter entitled "*De Mizquitl, seu Siliqua Acatiae*." He states that the Chichimec Indians make cakes from the pods, and, incorrectly of course, that the tree "is the true *Acacia* of the ancients, which furnishes Gum Arabic." The tree is mentioned also by Clavigero (*Historia de California*, 1789), who says, but doubtless erroneously, that it is introduced in that region. He also mentions the use of the juice for the relief of eye affections (a practice still followed in Mexico to the present day), and he reports that the Cochimi name of the plant is "guatrá."

Prosopis juliflora is a variable species, but there seems to be no satisfactory basis for separation of the forms. Some of the Mexican material exactly matches that from Jamaica, but many specimens approach the two following forms. It may be mentioned, incidentally, that the early writers state that the mesquite of Jamaica is not a native plant, but was introduced in early days, very probably from Mexico.

¹ Thesaurus 59. 1651. A figure is given on page 455.

Berlandier¹ once applied (but without technical description) the name *Mimosa "pseudo-echinus"* to this species, because of the resemblance of the leaves to those of "*Echinus Molle*," the "árbol del Perú." The latter Latin name, of course, is a typographical (?) error for *Schinus molle*.

4a. *Prosopis juliflora velutina* (Wooton) Sarg. Silv. N. Amer. 13: 15. 1902.

Prosopis odorata Torr. in Frém. Rep. Exped. Rocky Mount. 313. 1843.

Prosopis articulata S. Wats. Proc. Amer. Acad. 24: 48. 1889.

Prosopis velutina Wooton, Bull. Torrey Club 25: 456. 1898.

Sonora and Baja California to Michoacán. Arizona (type locality).

Shrub or often a tree, 2 to 6 meters high or larger. "Mezquite."

This form is usually distinguishable from the typical *juliflora* by the small pubescent leaflets. There are so many intermediate specimens, however, especially in Mexico, that it is not possible to recognize the form as a species. In case the plant should receive such recognition, the proper name for it is *Prosopis odorata* Torr. That name was based upon a flowering specimen of the present plant and fruit of *P. pubescens*, and for that reason has been discarded by most writers. Taking into consideration the specific name, "*odorata*," it seems reasonable to typify the name by the flowering specimen.

Prosopis articulata was based upon a form in which the pods are strongly constricted between the seeds. Specimens examined show great variation in this respect, the prominence of the constrictions being dependent, apparently, upon the amount of fleshy matter developed in the valves.

4b. *Prosopis juliflora glandulosa* (Torr.) Cockerell, N. Mex. Agr. Expt. Sta. Bull. 15: 58. 1895.

Prosopis glandulosa Torr. Ann. Lyc. N. Y. 2: 192. 1828.

Baja California to Tamaulipas, Veracruz, and Yucatán. Louisiana to southern California; type from New Mexico.

Shrub or tree, either with a well developed trunk or without one. "Mezquite."

If the material from the West Indies and the United States were studied without reference to that from Mexico, as has been done, apparently, by recent writers, *Prosopis glandulosa* might well be considered a distinct species. In Mexico so many intergrading plants occur that it can not be regarded as more than a form of *P. juliflora*. The leaflets are usually glabrous, but often they are quite as pubescent as in *P. juliflora velutina*. Specimens from Peru and Argentina are so like the plant of the United States that if they were labeled as coming from the latter country no one would question their determination as *P. glandulosa*.

3. NEPTUNIA Lour. Fl. Cochinch. 653. 1790.

Low shrubs or herbs, unarmed; leaves bipinnate, the leaflets small, numerous, the stipules persistent; flowers small, capitate or in short oblong spikes; fruit short and broad, flat.

Neptunia oleracea Lour., an aquatic herbaceous species, has been collected in Tabasco.

Fruit about 15 mm. wide; plants pubescent.....1. *N. pubescens*.

Fruit 8 mm. wide or narrower; plants glabrous.....2. *N. plena*.

1. *Neptunia pubescens* Benth. in Hook. Journ. Bot. 4: 356. 1842.

Coahuila. Western Texas; South America, the type from Peru.

Low suffrutescent plant; pinnae 2 or 3 pairs, the leaflets 15 to 35 pairs, oblong, about 6 mm. long; fruit 2 to 2.5 cm. long.

¹ Diario de viage de la Comisión de Límites, p. 177. 1850.

2. *Neptunia plena* (L.) Benth. in Hook. Journ. Bot. **4**: 355. 1842.*Mimosa plena* L. Sp. Pl. 519. 1753.

Baja California and Sinaloa to Chiapas. Widely distributed in tropical America.

Low shrub or often herbaceous; pinnae 3 to 5 pairs, the leaflets 5 to 8 mm. long; flowers yellow, capitate, the heads long-pedunculate; fruit 3 to 4.5 cm. long.

4. PIPTADENIA Benth. in Hook. Journ. Bot. **4**: 334. 1842.

Erect or scandent shrubs or trees, armed or unarmed; leaves bipinnate, the leaflets few or numerous; flowers small, spicate.

Piptadenia cebil Griseb. of Argentina is valued as a source of tanbark. *P. rigida* Benth. of Brazil furnishes Angico gum, which resembles gum arabic. From the seeds of *P. peregrina* (L.) Benth., a species occurring in the West Indies and South America, the natives prepared a narcotic snuff known in the West Indies as "cohoba."¹ That species is known in Porto Rico as "cojoba," "cojóbana," "cojobo," and "cojobillo."Leaflets linear, about 1 mm. wide; fruit not constricted-----1. *P. flava*.

Leaflets oval or rhombic, 3 to 10 mm. wide; fruit constricted between the seeds.

2. *P. constricta*.**1. *Piptadenia flava* (Spreng.) Benth.** Trans. Linn. Soc. Bot. **30**: 371. 1875.*Acacia flava* Spreng. Syst. Veg. **3**: 141. 1826.*Piptadenia leptocarpa* Rose, Contr. U. S. Nat. Herb. **1**: 325. 1895.*Mimosa buceragenia* Robinson, Proc. Amer. Acad. **43**: 23. 1907.

Jalisco to Guerrero. Central America and northern South America; type from Colombia.

Erect shrub, 3 to 5 meters high; leaflets 4 to 7 mm. long, glabrous; flowers yellowish green; fruit flat, 3 to 8 cm. long, about 1.5 cm. wide, glabrous.

2. *Piptadenia constricta* (Mich. & Rose) Macbride, Contr. Gray Herb. n. ser. **59**: 18. 1919.*Goldmannia constricta* Mich. & Rose, Mém. Soc. Phys. Hist. Nat. Genève **34**: 274. pl. 20. 1903.

Sinaloa to Guerrero; type from Acapulco, Guerrero.

Tree, 10 to 12 meters high, unarmed or with short stout spines; pinnae about 5 pairs, the leaflets rhombic, 6 to 17 mm. long; fruit 10 to 15 cm. long, about 6 mm. wide, very deeply constricted between the seeds.

5. GOLDMANIA Rose; Micheli, Mém. Soc. Phys. Hist. Nat. Genève **34**: 274. 1903.**1. *Goldmania foetida* (Jacq.) Standl.***Mimosa foetida* Jacq. Pl. Hort. Schönbr. **3**: 73. pl. 390. 1798.*Piptadenia foetida* Benth. Trans. Linn. Soc. Bot. **30**: 366. 1875.*Goldmania platycarpa* Rose; Micheli, Mém. Soc. Phys. Hist. Nat. Genève **34**: 274. 1903.*Piptadenia platycarpa* Macbride, Contr. Gray Herb. n. ser. **59**: 18. 1919.

Sinaloa to Puebla; described from cultivated plants whose origin was doubtful.

Tree, sometimes 12 meters high, or only a shrub, unarmed; leaflets suborbicular to cuneate-obovate, 1 to 3 cm. long, nearly glabrous; flowers yellowish green, spicate, ill-scented; fruit short, 1 to 1.5 cm. wide, curved, reddish brown, rough.

¹ See W. E. Safford, Narcotic plants and stimulants of the ancient Americans, Ann. Rep. Smiths. Inst. **1916**: 387-424, pl. 1-17, f. 1-6. 1917.

"Pinzanguarimbo" (Guerrero); "coyacate" (Guerrero, *Bonpland*); "hui-zache" (Guerrero, Jalisco, *Urbina*); "yóndiro" (Michoacán, *Ramírez*); "cusa" (Sinaloa).

This has been reported from Mexico as *Piptadenia quadrifolia* N. E. Brown, a South American species.

6. MIMOSA L. Sp. Pl. 516. 1753.

REFERENCE: Robinson, Proc. Amer. Acad. 33: 305-331. 1898.

Trees or shrubs, usually armed with stout spines, occasionally scandent; leaves bipinnate; petiolar glands commonly absent; flowers small but often bright-colored, capitate or spicate. sessile; stamens usually long-exserted; fruit very variable in form, usually compressed, the margin persistent, the valves often breaking into joints.

Several herbaceous species occur in Mexico. A large number of Mexican species are described by Sessé and Mocino,¹ but in most cases it is impossible to identify them.

A. Flowers spicate.

Leaflets 1 or 2 pairs.

Leaflets densely pubescent; fruit coiled.....1. *M. spirocarpa*.

Leaflets glabrous; fruit straight.

Leaflets 15 to 22 mm. long.....2. *M. rosei*.

Leaflets 4 to 9 mm. long.....3. *M. paucifoliolata*.

Leaflets more than 2 pairs, at least in most of the leaves, usually much more numerous.

Corolla glabrous or nearly so.

Leaflets few, 1 to 5 or rarely 7 pairs, elliptic to obovate, less than twice as long as broad.

Leaflets and fruit glabrous.....4. *M. laxiflora*.

Leaflets and fruit pubescent.

Fruit armed with spines.....5. *M. distachya*.

Fruit unarmed.....6. *M. purpurascens*.

Leaflets 4 to 20 pairs or more, linear or oblong, more than twice as long as broad.

Fruit sessile or nearly so.....7. *M. polyantha*.

Fruit long-stipitate.

Valves of the fruit hispid.....8. *M. polyanthoides*.

Valves of the fruit glabrous.

Joints of the fruit much broader than long; filaments yellowish.

9. *M. stipitata*.

Joints of the fruit about as long as broad; filaments purplish.

10. *M. ionema*.

Corolla densely sericeous or puberulent.

Leaflets 4 to 10 mm. wide.....11. *M. guatemalensis*.

Leaflets 2.5 mm. wide or narrower.

Stems unarmed.....12. *M. puberula*.

Stems armed with stout spines.

Leaflets usually 20 to 40 pairs.....13. *M. cabrera*.

Leaflets usually less than 20 pairs.

Spikes oblong, little longer than broad.....56. *M. monancistra*.

Spikes cylindric, much longer than broad.

Branches covered with minute, sessile or stipitate glands.

14. *M. adenantheroides*.

¹ Pl. Nov. Hisp. 175-179. 1887.

Branches not glandular.

Calyx distinctly dentate, 1 to 1.5 mm. long, a third to half as long as the corolla.

Fruit about 4 mm. wide, unarmed-----15. *M. coelocarpa*.

Fruit about 6 mm. wide, often spiny.

Spines dark-colored, not much broadened at the base; fruit unarmed-----16. *M. wrightii*.

Spines usually light-colored, very broad and flat at base; fruit armed with spines on the margins.

17. *M. dysocarpa*.

Calyx subtruncate, about 0.8 mm. long, about a fourth as long as the corolla.

Pinnae 3 or 4 pairs-----18. *M. luisana*.

Pinnae 9 to 20 pairs.

Leaflets glabrous on the upper surface.

19. *M. rhododactyla*.

Leaflets tomentulose-sericeous on both surfaces.

Fruit unarmed or nearly so-----20. *M. palmeri*.

Fruit densely armed with spines----21. *M. benthami*.

AA. Flowers capitate.

B. Stamens of the same number as the corolla lobes.

Pinnae one pair; leaflets 1 or 2 pairs, usually large.

Stems copiously pubescent or setose-----22. *M. albida*.

Stems glabrous or nearly so.

Plants unarmed or nearly so; leaflets 1.7 cm. long or shorter.

23. *M. goldmanii*.

Plants armed with spines; leaflets mostly 2.5 to 8 cm. long.

Pods sessile or nearly so; leaflets setose beneath.

24. *M. manzanilloana*.

Pods stipitate; leaflets glabrous beneath-----25. *M. acapulcensis*.

Pinnae usually 2 to several pairs, sometimes one pair; leaflets 3 to many pairs, usually small.

Pinnae 3 to 5 pairs-----26. *M. leptocarpa*.

Pinnae 1 or 2 pairs. Fruit (so far as known) less than 1 cm. wide.

Leaflets 3 to 5 or rarely 6 pairs, 7 to 25 mm. wide.

Leaflets 2 cm. long or shorter, glabrous-----27. *M. lactiflua*.

Leaflets 2.3 to 3.6 cm. long, more or less pubescent.

Fruit strigose; leaflets strigose-----28. *M. deamii*.

Fruit glabrous; leaflets soft-pubescent when young.

29. *M. psilocarpa*.

Leaflets more than 5 pairs in most of the leaves, less than 7 mm. wide.

Peduncles glabrous or merely puberulent.

Fruit densely spiny-----30. *M. sicyocarpa*.

Fruit unarmed, except sometimes on the margin.

Plants unarmed; margin of the fruit spiny----31. *M. caerulea*.

Plants armed with stout spines; fruit unarmed.

32. *M. mixtecana*.

Peduncles densely pilose, tomentose, scabrous, or hispid.

Fruit glabrous but spiny; plants chiefly herbaceous.

34. *M. pudica*.

Fruit puberulent or pilose as well as spiny; plants woody almost throughout.

Leaflets glabrous on the upper surface-----34. *M. nelsonii*.

Leaflets densely pubescent on both surfaces-----35. *M. xanti*.

BB. Stamens twice as many as the corolla lobes.

Branches more or less bristly-hispid, usually armed with spines also, in one species the pubescence only obscurely hispid, but the spines then tipped with flexuous bristles.

Stems bristly but without spines-----36. *M. camporum*.

Stems armed with spines.

Rachis of the leaf bristly but without spines; pinnae 20 to 25 pairs.

37. *M. galeottii*.

Rachis of the leaf armed with spines.

Bristles of the peduncles usually gland-tipped; corolla striate.

38. *M. somnians*.

Bristles of the peduncles eglandular; corolla not striate.

Pods obovate, 1 to 3-seeded; spines with slender flexuous tips.

39. *M. dormiens*.

Pods linear-oblong, 15 to 20-seeded; spines stiff, straight.

40. *M. pigra*.

Branches not bristly-hispid; spines never ending in flexuous bristles.

C. Corolla glabrous.

Fruit winged; peduncles rufous-tomentose. Leaflets 2 to 3 mm. wide.

41. *M. hemiendyta*.

Fruit not winged; peduncles not rufous-tomentose.

Leaflets 3 to 17 mm. wide or broader.

Plants unarmed; leaflets coriaceous, 6 to 17 mm. wide.

43. *M. leucaenoides*.

Plants armed with spines; leaflets thin, mostly 3 to 8 mm. wide.

Leaflets glabrous.

Pinnae one pair; leaflets about 8 pairs----44. *M. micheliana*.

Pinnae 3 or 4 pairs; leaflets 4 or 5 pairs--53. *M. wootonii*.

Leaflets pubescent. Pinnae 3 or more pairs.

Leaflets rhombic, acute or acutish, mostly 5 to 8 mm. wide, soft-pilose beneath when young; branches pilose.

45. *M. ervendbergii*.

Leaflets oblong, rounded at the apex, 3 to 4 mm. wide, minutely strigillose; branches puberulent or glabrate.

46. *M. argillotropia*.

Leaflets 2 mm. wide or narrower.

Pinnae 1 to 3 pairs; leaflets few, usually 5 pairs or fewer.

Spines geminate-----47. *M. tenuiflora*.

Spines solitary-----58. *M. lindheimeri*.

Pinnae 3 to many pairs; leaflets numerous.

Petioles equaling or longer than the rachis, densely armed with short recurved spines-----48. *M. invis.*

Petioles much shorter than the rachis, unarmed or with a few scattered spines.

Leaflets 8 pairs or fewer; fruit about 6 mm. wide.

49. *M. grahami*.

Leaflets 20 to 32 pairs, thin; fruit often 2 cm. wide.

Pinnae 6 to 12 pairs-----50. *M. eurycarpa*.

Pinnae 15 to 18 pairs-----51. *M. colimensis*.

CC. Corolla pubescent, at least on the lobes.

Leaflets 4 to 6 mm. wide-----52. *M. malacophylla*.

Leaflets less than 3 mm. wide.

Fruit with 2 broad lacerate wings-----42. *M. lacerata*.

Fruit not winged.

D. Pinnae 1 to 4 pairs.

Leaflets one pair-----54. *M. zygophylla*.

Leaflets 2 or more pairs.

Valves of the fruit armed with spines.

Rachis of the leaf armed with numerous spines.

55. *M. hystriosa*.

Rachis of the leaf unarmed.

Leaflets green, thinly sericeous-----56. *M. monancistra*.

Leaflets white with a dense sericeous pubescence.

57. *M. emoryana*.

Valves of the fruit unarmed, the margins often spiny.

Corolla nearly glabrous-----58. *M. lindheimeri*.

Corolla densely pubescent.

Spines straight; leaflets densely sericeous with long soft hairs-----59. *M. purpusii*.

Spines recurved; leaflets strigillose or sericeous with very short hairs.

Pinnae 3 or 4 pairs-----65. *M. biuncifera*.

Pinnae 1 or 2 pairs.

Fruit glabrate, acute at the base----60. *M. pringlei*.

Fruit densely tomentose, rounded at the base.

Fruit strongly constricted between the seeds, the margins with numerous long spines.

61. *M. depauperata*.

Fruit scarcely at all constricted, the margins unarmed or nearly so-----62. *M. calcicola*.

DD. Pinnae more than 4 pairs in all or most of the leaves.

Leaflets about 1 mm. long. Valves of the fruit very spiny.

63. *M. minutifolia*.

Leaflets 2 mm. long or longer.

Leaflets 2.5 to 3 mm. wide, densely pilose-sericeous on both surfaces-----64. *M. mollis*.

Leaflets mostly less than 2 mm. wide.

Fruit acute or acutish at base and usually also at apex, 4 to 6 mm. wide-----65. *M. biuncifera*.

Fruit rounded or very obtuse at base and apex, 7 to 10 mm. wide.

Leaflets 5 to 7 mm. long-----66. *M. lemmoni*.

Leaflets 4 to 5 mm. long-----67. *M. aculeaticarpa*.

1. *Mimosa spirocarpa* Rose, Contr. U. S. Nat. Herb. 3: 316. *pl. 11*. 1895.

Sinaloa to Colima; type from Culiacán, Sinaloa.

Shrub, 3 to 6 meters high; leaflets obliquely oval or suborbicular, 1 to 3 cm. long; flowers purplish at first, becoming white, the spikes 7 to 13 cm. long; fruit narrow, coiled like a snail shell.

2. *Mimosa rosei* Robinson, Proc. Amer. Acad. 33: 317. 1898.

Known only from the type locality, Bolaños, Jalisco.

Plant unarmed, so far as specimens show; leaflets obliquely obovate or oval; fruit pale green, about 7 cm. long and 7 mm. wide, glabrous, unarmed, long-stipitate.

3. *Mimosa paucifoliolata* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 278. *pl. 24*. 1903.

Mimosa laxiflora zygophylloides Robinson, Proc. Amer. Acad. 33: 317. 1898. Colima and Michoacán or Guerrero; type from Las Minítas.

Shrub or small tree, 2 to 5 meters high, sparsely armed with flat straight spines; leaflets obovate-orbicular; flowers white, the spikes 3 to 4 cm. long, lax.

4. *Mimosa laxiflora* Benth. Lond. Journ. Bot. 5: 93. 1846.

? *Acacia prosopoides* DC. Prodr. 2: 460. 1825.

Chihuahua and Sonora (type locality).

Shrub with few short spines; leaflets 5 to 12 mm. long, pale green; flowers white, the spikes 2 to 4 cm. long; fruit unarmed.

5. *Mimosa distachya* Cav. Icon. Pl. 3: 48. pl. 295. 1794.

Mimosa brandegei Robinson, Proc. Amer. Acad. 33: 316. 1898.

Baja California and Sinaloa to Oaxaca and Puebla.

Shrub, copiously armed with short recurved spines; leaflets 4 to 18 mm. long, pale green; flowers white or pinkish, the spikes long and lax; fruit usually setose, 6 to 8 mm. wide. "Garabatillo" (Oaxaca).

It is possible that *M. brandegei* is a distinct species, but the material at hand can not be separated consistently into two forms.

6. *Mimosa purpurascens* Robinson, Proc. Amer. Acad. 33: 317. 1898.

Baja California, Sonora, and Sinaloa; type from La Paz, Baja California.

Shrub or small tree, 2 to 10 meters high; leaflets 3 to 8 mm. long; flowers pink; fruit puberulent, unarmed. "Cuca," "cuilón," "iguano" (Sinaloa).

In Sinaloa the bark is used for tanning skins, and it is sometimes chewed to harden the gums.

7. *Mimosa polyantha* Benth. in Hook. Journ. Bot. 4: 410. 1842.

Mimosa polyantha levior Robinson, Proc. Amer. Acad. 33: 318. 1898.

Sinaloa to Morelos and Oaxaca; type from Acatlán, Puebla. Guatemala.

Shrub, 1 to 3.5 meters high, copiously armed with spines; leaflets 2 to 4 mm. long; flowers pink or white, the spikes long and lax; fruit usually hispid, sometimes smooth, about 8 mm. wide. "Arrendador" (Sinaloa).

8. *Mimosa polyanthoides* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 260. 1904.

Guerrero; type from mountains above Iguala, altitude 1,200 meters.

Shrub, 3 to 4.5 meters high; leaflets 5 to 7 mm. long.

9. *Mimosa stipitata* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 261. 1904.

Guerrero, Oaxaca, Puebla, and Morelos; type from Iguala, Guerrero, altitude 1,200 meters.

Shrub or small tree, 1.5 to 4.5 meters high; leaflets 3 to 5 mm. long; flowers white, the spikes 2.5 to 4.5 cm. long, lax; fruit about 4.5 cm. long and 1 cm. wide, glabrous. "Timbln" (Michoacán, Guerrero).

Bark used for tanning.

10. *Mimosa ionema* Robinson, Proc. Amer. Acad. 36: 473. 1901.

Guerrero and Morelos; type from Cuernavaca.

Shrub, 3 to 4.5 meters high, armed with straight flat spines; leaflets 5 to 9 mm. long; flowers pinkish.

Doubtfully distinct from *M. stipitata*.

11. *Mimosa guatemalensis* (Hook. & Arn.) Benth. Bot. Voy. Sulph. 89. 1844.

Inga guatemalensis Hook. & Arn. Bot. Beechey Voy. 419. 1841.

Sinaloa and Tepic. Guatemala (type locality) and Nicaragua.

Shrub, about 2 meters high, densely pubescent, armed with numerous short straight spines; leaflets oval or obovate-oval, 7 to 20 mm. long; fruit densely pubescent, unarmed, about 6 mm. wide.

12. *Mimosa puberula* Benth. Lond. Journ. Bot. 5: 88. 1846.

Hidalgo and perhaps elsewhere; type from Zimapan.

Pinnae 5 to 10 pairs, the leaflets oblong, 4 to 5 mm. long; spikes 4 to 5 cm. long; fruit pubescent.

13. *Mimosa cabrera* Karst. Fl. Columb. 2: 63. pl. 132. 1869.

Chiapas. Central America and Colombia (type locality).

Small tree, armed with very stout flat spines; leaflets about 5 mm. long, linear-oblong; fruit pubescent. "Tepescahuite" (Chiapas, Seler); "carbón," "carbonal" (Honduras); "carbonal" (Colombia); "cabrero" (Venezuela).

14. *Mimosa adenanthroides* (Mart. & Gal.) Benth. Lond. Journ. Bot. 5: 88. 1846.

Acacia adenanthroides Mart. & Gal. Bull. Acad. Brux. 10²: 310. 1843.

Guerrero and Oaxaca; type from mountains of Sola and Yolotepeque, Oaxaca.

Erect shrub, armed with stout flat spines; leaflets oblong, 3 to 13 mm. long; spikes 1.5 to 2 cm. long; fruit 6 to 7 mm. wide, puberulent.

15. *Mimosa coelocarpa* Robinson, Proc. Amer. Acad. 33: 319. 1898.

Known only from the type locality, Topolobampo, Sinaloa.

Very spiny shrub; leaflets about 3 mm. long; spikes 3 to 4 cm. long; fruit densely pubescent.

16. *Mimosa wrightii* A. Gray, Pl. Wright. 2: 52. 1853.

Chihuahua and Sonora (type locality). Southern Arizona.

Shrub, armed with straight flat spines; leaflets 3 to 5 mm. long, obtuse or acute; flowers pink; fruit densely pubescent, unarmed.

17. *Mimosa dysocarpa* Benth.; A. Gray, Pl. Wright. 1: 62. 1852.

Chihuahua, Sonora, and Durango. Western Texas (type locality) to southern Arizona.

Densely armed shrub; leaflets 3 to 6 mm. long, pubescent; flowers pink, sweet-scented; fruit armed on the margins with short stout spines, densely pubescent. "Gatuño" (Chihuahua).

18. *Mimosa luisana* T. S. Brandeg. Zoe 5: 248. 1908.

Puebla and Oaxaca; type from San Luis Tultitlanapa, Puebla.

Shrub, armed with straight flat spines; leaflets 3 to 4 mm. long, pubescent; flowers pink, the spikes about 3.5 cm. long; fruit densely pubescent, unarmed, about 5 mm. wide.

19. *Mimosa rhododactyla* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 260. 1904.

Known only from the type locality, Las Higueritas, near the boundary between Michoacán and Guerrero, altitude 500 meters.

Shrub, 3 meters high; leaflets 3 mm. long, pubescent; flowers pale pink.

20. *Mimosa palmeri* Rose, Contr. U. S. Nat. Herb. 1: 99. 1891.

Mimosa fasciculata malacocarpa Robinson, Proc. Amer. Acad. 33: 319. 1898.

Sonora, Sinaloa, and Jalisco; type from Alamos, Sonora.

Shrub, 1.8 to 3 meters high, armed with stout straight spines; leaflets 2 to 4 mm. long; flowers pink, fragrant, the spikes 4 to 6 cm. long; fruit long, narrow, unarmed, about 3 mm. wide.

21. *Mimosa benthami* Macbride, Contr. Gray Herb. n. ser. 59: 12. 1919.

Acacia fasciculata Kunth, Mimos. Pl. Légum. 75. pl. 23. 1819-24.

Mimosa fasciculata Benth. Lond. Journ. Bot. 5: 88. 1846. Not *M. fasciculata* Benth. 1842.

Durango to Jalisco, Oaxaca, and Morelos; type from Guanajuato.

Shrub, armed with stout straight spines; leaflets 2 to 6 mm. long; bark whitish; flowers pinkish, the spikes long and dense; fruit densely spiny, about 5 mm. wide. "Uña de gato" (Jalisco, Michoacán, Guerrero).

22. *Mimosa albida* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1030. 1805.

Mimosa floribunda Willd. Sp. Pl. 4: 1031. 1805.

Mimosa albida floribunda Robinson, Proc. Amer. Acad. 33: 311. 1898.

Mimosa albida euryphylla Robinson, Proc. Amer. Acad. 33: 311. 1898.

Sinaloa to San Luis Potosí, Tabasco, and Chiapas. Central America and South America; type from Peru.

Shrub, 1 to 3 meters high, armed with short recurved spines; leaflets oblique, 3 to 8 cm. long, usually obtuse, densely pubescent; flowers pinkish; fruit 2 to 3 cm. long, 5 mm. wide, setose-hispid. "Sensitiva," "vergonzoso" (Oaxaca).

23. *Mimosa goldmanii* Robinson, Proc. Amer. Acad. 33: 308. 1898.

Known only from the type locality, between Juchitán and Chivela, Oaxaca.

Erect shrub with brownish branches; leaflets glabrous, aculeate-ciliate.

24. *Mimosa manzanilloana* Rose, Contr. U. S. Nat. Herb. 1: 326. 1895.

Sinaloa to Guerrero; type from Manzanillo, Colima.

Shrub, 1 to 1.5 meters high, armed with short stout recurved spines; leaflets 1 to 4 cm. long, obtuse or acute; flowers pink; fruit short, hispidulous, about 5 mm. wide.

25. *Mimosa acapulcensis* Robinson, Bot. Gaz. 28: 135. 1899.

Known only from Acapulco, Guerrero, the type locality.

Spiny shrub; leaflets oblique, 3 to 10 cm. long, acute or obtuse; flower heads racemose; fruit 5 to 6 mm. wide.

26. *Mimosa leptocarpa* Rose, Contr. U. S. Nat. Herb. 1: 326. 1895.

Colima to Guerrero; type from Manzanillo, Colima.

Straggling shrub, armed with very short recurved spines; leaflets oblong, obtuse, about 1 cm. long; flowers said to be yellowish white; fruit broad, very thin, glabrous, 7 to 11 cm. long, armed on the margin with short curved spines. "Sierilla" (Guerrero).

27. *Mimosa lactiflua* Delile; Benth. Trans. Linn. Soc. 30: 393. 1875.

Oaxaca; described from cultivated specimens of uncertain source; it is possible that the name does not apply properly to the Oaxaca plant.

Shrub, armed with short straight spines.

28. *Mimosa deamii* Robinson, Proc. Amer. Acad. 35: 324. 1900.

Known only from the type locality, Salina Cruz, Oaxaca.

Shrub, 3 meters high; flowers pinkish; fruit 3 to 3.4 cm. long, strigose.

29. *Mimosa psilocarpa* Robinson, Proc. Amer. Acad. 35: 325. 1900.

Known only from the type locality, in the mountains of Oaxaca.

Fruit glabrous, unarmed, 2 to 3 cm. long.

30. *Mimosa sicyocarpa* Robinson, Proc. Amer. Acad. 33: 313. 1898.

Known only from the type locality, between San Sebastián and Bufa de Mascota, Jalisco.

Shrub, 1 to 2 meters high, sparsely armed with short recurved spines; leaflets narrowly oblong, 1.5 to 2 cm. long; fruit 2.5 to 3 cm. long, densely spiny.

31. *Mimosa caerulea* Rose, Contr. U. S. Nat. Herb. 5: 141. 1897.

Morelos and Oaxaca; type from Cuernavaca.

Unarmed shrub, about a meter high; leaflets oblong, 1 to 1.5 cm. long, obtuse or acute, nearly glabrous; flowers purplish; fruit glabrous, the margins minutely aculeolate.

32. *Mimosa mixtecana* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 379. 1909.

Puebla and Oaxaca; type from the region of San Luis Tultitlanapa, Puebla.

Shrub, armed with straight brown spines; leaflets 6 to 20 mm. long; flowers pink; fruit glabrous, unarmed, long-stipitate.

33. *Mimosa pudica* L. Sp. Pl. 518. 1753.

Veracruz and probably elsewhere. Widely distributed in tropical America; type from Brazil.

Plants decumbent or spreading, suffrutescent occasionally, but perhaps hardly to be considered a shrub; leaflets linear-oblong, about 1 cm. long; flowers white

or pink. "Dormilona," "pinahuihuixtle," "quecupatli," "sensitiva," "ten vergüenza," "vergonzosa," "xmutz" (Ramírez); "cierra tus puertas" (Guatemala).

34. *Mimosa nelsonii* Robinson, Proc. Amer. Acad. 33: 314. 1898.

Mimosa lignosa Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 278. pl. 23. 1903.

Michoacán to Oaxaca; type collected between San Gerónimo and La Venta, Oaxaca.

Shrub, 0.3 to 2 meters high, rather sparsely armed with straight spines; leaflets 5 to 10 mm. long, thick, obtuse; flowers pink; fruit short, densely bristly, about 5 mm. wide.

35. *Mimosa xanti* A. Gray, Proc. Amer. Acad. 5: 157. 1862.

Mimosa langlassei Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 277. pl. 23. 1903.

Baja California (type locality) and Michoacán. Guatemala.

Erect shrub, 1 to 3.5 meters high, often forming dense thickets, armed with stout straight spines; leaflets oblong, about 1 cm. long, acute or obtuse; flowers pink; fruit short, hispid. "Celosa" (Baja California).

36. *Mimosa camporum* Benth. in Hook. Journ. Bot. 2: 130. 1840.

Tepic to Guerrero. Central America and South America.

Plants chiefly herbaceous but sometimes somewhat shrubby, nearly or quite without spines; leaflets about 8 mm. long; flowers pink; fruit short, hispid.

37. *Mimosa galeottii* Benth. Lond. Journ. Bot. 5: 92. 1846.

Acacia hirta Mart. & Gal. Bull. Acad. Brux. 10²: 318. 1843.

Morelos, Oaxaca, and Guerrero; type from mountains of Yolotepeque, Oaxaca, at an altitude of 2,460 meters.

Shrub or small tree, 3 to 4.5 meters high, armed with rather slender recurved spines; leaflets very numerous, 2 mm. long or shorter; flowers yellowish, turning pink; fruit usually very spiny, about 4 cm. long and 6 mm. wide. "Uña de gato" (Michoacán, Guerrero).

Specimens reported by Micheli¹ as *M. adenotricha* belong here.

38. *Mimosa somnians* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1036. 1805.

Veracruz, Oaxaca, and Guerrero. Widely distributed in tropical America.

Plants chiefly herbaceous but often suffrutescent, armed with rather few short spines; leaflets mostly 4 to 5 mm. long; flowers white or pinkish; fruit glabrous or pilose, 3 to 4 mm. wide.

39. *Mimosa dormiens* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1035. 1805.

Chiapas. Widely distributed in tropical America.

Ascending or erect shrub, densely armed with slender spines; leaflets about 8 mm. long, pubescent. "Dormidera" (Colombia).

40. *Mimosa pigra* L. Cent. Pl. 1: 13. 1755.

Mimosa asperata L. Syst. Nat. ed. 10. 1312. 1759.

Mimosa berlandieri A. Gray; Torr. U. S. & Mex. Bound Bot. 61. 1859.

Tamaulipas to Sinaloa, Chiapas, and Tabasco. Widely distributed in tropical America and Africa.

Erect or ascending shrub, 1 to 2 meters high, armed with numerous stout spines; leaflets linear, about 5 mm. long; flowers pink; fruit hispid, often very densely so, about 1 cm. wide. "Zarza" (Guerrero, Costa Rica); "choven" (Veracruz, San Luis Potosí, Seler); "espina de vaca" (Panama).

¹ Mém. Soc. Phys. Hist. Nat. Genève 34: 276. 1903.

41. *Mimosa hemiendyta* Rose & Robins. Contr. U. S. Nat. Herb. 8: 32. 1903.

Yucatán and Campeche; type from Apazote, Campeche.

Shrub, 1.5 to 6 meters high; leaflets 4 to 5 mm. long, glabrate; fruit with a broad, erose or shallowly lacerate wing.

42. *Mimosa lacerata* Rose, Contr. U. S. Nat. Herb. 5: 141. 1897.

Querétaro, Morelos, Puebla, and Oaxaca; type from Piaxtla, Puebla.

Shrub, 1.5 to 2.5 meters high, armed with stout spines; leaflets 2 to 3 mm. long; fruit with a broad, deeply lacerate wing.

43. *Mimosa leucaenoides* Benth. Lond. Journ. Bot. 5: 89. 1846.

San Luis Potosí and Hidalgo; type from Zimapán, Hidalgo.

Shrub or small tree, 3 to 4.5 meters high; leaflets 1.5 to 2.5 cm. long, lustrous; fruit unarmed, about 6 mm. wide.

44. *Mimosa micheliana*¹ Robinson, Proc. Bost. Soc. Nat. Hist. 31: 259. 1904.

Known only from the type locality, La Correa, Guerrero, altitude 250 meters.

Shrub, armed with small recurved spines; leaflets 9 to 13 mm. long; flowers pale pink.

45. *Mimosa ervendbergii*² A. Gray, Proc. Amer. Acad. 5: 178. 1862.

Veracruz, Oaxaca, and Chiapas; type from Tantoyuca, Veracruz. Central America.

Shrub, probably scandent, armed with very short recurved spines; leaflets 1 to 3 cm. long; flower heads in large naked panicles. "Zarza," "sierrilla" (Oaxaca).

46. *Mimosa argillotropha* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 257. 1904.

Known only from the type locality, La Correa, Guerrero.

Shrub, armed with very small recurved spines; leaflets 1 cm. long or shorter; flowers white.

47. *Mimosa tenuiflora* Benth. Lond. Journ. Bot. 5: 92. 1846.

Type from Zimapán, Hidalgo.

Pinnæ 1 to 3 pairs; branchlets glabrous.

48. *Mimosa invis*a Mart. Herb. Fl. Bras. 121. 1837-40.

Schrankia brachycarpa Benth. in Hook. Journ. Bot. 2: 130. 1840.

Sinaloa to Guerrero and Veracruz. Widely distributed in tropical America.

Procumbent or prostrate plant, chiefly herbaceous, armed with very numerous short recurved spines; leaflets 5 mm. long; flowers pink; fruit hispid, 4 mm. wide. "Dormilona" (Costa Rica).

The roots have a disagreeable odor and are said to have irritant properties. In Costa Rica the bitter infusion of the leaves is considered tonic, and the seeds are sometimes used as an emetic.

49. *Mimosa grahami* A. Gray, Pl. Wright. 2: 52. 1853.

Northern Sonora (type locality) and Chihuahua.

Shrub, armed with rather slender spines; leaflets 4 mm. long; flowers pink; margins of the fruit with a few short spines, about 6 mm. wide.

50. *Mimosa eurycarpa* Robinson, Proc. Amer. Acad. 33: 322. 1898.

Mimosa eurycarpoides Robinson, Proc. Amer. Acad. 36: 472. 1901.

Sinaloa to Oaxaca; type collected between Guichocovi and Lagunas, Oaxaca.

¹ Named for Marc Micheli, a botanist of Geneva, who published a paper describing the Leguminosae collected in Mexico by Eugène Langlассé.

² L. C. Ervendberg made a small collection of plants in the District of Huasteca, Veracruz, in 1858 and 1859. This was reported upon by Gray in 1861 (Proc. Amer. Acad. 5: 174-190).

Shrub or small tree, sometimes 6 meters high; leaflets 4 to 6 mm. long; flowers white; fruit broad, thin, sparsely hispid on the valves. "Rabo de iguana" (Guerrero); "uña de gato" (Oaxaca).

It is possible that *M. eurycarpoides* is distinct, but it is known only from flowering branches, which show no essential differences from *M. eurycarpa*. The fruit originally described as belonging to *M. eurycarpoides* is probably that of *Acacia farnesiana*.

51. *Mimosa colimensis* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 358. 1904.
Known only from Colima, the type locality.

Shrub, armed with short recurved spines; leaflets 5 to 7 mm. long; flower heads racemose-paniculate.

It is doubtful whether this is distinct from *M. eurycarpa*. The fruit is not known.

52. *Mimosa malacophylla* A. Gray, Journ. Bost. Soc. Nat. Hist. 6: 182. 1850.
Chihuahua and Coahuila to Tamaulipas. Western Texas; type collected on the Rio Grande.

Scandent or recumbent shrub, 3 to 4.5 meters high, armed with numerous small recurved spines; leaflets mostly oval, 7 to 14 mm. long, obtuse or acute; flowers white, sweet-scented; fruit 5 to 7.5 cm. long, 1 cm. wide, glabrous. "Raspa-huevos" (Nuevo León, Tamaulipas); "raspilla" (Tamaulipas).

53. *Mimosa wootonii*¹ Standl., sp. nov.

Type from Hacienda Buena Vista, Tamaulipas (Wooton, June 14, 1919; U. S. Nat. Herb. no. 989828).

Subscandent shrub, the branches angulate, glabrous, armed with very numerous short recurved prickles; leaf rachis 9 to 12 cm. long, with numerous recurved prickles, sparsely puberulent with short curled hairs; pinnae 3 or 4 pairs; leaflets usually 4 or 5 pairs, oval-elliptic, oval, or sometimes obovate-oval, 8 to 15 mm. long, 5 to 9 mm. wide, acute or obtuse at apex, mucronate, bright green, glabrous, with rather prominent venation; flowers capitate, racemose, the peduncles fasciculate, 1.2 to 2 cm. long, puberulent; calyx and corolla glabrous, the calyx one-third as long as the corolla; ovary glabrous. "Raspilla," "raspa-huevos."

Except in pubescence, this plant is almost exactly like *M. malacophylla* Gray, which was collected at the same locality. It may be only a form of that species, but in the latter the pubescence is very copious on all parts, consisting of short straight hairs. The quality and quantity of pubescence seem to be constant characters in the other Mexican species of the genus.

54. *Mimosa zygophylla* Benth.; A. Gray, Pl. Wright. 1: 61. 1852.

Coahuila, Nuevo León, San Luis Potosí, and Zacatecas; type from the region of Saltillo.

Densely branched shrub, 0.3 to 1 meter high or larger, armed with short stout recurved spines; leaflets about 3 mm. long; flowers pink; fruit short, glabrous, unarmed or nearly so, 7 cm. wide.

55. *Mimosa hystriosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 86. 1910.

Jalisco to Puebla; type from Cerro de Gavilán, Puebla.

Shrub, armed with numerous short spines; leaflets 5 to 8 mm. long; fruit very spiny.

56. *Mimosa monancistra* Benth. Pl. Hartw. 12. 1839.

?*Mimosa herincquiana* Micheli, Mém. Soc. Phys. Genève 34: 276. pl. 21. 1903.

Coahuila to San Luis Potosí, Oaxaca, and Jalisco; type from Aguascalientes.

¹ Named for Elmer Ottis Wooton (1865-), now of the U. S. Department of Agriculture, who made a collection of plants in Tamaulipas in 1919.

Shrub, 0.6 to 1.5 meters high, sparsely or densely armed with short spines; leaflets 3 to 5 mm. long; flowers pink; fruit very spiny, 4 to 5 mm. wide. "Garabatillo" (Aguascalientes); "uña de gato" (Guanajuato).

57. *Mimosa emoryana* Benth. Trans. Linn. Soc. Bot. 30: 426. 1875.

Chihuahua and Durango. Western Texas (type locality).

Shrub, densely pubescent, armed with numerous stout spines; leaflets 3 to 5 mm. long; flowers pink; fruit very spiny, about 5 mm. wide.

58. *Mimosa lindheimeri*¹ A. Gray, Proc. Bost. Soc. Nat. Hist. 6: 181. 1850.

Mimosa biuncifera lindheimeri Robinson, Proc. Amer. Acad. 33: 328. 1898.

Coahuila to San Luis Potosí, Puebla, and Michoacán. Western Texas (type locality).

Erect, very spiny shrub, nearly glabrous, with reddish purple or pink flowers; leaflets 2 to 3 mm. long; fruit armed with spines on the margins, 4 to 5 mm. wide.

59. *Mimosa purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 379. 1909.

Puebla and Oaxaca; type from Cerro de Matzize, Puebla.

Very spiny shrub, densely pubescent; leaflets 3 to 4 mm. long; flowers pink; fruit densely pubescent, 6 mm. wide, with a few short spines on the margins.

60. *Mimosa pringlei* S. Wats. Proc. Amer. Acad. 21: 452. 1886.

Chihuahua; type collected near the city of Chihuahua. Western Texas.

Densely branched shrub, armed with short slender recurved spines; leaflets 3 to 4 mm. long; fruit 2 cm. long, glabrous, unarmed or nearly so.

61. *Mimosa depauperata* Benth. Pl. Hartw. 13. 1839.

Acacia canescens Mart. & Gal. Bull. Brux. 10²: 312. 1843.

Querétaro to Mexico and Oaxaca; type from Actopan, Hidalgo.

Shrub, 0.3 to 1 meter high, very spiny; leaflets 2 to 3 mm. long; fruit densely pubescent, 5 mm. wide, the margins armed with stout straight spines.

62. *Mimosa calcicola* Robinson, Proc. Amer. Acad. 33: 325. 1898.

Hidalgo and Puebla; type from plains near Tehuacán, Puebla.

Shrub, 0.3 to 1 meter high, very spiny; leaflets 2 to 4 mm. long; flowers white or pinkish; fruit densely pubescent, unarmed or nearly so, about 4 mm. wide.

63. *Mimosa minutifolia* Robins. & Greenm. Amer. Journ. Sci. III. 50: 150. 1895.

Jalisco; type from Río Blanco.

Fruit very spiny, 7 to 8 mm. wide.

64. *Mimosa mollis* Benth. in Hook. Journ. Bot. 4: 408. 1842.

Puebla; type from Acatlán.

Shrub, armed with short flat spines, densely pubescent; leaflets 4 to 6 mm. long; fruit densely pubescent, unarmed.

65. *Mimosa biuncifera* Benth. Pl. Hartw. 12. 1839.

Mimosa prolifica S. Wats. Proc. Amer. Acad. 21: 452. 1886.

Chihuahua to San Luis Potosí, Mexico, Oaxaca, and Durango; type from León, Guanajuato. Southern Arizona and New Mexico.

Shrub 1 to 2 meters high, densely armed with stout recurved spines; leaflets mostly 2 to 3 mm. long; flowers pink or white; fruit very spiny on the margins. "Gatuño" (Zacatecas, Durango, Chihuahua); "uña de gato" (Chihuahua, Texas, etc.).

¹ Ferdinand Lindheimer (1801–1879), a native of Germany, resided for more than 30 years in Texas, where he made large collections of plants. These were reported upon by Gray and Engelm. The genus *Lindheimera*, of the family Asteraceae, was named in his honor.

66. *Mimosa lemmonii* A. Gray, Proc. Amer. Acad. 19: 76. 1883.

Northern Chihuahua and Sonora. Southern New Mexico and Arizona; type from Huachuca Mountains, Arizona.

Shrub, about 1 meter high, very pubescent; fruit densely pubescent, unarmed or nearly so, about 6 mm. wide.

67. *Mimosa aculeaticarpa* Ortega, Hort. Matr. Dec. 134. 1800.

Mimosa acanthocarpa Benth. in Hook. Journ. Bot. 4: 409. 1842.

Mimosa acanthocarpa desmanthocarpa Robinson, Proc. Amer. Acad. 36: 472. 1901.

Mimosa aculeaticarpa imparilis Macbride, Contr. Gray Herb. n. ser. 59: 12. 1919.

San Luis Potosí to Tepic, Chiapas, and Hidalgo.

Shrub or small tree, armed with numerous spines; flowers white or pink; fruit usually spiny on the margins, about 6 mm. wide, reddish brown.

Mimosa acanthocarpa desmanthocarpa is a form with unarmed fruit. *M. aculeaticarpa imparilis* has glandular and hirsute branchlets.

DOUBTFUL SPECIES.

MIMOSA ARCUATA Mart. & Gal. Bull. Acad. Brux. 10³: 308. 1843. Type from Tehuacán, Puebla. According to Robinson, probably a synonym of *M. biuncifera* Benth.

MIMOSA GEMINATA DC. Prodr. 2: 427. 1825. Described from Mexico.

MIMOSA TRICEPHALA Cham. & Schlecht. Linnaea 5: 591. 1830. Type from Actopan, Hidalgo.

7. ACUAN Medic. Theod. Sp. 62. 1786.

Low suffrutescent or herbaceous plants, unarmed; leaves bipinnate, the leaflets numerous, small, the stipules setaceous, persistent; flowers in dense heads; fruit linear, compressed.

Several other species of the genus occur in Mexico, but they are herbaceous plants.

Fruit 3 to 5 mm. wide.....1. *A. virgatum*.
Fruit 5 to 6 mm. wide.....2. *A. fruticosum*.

1. *Acuan virgatum* (L.) Medic. Theod. Sp. 62. 1786.

Mimosa virgata L. Sp. Pl. 519. 1753.

Desmanthus virgatus Willd. Sp. Pl. 4: 1047. 1806.

Sonora to San Luis Potosí, Veracruz, and Oaxaca. Widely distributed in tropical America.

More commonly, perhaps, a herbaceous plant, but often a shrub 1 to 3 meters high; leaflets 2 to 4 mm. long, oblong, obtuse; flowers white; fruit 4.5 to 10 cm. long, glabrous.

2. *Acuan fruticosum* (Rose) Standl.

Desmanthus fruticosus Rose, Contr. U. S. Nat. Herb. 1: 131. pl. 13. 1892. Baja California; type from Carmen Island.

Slender shrub, 1.5 to 3 meters high; leaflets oblong, 5 to 9 mm. long; fruit 4 to 8 cm. long.

8. LEUCAENA Benth. in Hook. Journ. Bot. 4: 416. 1842.

Unarmed trees or shrubs; leaves bipinnate, the leaflets few and large or numerous and small, the petiole usually glanduliferous; stipules small; flowers in dense globose heads, white; fruit flat, stipitate, bivalvate.

Some of the South American species are said to be employed to poison or stupefy fish.

Leaflets large, most of them 0.8 to 3 cm. wide, comparatively few.

Mature fruit 2.5 to 4.5 cm. wide.

Leaflets 6 to 8 pairs; pinnae 3 to 6 pairs-----1. *L. plurijuga*.

Leaflets 2 to 4 pairs; pinnae 2 or 3 pairs.

Leaflets lance-ovate, 1.5 to 2.3 cm. wide; fruit 2.5 to 3 cm. wide.

2. *L. macrophylla*.

Leaflets broadly ovate or oval, most of them 2.5 to 3.5 cm. wide; fruit

3.5 to 4.5 cm. wide-----3. *L. macrocarpa*.

Mature fruit less than 2 cm. wide.

Leaflets lance-oblong or oblong-ovate, 0.8 to 1.3 cm. wide---4. *L. lanceolata*.

Leaflets oval or rounded-oval, most of them 1.5 to 3.5 cm. wide or larger.

5. *L. microcarpa*.

Leaflets small, 1 to 8 mm. wide, numerous.

Young branches sharply angulate-----6. *L. esculenta*.

Young branches terete.

Corolla glabrous.

Leaflets 6 mm. long or shorter.

Leaflets thin, linear-oblong, the venation plane, rounded or obtuse at apex-----7. *L. diversifolia*.

Leaflets coriaceous, oval-oblong or broadly oblong, the venation prominent beneath, cuspidate at apex-----8. *L. cuspidata*.

Leaflets 10 mm. long or longer.

Leaflets oblong, obtuse or rounded at apex, 3 to 8 mm. wide; fruit puberulent-----9. *L. shannoni*.

Leaflets narrowly lance-oblong, acute, 2.5 to 4 mm. wide; fruit glabrous.

10. *L. glabrata*.

Corolla pubescent.

Limb of the corolla pilose with spreading yellow hairs; beak of the fruit 1.5 to 3.5 cm. long-----11. *L. greggii*.

Limb of the corolla pilose with minute appressed hairs; beak of the fruit less than 1 cm. long.

Corolla 3 to 4 times as long as the calyx-----12. *L. pulverulenta*.

Corolla about twice as long as the calyx.

Leaflets 7 to 15 mm. long-----13. *L. glauca*.

Leaflets 2 to 5 mm. long.

Leaflets glabrous on the faces, the costa impressed beneath.

14. *L. brachycarpa*.

Leaflets densely pilose on both surfaces with minute, mostly spreading hairs, the costa prominent beneath-----15. *L. stenocarpa*.

1. *Leucaena plurijuga* Standl. Contr. U. S. Nat. Herb. 20: 189. 1919.

Querétaro, Guanajuato, and Michoacán; type from Monte León, Michoacán.

Leaflets oblong or oval, 2 to 3 cm. long, rounded at apex, nearly glabrous; fruit about 24 cm. long.

2. *Leucaena macrophylla* Benth. Bot. Voy. Sulph. 90. 1844.

Colima to Guerrero; type from Acapulco, Guerrero. Reported from Panama.

Small tree, about 3.5 meters high; leaflets 5 to 6.5 cm. long, acute, pubescent beneath when young, glabrate in age; fruit about 20 cm. long.

3. *Leucaena macrocarpa* Rose, Contr. U. S. Nat. Herb. 1: 327. f. 6. 1895.

Tepic to Colima; type from Río Blanco, Jalisco.

Shrub or small tree, sometimes 7.5 meters high; leaflets 4 to 9 cm. long, acute or obtuse, bright green, nearly glabrous; flower heads 1 cm. in diameter, racemose.

4. *Leucaena lanceolata* S. Wats. Proc. Amer. Acad. 21: 427. 1886.

Sonora, Chihuahua, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Shrub, 1.5 to 3 meters high; leaflets 2 to 4 cm. long, acute; flower heads 1.5 to 2 cm. in diameter; fruit 12 to 18 cm. long.

5. *Leucaena microcarpa* Rose, Contr. U. S. Nat. Herb. 5: 141. 1897.

Baja California and Sinaloa to Morelos and Guerrero; type from Miraflores, Baja California.

Shrub or tree, sometimes 6 meters high; leaflets 2 to 5.5 cm. long, rounded to acute at apex, thick, lustrous; flowers white, the heads 2 cm. in diameter. "Guajillo" (Michoacán, Guerrero).

It is possible that the southern plant, with larger leaflets, represents another species. All the material is very close to *L. trichodes* (Jacq.) Benth., of Hispaniola.

6. *Leucaena esculenta* (Moc. & Sessé) Benth. Trans. Linn. Soc. 30: 442. 1875.

Acacia esculenta Moc. & Sessé; DC. Prodr. 2: 470. 1825.

Mimosa esculenta Moc. & Sessé, Pl. Nov. Hisp. 178. 1887.

Jalisco to Puebla and Chiapas; type from "Nova-Hispania."

Tree, 6 to 15 meters high; leaves often 40 cm. long, the leaflets linear, 3 to 4 mm. long, glabrate; flowers white, odorless, the heads 2 cm. in diameter, arranged in large racemes or panicles; fruit 12 to 27 cm. long, 2 to 3 cm. wide, red or purplish. "Guaje" or "huaje" (Jalisco, Mexico, Morelos, Oaxaca; derived from the Nahuatl *huaxin*, *hoatzin*, or *hoaxin*); "uachi blanco" (Chiapas); "huassl," "guaxi" (Otomí, *Peñafiel*).

Sessé and Mociño state that the pods were an article of commerce and that the seeds, in spite of their unpleasant flavor, were eaten by the Indians, who believed that they possessed aprodisiac properties. The seeds are still eaten in Mexico, usually with salt.

This is probably the plant of which Sahagún writes: "There is a tree known as *uaxin*. It is of medium size; its trunk is smooth, likewise the leaves, which are almost like those of the árbol del Perú [*Schinus molle*]. It bears a fruit like that of the carob, which is good to eat and is offered for sale in the markets."

According to Robelo, the geographic name Oaxaca takes its derivation from the word *huaxin*, the Nahuatl form being *Huaxyacac*, or "place where the *huaxin* begins to grow." The word *Huaxtl* signifies "where the *huaxin* abounds," and *Huajuapan* "river of the *huaxin*."

7. *Leucaena diversifolia* (Schlecht.) Benth. in Hook. Journ. Bot. 4: 417. 1842.

Acacia diversifolia Schlecht. Linnaea 12: 570. 1838.

Jalisco to Oaxaca and Veracruz; type from Jalapa, Veracruz.

Shrub; leaves large, glabrate; flower heads 2 cm. in diameter; fruit 15 to 20 cm. long, about 1.5 cm. wide, lustrous.

8. *Leucaena cuspidata* Standl. Contr. U. S. Nat. Herb. 20: 189. 1919.

Known only from the type locality, Minas de San Rafael, San Luis Potosí. Leaflets pale beneath; flower heads less than 1 cm. in diameter.

9. *Leucaena shannoni* Donn. Smith, Bot. Gaz. 57: 419. 1914.

Chiapas. El Salvador (type locality).

Shrub or tree; leaflets oblong, 2.5 to 4 mm. wide, obtuse; flowers glabrous; fruit puberulent.

10. *Leucaena glabrata* Rose, Contr. U. S. Nat. Herb. 5: 140. 1897.

Guerrero and Puebla to Chiapas; type from Acapulco, Guerrero.

Tree, 9 to 12 meters high, with a trunk 30 cm. or more in diameter; leaflets glabrous or nearly so. "Guaje" (Guerrero).

The Chiapas plant (known as "uaxi" or "guacis") has very short fruit, and is perhaps distinct. The seeds are eaten raw when they are green.

11. *Leucaena greggii* S. Wats. Proc. Amer. Acad. 23: 272. 1888.

Coahuila and Nuevo León; type from Rinconada. Southwestern Texas.

Shrub or small tree, 3 to 4.5 meters high; leaflets 5 to 7 mm. long, acute, glaucous; flower heads 1.5 cm. in diameter; fruit 14 to 19 cm. long, 1 cm. wide; wood hard, close-grained, brown, its specific gravity about 0.92.

12. *Leucaena pulverulenta* (Schlecht.) Benth. in Hook. Journ. Bot. 4: 417. 1842.

Acacia pulverulenta Schlecht. Linnaea 12: 571. 1838.

Nuevo León, Tamaulipas, and Veracruz; type from San Antonio, Veracruz. Southwestern Texas.

Tree, sometimes 18 meters high, the tall straight trunk sometimes 50 cm. in diameter, covered with cinnamon-brown bark; leaflets 3 to 4 mm. long, glabrate; flowers white, sweet-scented; fruit 11 to 18 cm. long, about 1.5 cm. wide; wood hard, heavy, close-grained, of a rich, dark brown color, the sapwood bright clear yellow, the specific gravity about 0.67. "Tepeguaje," "quiebra-hacha" (Tamaulipas).

The tree is a source of lumber, which is employed for general purposes.

13. *Leucaena glauca* (L.) Benth. in Hook. Journ. Bot. 4: 416. 1842.

Mimosa glauca L. Sp. Pl. 520. 1753.

Jalisco to Michoacán, Chiapas, and Yucatán. Widely distributed in tropical and subtropical America.

Shrub or tree, sometimes 10 meters high, with a trunk 10 cm. in diameter, the bark dark brown, somewhat scaly; leaves 10 to 30 cm. long; flowers whitish; fruit 10 to 15 cm. long, 1.5 cm. wide; wood hard, close-grained, light brown. "Xaxim" (Yucatán, Maya); "uaxi," "guacis" (Chiapas); "aroma blanca" (Cuba); "hediondilla" (Porto Rico); "granalino" (Santo Domingo).

There is a prevalent belief in tropical America that if horses, mules, or pigs eat any part of the plant their hair will fall out. Cattle are said not to be affected, and in Mauritius the plant is considered valuable as forage for goats. The seeds are sometimes used for making necklaces, bracelets, and other articles. Grosourdy reports that the roots have emmenagogue and abortive properties. The plant has been introduced into the tropics of the old World, where it is sometimes planted for hedges. It grows readily from cuttings. Its most common English name is "lead-tree," but in the Bahamas it is known as "jumby-bean."

14. *Leucaena brachycarpa* Urban, Symb. Antill. 2: 265. 1900.

Veracruz. Described from plants cultivated in Jamaica.

Tree, 7.5 meters high; flower heads 1 cm. in diameter; fruit 10 to 11 cm. long, 1.2 cm. wide.

15. *Leucaena stenocarpa* Urban, Symb. Antill. 2: 266. 1900.

Oaxaca; type from foothills of the Sierra de San Felipe.

Small tree, 4.5 meters high; fruit about 10 cm. long and 1.2 cm. wide.

DOUBTFUL SPECIES.

LEUCAENA LAXIFOLIA Urban, Symb. Antill. 2: 296, 1900. Described from Mexico. Closely related to *L. diversifolia* (Schlecht.) Benth.

LEUCAENA TRICHANDRA (Zucc.) Urban, Symb. Antill. 2: 267. 1900. *Acacia trichandra* Zucc. Abh. Akad. Wiss. München 2: 349. 1838. Described from cultivated specimens, probably of Mexican origin. Very closely related to *L. diversifolia*, and doubtfully distinct. Benthham considered it synonymous with that species.

9. **ACACIA** Willd. Sp. Pl. 4: 1049. 1806.

REFERENCE: Benth. Trans. Linn. Soc. Bot. 30: 444-533. 1875.

Trees or shrubs, rarely herbs, usually armed with spines; leaves bipinnate, the leaflets usually small and numerous, the petiole usually glanduliferous; flowers small but often showy, capitate or spicate, the stamens numerous (sometimes as many as 400), exserted; fruit very variable in form.

The species of *Acacia* are widely distributed in the tropics of both hemispheres, being particularly abundant in Australia. Many of them yield useful gums, gum arabic being furnished by *A. scorpioides* (L.) W. F. Wight [*A. arabica* (Lam.) Willd.] and other species. This gum is employed in medicine as a remulcent and has varied uses in different industries.

- A. Spines very large, most of them 5 mm. wide at the base or often much broader, either inflated and then usually punctured by ants or flattened and sword-shaped, never abruptly recurved, sometimes boat-shaped.

Involucel borne at or above the middle of the peduncle; bractlets of the flower heads not peltate; spines often puberulent when young.

Flowers in globose heads.

Spines boat-shaped.....1. *A. cochliacantha*.

Spines sword-shaped, flat.....2. *A. macracantha*.

Flowers in cylindrical spikes.

Spines turgid and only slightly compressed.....3. *A. standleyi*.

Spines flat, strongly compressed.....4. *A. gladiata*.

Involucel borne near the base of the peduncle, or at least below the middle; bractlets peltate; spines glabrous.

Fruit indehiscent, terete, terminating in a spinose beak.

Flowers in globose or oblong-globose heads.....5. *A. sphaerocephala*.

Flowers in long cylindric spikes.....6. *A. cornigera*.

Fruit dehiscent.

Fruit opening by a single suture. Flowers spicate.....7. *A. hindsii*.

Fruit opening by 2 sutures.

Flowers in globose heads.....8. *A. globulifera*.

Flowers in cylindric spikes.

Spines much broadened and compressed at base; fruit somewhat compressed.....9. *A. nelsonii*.

Spines little broadened and scarcely at all compressed; fruit terete or nearly so.....10. *A. collinsii*.

- AA. Spines often wanting, when present much smaller, usually much less than 5 mm. wide at base, never boat-shaped or large and sword-shaped, often abruptly recurved.

B. Flowers spicate.

Leaflets large, all or most of them more than 1 cm. wide.

Flowers pedicellate. Plant glabrous.....11. *A. reniformis*.

Flowers sessile.

Stipular spines mostly 1 to 3 cm. long.....13. *A. conzattii*.

Stipular spines 5 mm. long or shorter.

Leaves densely short-pilose at maturity.....15. *A. californica*.

Leaves glabrous or nearly so at maturity or puberulent.

Fruit 5 mm. wide or narrower.....14. *A. pringlei*.

Fruit 1 to 2.5 cm. wide.

Pinnae one pair; leaflets subchartaceous, longer than broad.

16. *A. unijuga*.

Pinnae 2 or 3 pairs; leaflets coriaceous, nearly as broad as long.

12. *A. sororia*.

Leaflets small, the largest 6 mm. wide.

Petioles flat, striate, usually 10 to 20 cm. long; leaflets soon deciduous.

17. *A. willardiana*.

Petioles not flat and striate, commonly less than 10 cm. long; leaflets persistent.

Stipules spinelike, usually 1 to 3 cm. long.

Leaflets glabrous-----18. *A. amentacea*.

Leaflets pubescent.

Fruit densely hirtellous-----19. *A. bilimekii*.

Fruit glabrous or minutely puberulent-----20. *A. sonorensis*.

Stipules not spinelike, the spines all less than 1 cm. long.

Leaflets 3 to 7 pairs.

Leaflets 2.5 to 4 mm. long; fruit about 1.5 cm. wide.

21. *A. greggii*.

Leaflets mostly 6 to 10 mm. long; fruit 2 cm. wide or wider.

22. *A. wrightii*.

Leaflets 10 to many pairs in all or most of the leaves.

Rachis of the leaves with recurved spines-----23. *A. iguana*.

Rachis of the leaves unarmed.

Pinnae much shorter than the rachis of the leaf, usually numerous (commonly 15 or more).

Fruit velvety-puberulent, about 2 cm. wide--24. *A. macilenta*.

Fruit glabrous or nearly so, about 1.5 cm. wide.

Rachis of the leaves glabrous-----25. *A. millefolia*.

Rachis of the leaves densely short-pilose--32. *A. acatlensis*.

Pinnae nearly or quite as long as the rachis or often longer, usually less than 10.

Leaflets 7 to 10 pairs-----26. *A. rotundata*.

Leaflets 10 to many pairs.

Pinnae 2 to 5 pairs.

Leaflets 8 to 11 mm. long-----27. *A. gaumeri*.

Leaflets 2 to 6 mm. long.

Surfaces of the leaflets glabrous, the margins ciliate.

28. *A. dolichostachya*.

Surfaces, at least the lower one, of the leaflets puberulent or sericeous.

Leaflets about 2 mm. long; fruit 16 mm. wide.

29. *A. compacta*.

Leaflets 6 mm. long; fruit 8 mm. wide.

30. *A. mammiifera*.

Pinnae 6 to 10 pairs in all or most of the leaves.

Pinnae mostly 5 to 8 cm. long; fruit glabrous.

31. *A. coulteri*.

Pinnae mostly 1.5 to 3 cm. long; fruit pubescent.

32. *A. acatlensis*.

BB. Flowers capitate.

Stipules spinose, stout, straight, usually long.

Fruit covered with thick stalked glands-----33. *A. glandulifera*.

Fruit without glands, or the glands sessile.

Fruit flat, bivalvate; bracts borne near the middle of the peduncle.

Fruit 2 to 3 cm. long, strongly curved; spines very slender, yellowish.

34. *A. blaciculata*.

Fruit 5 to 12 cm. long, straight or nearly so; spines stout, brown, white, or grayish.

- Pinnae 4 to 9 (rarely 3) pairs; leaflets usually puberulent, slightly or not at all viscid.....35. *A. constricta*.
- Pinnae 1 or 2 (rarely 3) pairs; leaflets glabrous, very viscid.
36. *A. vernicosa*.
- Fruit turgid, tardily or not at all dehiscent; bracts borne at the summit of the peduncle.
- Pinnae 2 to 8 pairs.
- Fruit glabrous, 5 to 7.5 cm. long.....37. *A. farnesiana*.
- Fruit pubescent, 7.5 to 10 cm. long.....38. *A. tortuosa*.
- Pinnae 10 to 60 pairs.
- Fruit 2 to 2.5 cm. wide.....39. *A. pennatula*.
- Fruit 0.7 to 1 cm. wide.....1. *A. cochliacantha*.
- Stipules not spinose, the spines infrastipular.
- C. Leaflets large, more than 5 mm. wide, usually 1 to 2.5 cm.
- Leaflets one pair, thick-coriaceous.....40. *A. crassifolia*.
- Leaflets 2 to many pairs, usually thin.
- Leaflets 2 or 3 pairs.....41. *A. rosei*.
- Leaflets 4 to many pairs.
- Stems densely setose-pilose.....42. *A. crinita*.
- Stems glabrous.
- Costa of the leaflets strongly excentric; fruit 3 cm. wide; plants armed with short spines.....43. *A. anisophylla*.
- Costa of the leaflets nearly central; fruit about 1.2 cm. wide; plants unarmed.
- Leaflets oblong or oval-oblong, chartaceous, the venation not prominent on the upper surface.....52. *A. penicillata*.
- Leaflets broadly oval or suborbicular, nearly as broad as long, coriaceous, the venation prominent on the upper surface.
53. *A. tequilana*.
- CC. Leaflets small, less than 5 mm. wide.
- D. Petioles without glands; flowers pedicellate; plants unarmed.
- E. Stems hirsute or pilose with long or with short and dense, spreading hairs.
- Margins of the leaflets revolute; leaflets usually pubescent on both surfaces with short curved hairs.....44. *A. polypodioides*.
- Margins of the leaflets plane; leaflets glabrous on the faces or pilose with short straight hairs.
- Pinnae 2 to 5 pairs; leaflets 10 to 13 pairs. Stems hirsute.
45. *A. leucothrix*.
- Pinnae usually 5 to 10 pairs or more; leaflets numerous.
- Venation of the lower surface of the leaflets not elevated.
- Leaflets glabrous beneath.....46. *A. villosa*.
- Venation of the lower surface of the leaflets elevated.
- Leaflets glabrous beneath, ciliate; fruit hirsute; stems sparsely hirsute.....47. *A. filicioides*.
- Leaflets pilose beneath; fruit glabrous or nearly so; stems densely short-pilose.....48. *A. elegans*.
- EE. Stems glabrous or puberulent, the pubescence of short, appressed or incurved hairs.
- Leaflets 1.5 mm. wide or narrower, oblong-linear or narrowly oblong, the venation not reticulate, although sometimes prominent.
- Venation of the lower surface of the leaflets elevated.
48. *A. elegans*.

Venation of the lower surface of the leaflets not elevated.

Pinnae usually 3 to 6 pairs; leaflets commonly 10 to 15 pairs;
leaves rarely over 5 cm. long-----49. *A. cuspidata*.

Pinnae usually 6 to 10 or more pairs; leaflets numerous; leaves
usually 8 to 10 cm. long or larger----50. *A. angustissima*.

Leaflets 2 to 7 mm. wide, oval or broadly oblong, the venation
reticulate, prominent.

Pinnae 8 to 11 pairs-----51. *A. laevis*.

Pinnae 3 to 5 pairs.

Leaflets oval-oblong, about twice as long as broad.

52. *A. penicillata*.

Leaflets quadrangular-orbicular, nearly as broad as long.

53. *A. tequilana*.

DD. Petioles with glands; flowers sessile or nearly so; plants usually
armed with spines.

Pinnae 6 to many pairs in all or most of the leaves.

Leaflets linear or oblong-linear, 1 mm. wide or narrower.

Fruit long-stipitate, glabrous or nearly so, very thin.

54. *A. paniculata*.

Fruit sessile, densely velvety-puberulent, thick.

55. *A. berlandieri*.

Leaflets oblong, or narrowly oblong, more than 1 mm. wide.

Costa of the leaflets close to the upper margin.

56. *A. glomerosa*.

Costa remote from the margin.

Leaflets thick, densely puberulent beneath; fruit subsessile,
densely puberulent, the valves thick--57. *A. subangulata*.

Leaflets thin, glabrous or nearly so; fruit stipitate, glabrate,
the valves thin-----58. *A. riparia*.

Pinnae 1 to 4 pairs.

Rachis of the leaves or pinnae armed with spines.

Leaflets glabrous, 4 or 5 pairs-----59. *A. palmeri*.

Leaflets pubescent, 6 to 14 pairs.

Leaflets 6 to 10 pairs; valves of the fruit thin.

60. *A. malacophylla*.

Leaflets 10 to 14 pairs; valves of the fruit thick.

61. *A. purpusii*.

Rachis of the leaves and pinnae unarmed.

Leaflets 1.5 mm. wide or narrower-----62. *A. occidentalis*.

Leaflets 2.5 to 5 mm. wide.

Leaflets oval-oblong, bright green-----63. *A. micrantha*.

Leaflets cuneate-oblong, glaucescent-----64. *A. roemeriana*.

1. *Acacia cochliacantha* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1081. 1806.

Mimosa campeachiana Mill. Gard. Dict. ed. 8. *Mimosa* no. 20. 1768.

Chihuahua to Baja California, Puebla, and Chiapas. South America; type
from Guayaquil, Ecuador.

Shrub or small tree, 1.5 to 4.5 meters high; spines, especially those on sterile
branches, very large, 1.5 to 5 cm. long, boat-shaped, brown or gray, those on
fertile branches mostly subulate; leaflets very numerous, 2 to 3 mm. long,
linear; flowers yellow; fruit compressed or nearly terete, usually 9 to 10 cm.
long, blackish brown, tardily dehiscent or indehiscent. "Quisache corteño,"
"quisache tepamo" (Michoacán, Guerrero); "cucharitas," "palo de cucharitas"
(Oaxaca).

The spines are very different from those of any other species. Palmer reports that a decoction of the plant is used in Sonora as a remedy for affections of the bladder.

2. *Acacia macracantha* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1080. 1806.

Mimosa lutea Mill. Gard. Dict. ed. 8. *Mimosa* no. 17. 1768.

Acacia lutea Hitchc. Rep. Mo. Bot. Gard. 4: 83. 1893. Not *A. lutea* Leavenw. 1824.

Sinaloa to Puebla and Veracruz. Central America, West Indies, and South America.

Shrub or small tree; spines 2.5 to 5 cm. long, compressed, brown or gray; leaflets numerous, linear, about 2 mm. long; flowers yellow, the heads about 8 mm. in diameter; fruit 10 to 12 cm. long, somewhat compressed, dark brown, tardily if at all dehiscent.

3. *Acacia standleyi* Safford, Journ. Washington Acad. Sci. 4: 367. 1914.

Known only from the type locality, Acaponeta, Tepic.

Shrub; spines 2.5 to 3.5 cm. long, castaneous or grayish, slightly compressed; leaflets about 3 mm. long; flowers yellow, the very dense spikes 2 cm. long.

4. *Acacia gladiata* Safford, Journ. Washington Acad. Sci. 5: 359. f. 2. 1915.

Sinaloa and Tepic; type from Rosario, Sinaloa.

Spines 3.5 to 5 cm. long, almost flat, brown or gray; leaflets 3 to 4 mm. long.

Probably only a form of *A. standleyi*.

5. *Acacia sphaerocephala* Schlecht. & Cham. Linnaea 5: 594. 1830.

Acacia veracruzensis Schenck, Repert. Sp. Nov. Fedde 12: 362. 1913.

Acacia dolichocephala Safford, Journ. Washington Acad. Sci. 5: 355. 1915.

Tamaulipas, San Luis Potosí, Veracruz, and Yucatán.

Shrub or small tree, sometimes 6 meters high; spines mostly 4 to 11 cm. long, terete or nearly so, whitish, pale brown, or yellowish; leaflets oblong-linear, 5 to 8 mm. long; flowers yellow; fruit about 5 cm. long, red or reddish brown, with a very long sharp beak. "Cornezuelo" (Tamaulipas); "zubin," "zubinché" (Yucatán, Maya).

The seeds are imbedded in abundant pulp. In this, as in the following species (nos. 6 to 10), the bull-horn acacias, the large spines are usually inhabited by ferocious ants, which enter the spines by a puncture near the apex. These ants subsist upon nectar of the large pale glands which are borne as appendages upon the tips of the leaflets.

6. *Acacia cornigera* (L.) Willd. Sp. Pl. 4: 1080. 1806.

Mimosa cornigera L. Sp. Pl. 520. 1753.

Acacia spadicigera Schlecht. & Cham. Linnaea 5: 595. 1830.

Acacia hernandezii Safford, Journ. Washington Acad. Sci. 4: 358. 1914.

Acacia furcella Safford, Journ. Washington Acad. Sci. 4: 359. 1914.

San Luis Potosí and Veracruz to Chiapas, and probably elsewhere; described from a cultivated plant of Mexican origin. Central America.

Shrub or small tree; spines 2.5 to 10 cm. long, terete or slightly compressed, varying in color from brownish yellow to almost black, often recurved or twisted; leaflets about 8 mm. long, glabrous, the nectar glands 1 to 2 mm. long; flowers yellow, the very dense thick spikes 2.5 to 4 cm. long; fruit 2.5 to 6 cm. long, red or brown at maturity. "Espino blanco" (Chiapas); "zubin," "zubinché" (Yucatán, Maya, *Seler*); "cornezuelo" (Tabasco, *Roviroso*, Nicaragua); "cuernos del toro" (Oaxaca); "árbol del cuerno" (Veracruz); "cuernitos" (Veracruz, Oaxaca); "huitzmamaxalli" of Hernández; "iscanal blanco" (El

Salvador). The name "tépame" is reported from Jalisco and Guerrero, but may refer to some other species.

The young shoots are said to be cooked and eaten, and the leaves to be used for the bites of insects, etc.

7. *Acacia hindsii*¹ Benth. Lond. Journ. Bot. 1: 504. 1842.

Acacia sinaloensis Safford, Journ. Washington Acad. Sci. 4: 365. 1914.

Acacia tepicana Safford, Journ. Washington Acad. Sci. 4: 366. 1914.

Sinaloa to Chiapas; type from Manzanillo, Colima.

Shrub or small tree; spines mostly 3 to 5 cm. long, brown, gray, or black, usually much compressed and often 2 cm. wide at base; leaflets 3 to 8 mm. long; flowers yellow, the spikes slender, 3 to 5 cm. long; fruit usually 4 to 6 cm. long, brown or blackish, beaked, more or less compressed. "Guisache corteño," "cornezuelo" (Michoacán, Guerrero); "carretadera" (Sinaloa).

The spines vary greatly in form and color in this and related species, so that it is doubtful whether they afford characters of any value for the separation of species. The bark is employed in Sinaloa as a remedy for scorpion stings.

8. *Acacia globulifera* Safford, Journ. Washington Acad. Sci. 4: 360. 1914.

Type from Tsilam, Yucatán.

Spines 3 to 4 cm. long, terete or slightly compressed, pale; leaflets 3 to 4 mm. long; flowers yellow, in small heads.

A. chiapensis Safford² is probably the same species, but since it was described from fruiting specimens and *A. globulifera* from specimens with flowers, it is impossible to be certain. *A. chiapensis* was based on specimens collected near San Fernandino, Chiapas. It is a shrub or small tree, 3 to 5 meters high.

9. *Acacia nelsonii* Safford, Journ. Washington Acad. Sci. 4: 363. 1914.

Vicinity of the type locality, Acapulco, Guerrero.

Spines 2.5 to 3.5 cm. long, grayish or brownish, polished; leaflets about 1 cm. long.

10. *Acacia collinsii* Safford, Science n. ser. 31: 677. 1910.

Acacia yucatanensis Schenck. Repert. Sp. Nov. Fedde 12: 361. 1913.

Chiapas and Yucatán; type collected between Chicoasen and San Fernandino, Chiapas.

Shrub, 3 to 4.5 meters high; spines 3 to 5 cm. long, brown or brownish, polished; leaflets about 1 cm. long; spikes very thick and dense, the flowers yellow; fruit short, slightly or not at all compressed.

11. *Acacia reniformis* Benth. in Hook. Icon. Pl. 12: 59. pl. 1165. 1875.

Known only from the type locality, banks of the Río Moctezuma, near Las Apuntas.

Glabrous shrub; pinnae 1 or 2 pairs, the leaflets one pair, orbicular-reniform, 2.5 to 3.5 cm. wide, coriaceous; stipules large, persistent; spikes 2.5 to 3.5 cm. long, lax.

¹ Richard Brinsley Hinds was an officer of H. M. S. *Sulphur*, a British ship which was engaged from 1836 to 1842 in surveying the western coast of America, the field of operations extending from Peru to Alaska. The botanical collections were obtained by Hinds, Dr. Sinclair, an officer of the ship, and George Barclay, a gardener from Kew. Plants were collected in Mexico about San Blas and Tepic, and at Cape San Lucas and Magdalena Bay, Baja California. They were reported upon by Hinds, the new species being described by Bentham.

² Journ. Washington Acad. Sci. 5: 356. 1915.

12. *Acacia sororia* Standl. Contr. U. S. Nat. Herb. 20: 186. 1919.

Querétaro; type from Higuierillas.

Leaflets one pair, oval or orbicular, 1 to 2.5 cm. long, coriaceous, puberulent; fruit strongly compressed, bivalvate, 1.5 to 2.5 cm. wide, puberulent.

13. *Acacia konzattii* Standl. Contr. U. S. Nat. Herb. 20: 186. 1919.

Known only from the type locality, Estación Almaloyas, Oaxaca, altitude 800 meters.

Pinnæ one pair, the leaflets 2 pairs, 1.5 to 2.5 cm. long; spikes long and slender.

14. *Acacia pringlei* Rose, Contr. U. S. Nat. Herb. 3: 316. 1895.

Oaxaca and Guerrero; type from Tomellín Canyon, Oaxaca.

Tree, 6 to 9 meters high; leaflets 1.5 to 5 cm. long, bright green, glabrate; spikes sometimes 12 cm. long; fruit about 15 cm. long, glabrous.

15. *Acacia californica* T. S. Brandeg. Proc. Calif. Acad. II. 3: 221. 1892.

Southern Baja California; type from La Palma.

Tree, 5 to 8 meters high, with very short stout spines; pinnæ one pair, the leaflets 2 pairs, oval or rounded, 1 to 3 cm. long, thick; flowers cream-colored, the spikes 5 to 10 cm. long. "Guamuchilillo."

16. *Acacia unijuga* Rose, Contr. U. S. Nat. Herb. 8: 32. f. 8. 1903.

Known only from the type locality, Las Palmas, San Luis Potosí.

Large tree, armed with very short spines; leaflets 2 to 3 cm. long; spikes very slender and interrupted; fruit flat, 1.7 to 2.5 cm. wide, puberulent.

17. *Acacia willardiana* Rose, Contr. U. S. Nat. Herb. 1: 88. 1890.

Prosopis heterophylla Benth. Lond. Journ. Bot. 5: 82. 1846. Not *Acacia heterophylla* Willd. 1805.

Sonora (type locality) and Baja California.

Slender unarmed tree, 3 to 5 meters high, the bark exfoliating in thin yellowish papery sheets; leaflets pale green, 2 to 6 mm. long, soon deciduous from the persistent petiole; flowers pale yellow, the spikes 3 to 6 cm. long; fruit flat, 0.8 to 1.5 cm. wide, glabrous. "Palo liso," "palo blanco" (Sonora).

18. *Acacia amentacea* DC. Prodr. 2: 455. 1825.

Acacia rigidula Benth. Lond. Journ. Bot. 1: 504. 1842.

Nuevo León, Tamaulipas, and San Luis Potosí. Southwestern Texas.

Shrub or small tree, 3 to 4.5 meters high; spines straight, sometimes 5 cm. long; pinnæ 1 pair, the leaflets few, oblong, about 1 cm. long, lustrous; spikes short, the flowers yellow, sweet-scented; fruit 3 to 4 mm. wide, compressed, brown, puberulent. "Gavia" (Tamaulipas); "chaparro prieto" (Nuevo León, Tamaulipas).

19. *Acacia bilimekii* Macbride, Contr. Gray. Herb. n. ser. 59: 6. 1919.

Acacia sericocarpa Rose, Contr. U. S. Nat. Herb. 8: 300. 1905. Not *A. sericocarpa* Fitzg. 1904.

Acacia ambigua Rose, Contr. U. S. Nat. Herb. 8: 31. f. 7. 1903. Not *A. ambigua* Hoffmg. 1826.

Morelos and Puebla; type from Matamoros, Puebla.

Low shrub, densely pubescent; spines 1 to 2 cm. long, whitish; leaflets oblong, about 1 cm. long; fruit 5 mm. wide.

20. *Acacia sonorensis* Rose, Contr. U. S. Nat. Herb. 8: 31. 1903.

Known only from the type locality, Guaymas, Sonora.

Shrub; pinnæ one pair, the leaflets 2 or 3 pairs, oblong, 6 to 12 mm. long.

21. *Acacia greggii* A. Gray, Pl. Wright. 1: 65. 1852.

Chihuahua and Coahuila; type from valley west of Patos. Western Texas to southern Arizona.

Shrub or tree, sometimes 9 meters high, with a trunk 30 cm. in diameter; pinnae 1 to 3 pairs; flowers yellowish, fragrant, the spikes 3 to 5 cm. long; fruit flat, 8 to 12 cm. long; wood hard, strong, durable, reddish brown, its specific gravity about 0.85. "Uña de gato" (Chihuahua, New Mexico, Texas, Arizona); "gatuño" (Chihuahua).

A gum similar to gum arabic, which exudes from the trunk, is used locally. The seeds were used for food by some of the Indians of Arizona and Mexico.

22. *Acacia wrightii* Benth.; A. Gray, Pl. Wright. 1: 64. 1852.

Tamaulipas to Sonora and Baja California. Western Texas (type locality) to southern California.

Shrub or tree, sometimes 9 meters high, with a trunk 30 cm. in diameter, the bark thin, broken into grayish brown scales; pinnae 2 or 3 pairs, the leaflets oblong or obovate; flowers light yellow, the spikes 3 to 5 cm. long; fruit flat, 8 to 11 cm. long, thin; wood hard, close-grained, light brown, its specific gravity about 0.94. "Uña de gato" (Nuevo León); "uña de gato negra" (Tamaulipas).

The wood is of little use except for fuel.

23. *Acacia iguana* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 281. pl. 25. 1903.

Michoacán and Guerrero; type from La Puerta.

Tree, 12 to 15 meters high, armed with short, recurved spines; leaflets oblong, 8 to 15 mm. long; flowers yellowish white, the spikes short or elongate. "Rabo de iguana."

24. *Acacia macilenta* Rose, Contr. U. S. Nat. Herb. 8: 31. 1903.

Type from Colima; a fruiting specimen from Jalisco also may belong here.

Tree, 6 meters high, the trunk 7.5 to 12.5 cm. in diameter; pinnae 25 pairs or fewer, the leaflets numerous, linear, 4 mm. long; flowers sweet-scented, the spikes 10 to 12 cm. long; fruit flat, about 11 cm. long and 2 cm. wide, very thin.

25. *Acacia millefolia* S. Wats. Proc. Amer. Acad. 21: 427. 1886.

Chihuahua to Sinaloa; type from Hacienda San José, southwestern Chihuahua. Southern Arizona.

Shrub, 3 meters high, with very short spines; leaflets numerous, linear, 3 to 7 mm. long; fruit 10 to 15 cm. long.

26. *Acacia rotundata* Benth. Trans. Linn. Soc. Bot. 30: 521. 1875.

Type from somewhere in Mexico; species not seen by the writer.

Pinnae 1 to 3 pairs; leaflets few, oblong-linear; spikes lax, about 2.5 cm. long.

27. *Acacia gaumeri* Blake, Proc. Biol. Soc. Washington 34: 44. 1921.

Known only from Yucatán, the type locality.

Tree, 8 meters high; pinnae 4 pairs; leaflets 9 to 16 pairs, oblong, appressed-pubescent beneath; spikes paniculate, 1 to 1.5 cm. long; ovary pilose.

28. *Acacia dolichostachya* Blake, Proc. Biol. Soc. Washington 34: 43. 1921.

Type from Yucatán.

Stems unarmed, glabrous; pinnae 5 pairs; leaflets 24 to 29 pairs, linear-oblong, about 3.5 mm. long; spikes 3 to 3.5 cm. long; ovary glabrous.

29. *Acacia compacta* Rose, Contr. U. S. Nat. Herb. 8: 31. 1903.

Known only from the type locality, Tomellín Canyon, Oaxaca.

Shrub, 2 to 3 meters high; pinnae 2 to 5 pairs; flowers yellow, the spikes dense, 2.5 to 3 cm. long; fruit flat, 10 cm. long, 1.5 cm. wide.

30. *Acacia mammifera* Schlecht. Linnaea 12: 563. 1838.

Known only from the type locality, Barranca de Acholoya.

Glabrate unarmed shrub; pinnae 2 to 4 pairs, the leaflets narrowly elliptic, puberulent; spikes 2.5 to 5 cm. long; fruit flat, 7.5 to 15 cm. long, 8 mm. wide.

31. *Acacia coulteri* Benth.; A. Gray, Pl. Wright. 1: 66. 1852.

Sonora to Tamaulipas and Hidalgo; type from Zimapán, Hidalgo.

Slender shrub or tree, 3 to 10 meters high, unarmed or nearly so, the trunk sometimes 60 cm. in diameter; leaflets 4 to 6 mm. long; flowers whitish, in long slender spikes; fruit about 15 cm. long and 2 cm. wide, flat. "Tepeguaje" (Durango); "palo de arco," "huajillo" (Tamaulipas).

Wood very hard; used for tool handles, general construction, and fuel.

32. *Acacia acatlensis* Benth. Lond. Journ. Bot. 1: 513. 1842.

Acacia sericea Mart. & Gal. Bull. Acad. Brux. 10²: 309. 1843.

Acacia pueblensis T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 85. 1910.

Jalisco to Oaxaca, Veracruz, and Yucatán; type from Acatlán.

Tree, 3 to 8 meters high, armed with short stout spines, or sometimes unarmed; leaflets oblong-linear, 2 to 5 mm. long; flowers white, in long spikes. "Guayolote" (Michoacán).

33. *Acacia glandulifera* S. Wats. Proc. Amer. Acad. 25: 147. 1890.

Coahuila; type from Carneros Pass.

Shrub, about 60 cm. high; spines stout, about 1 cm. long; leaflets few, 2 to 3 mm. long; flower heads 5 to 7 mm. in diameter; fruit 6 to 8 cm. long, about 7 mm. wide, very rough.

34. *Acacia biaciculata* S. Wats. Proc. Amer. Acad. 21: 452. 1886.

Chihuahua; type from sandy plains near the city of Chihuahua.

Shrub, the prostrate branches a meter long or shorter; spines very slender, 1 to 1.5 cm. long; leaflets few, 3 to 4 mm. long; flowers orange, in small long-pedunculate heads; fruit 3 to 4 cm. long, 4 mm. wide, compressed, falcate, pubescent.

35. *Acacia constricta* Benth.; A. Gray, Pl. Wright. 1: 66. 1852.

Sonora to Tamaulipas, Puebla, and Zacatecas, on dry plains and hillsides, often forming extensive thickets. Western Texas (type locality) to southern Arizona.

Shrub, 1 to 6 meters high, with reddish brown branches; spines 1 to 2.5 cm. long; leaflets mostly 2 to 3 mm. long; flowers yellow, sweet-scented; fruit 6 to 12 cm. long, 3 to 4 mm. wide, constricted between the seeds. "Huisache" (Zacatecas, Coahuila, etc.); "gigantillo," "vara prieta," "chaparro prieto" (Durango, *Patoni*); "largoncillo" (Chihuahua).

36. *Acacia vernicosa* Standl. Contr. U. S. Nat. Herb. 20: 187. 1919.

Sonora and Chihuahua to Zacatecas and Querétaro; type from Santa Rosalia, Chihuahua. Western Texas to southern Arizona.

Shrub, 1 to 2 meters high, similar to the preceding species.

37. *Acacia farnesiana* (L.) Willd. Sp. Pl. 4: 1083. 1806.

Mimosa farnesiana L. Sp. Pl. 521. 1753.

Vachellia farnesiana Wight & Arn. Prodr. Fl. Ind. Orient. 272. 1834.

Nearly throughout Mexico. Widely distributed in tropical and subtropical regions of both hemispheres; probably adventive in the Old World; type from Santo Domingo.

Shrub or tree, 1 to 9 meters high, the short trunk sometimes 45 cm. in diameter, the branches spreading or drooping; bark thin, peeling off in long, reddish brown scales; spines 1 to 2.5 cm. long; leaflets 2 to 6 mm. long; flowers bright yellow, very sweet-scented; fruit dark brown or purplish; wood hard, close-grained, brownish red to yellow, its specific gravity about 0.83. "Binorama" or "vinorama" (Sonora, Baja California, Sinaloa); "huisache" or "huizache"

(Nuevo León, Tamaulipas, Jalisco, Querétaro, Durango, Coahuila, Texas, etc.; from the Nahuatl *huitz-axin*); "guisache yondi" (Michoacán, Guerrero); "quisache" (Chiapas); "huisache de la semilla," "huixachin," "uisatsin" (Morelos, Oaxaca, *Seler*); "xkantiriz" (Yucatán, Maya); "matitas" (*Ramírez*); "fiñisachi" (Guanajuato, *Dugès*); "bihi" (Oaxaca, Zapotec, *Reko*); "espino" (Oaxaca); "aroma" or "aromo" (Yucatán, Nicaragua, Costa Rica, Porto Rico, Colombia, Peru, Philippines, etc.); "zubín," "zubin-ché" (Yucatán, Maya, *Seler*); "gabia" or "gavia" (Durango, *Patoni*); "subín" (Honduras *Pittier*); "aroma amarilla" (Cuba); "espino blanco" (Guatemala, El Salvador); "cachito de aroma" (Nicaragua); "cuji" (Venezuela); "cuji cimarrón," "pelá," "uña de cabra" (Colombia); "espinillo" (Argentina, Uruguay). Known in the southern United States as "opoponax."

In many parts of Mexico the plant is found chiefly about dwellings and seems to be naturalized, but in other regions it appears to be native. The wood is used for many purposes. The bark and fruit contain tannin and are used for tanning and dyeing, and the fruit is often used for making ink. The viscous juice of the pods is employed in some places for mending broken china. The gum which exudes from the trunk is employed locally in making mucilage; it is very similar to gum arabic. The leaves are of value as forage for stock, especially in winter. In southern Europe the plant is cultivated extensively for the flowers (known in commerce as cassie flowers), from which perfume is manufactured. As much as 100,000 pounds of them are harvested annually about Grasse, France. In tropical America the flowers are often laid among linen to impart their perfume to it. An ointment made from the flowers is used in Mexico as a remedy for headache, and their infusion for dyspepsia. The green fruit is very astringent, and a decoction is employed for dysentery, inflammation of the skin and mucous membrane, etc. *Seler* reports even that in San Luis Potosí a decoction of the roots is employed as a supposed remedy for tuberculosis. The pulverized dried leaves are sometimes applied as a dressing to wounds.

This is probably the plant reported from Baja California by Clavigero as "huisache." The pods, he states, were used there for making ink. Cattle, he says, are fond of the tender branches, but these impart a bad flavor to their flesh.

• 38. *Acacia tortuosa* (L.) Willd. Sp. Pl. 4: 1083. 1806.

Mimosa tortuosa L. Syst. Nat. ed. 10. 1312. 1759.

Prosopis microphylla H. B. K. Nov. Gen. & Sp. 6: 308. 1823.

Acacia subtortuosa Shafer in Britton, N. Amer. Trees 524. f. 485. 1908.

Durango to Tamaulipas, Hidalgo, and Colima. Western Texas; West Indies.

Shrub or tree, 1 to 6 meters high, the trunk sometimes 15 cm. in diameter; bark deeply fissured, blackish brown; spines 1 to 2 cm. long, whitish; pinnae 3 or 4 pairs, the leaflets 2 to 4 mm. long; flowers yellow, sweet-scented, the heads about 1 cm. in diameter; fruit reddish brown. "Huisache" (Durango, Aguascalientes); "huisache chino" (Jalisco).

39. *Acacia pennatula* (Schlecht. & Cham.) Benth. Lond. Journ. Bot. 1: 390. 1842.

Inga pennatula Schlecht. & Cham. Linnaea 5: 593. 1830.

Sonora to Tamaulipas and Chiapas; type from Hacienda de la Laguna, Veracruz. Guatemala and Nicaragua.

Shrub or tree, 3 to 6 meters high, copiously pubescent; spines short and stout; pinnae very numerous, the leaflets crowded, 1 to 2 mm. long; flowers yellow or orange, very fragrant, in rather large heads; fruit 7 to 13 cm. long, compressed, dark brown, with very thick hard valves. "Tepame" (Jalisco);

"quisache tepano" (Michoacán, Guerrero); "algarroba" or "algarrobo" (Sonora, Oaxaca); "espino" (Sinaloa).

The bark is sometimes employed as a remedy for indigestion, and the wood for making charcoal.

40. *Acacia crassifolia* A. Gray, Mem. Amer. Acad. 5: 317. 1854.

Coahuila and San Luis Potosí; type from La Peña, Coahuila.

Branches reddish brown, glaucous when young, armed with few very small spines; leaflets rounded or subreniform, 2 to 5 cm. wide, glabrous, very thick, with prominent venation; heads racemose; fruit thick, about 7 cm. long and 2 cm. wide, slightly curved, glaucous.

41. *Acacia rosei* Standl. Contr. U. S. Nat. Herb. 20: 187. 1919.

Sinaloa; type locality, Mazatlán.

Pinnae 2 pairs, the leaflets oval, 2 to 4.5 cm. long, thin, glabrate; flowers white; fruit flat, very thin, about 1 cm. wide. "Day."

42. *Acacia crinita* T. S. Brandeg. Zoe 5: 198. 1905.

Sonora and Sinaloa; type from Culiacán.

Low shrub, the stems covered with stiff yellowish hairs 5 mm. long; leaflets oval, 1.2 to 2 cm. long, glabrous, pale beneath; flowers white.

43. *Acacia anisophylla* S. Wats. Proc. Amer. Acad. 21: 452. 1886.

Known only from the type locality, mountain canyons near Jimulco, Coahuila.

Small tree, sparsely armed with short straight spines; pinnae 1 to 3 pairs, the leaflets 4 to 7 pairs, oblong, 6 to 14 mm. long; fruit compressed but very thick, 10 to 12 cm. long, somewhat glaucous.

44. *Acacia polypodioides* Standl. Contr. U. S. Nat. Herb. 20: 184. 1919.

Oaxaca and Chiapas; type from Chiapa, Chiapas. Nicaragua.

Unarmed shrub, copiously pilose; leaflets numerous, 3 to 5 mm. long; flowers white; fruit flat, thin, 8 to 11 mm. wide, pubescent.

45. *Acacia leucothrix* Standl. Contr. U. S. Nat. Herb. 20: 185. 1919.

Tamaulipas and San Luis Potosí; type from San Dieguito, San Luis Potosí.

Shrub, copiously hirsute; leaflets few, about 3 mm. long; flowers white, the heads axillary, slender-pedunculate; fruit flat, thin, about 4.5 cm. long and 7 mm. wide, brown, glabrate.

46. *Acacia villosa* (Swartz) Willd. Sp. Pl. 4: 1067. 1806.

Mimosa villosa Swartz, Fl. Ind. Occ. 2: 982. 1800.

Acacia hirsuta Schlecht. Linnaea 12: 572. 1838.

? *Acacia stipellata* Schlecht. Linnaea 12: 574. 1838.

Coahuila and Nuevo León to Oaxaca and Chiapas. West Indies and Central America; southern United States; type from Jamaica.

Erect unarmed shrub, pubescent or glabrate; leaflets linear, 3 to 5 mm. long; flowers white; fruit flat, thin.

47. *Acacia filicioides* (Cav.) Trel. Rep. Ark. Geol. Surv. 1888⁴: 178. 1891.

Mimosa filicioides Cav. Icon. Pl. 1: 55. pl. 78. 1791.

Acacia filicina Willd. Sp. Pl. 4: 1072. 1806.

Acacia carbonaria Schlecht. Linnaea 12: 571. 1838.

Guerrero to Veracruz; type from somewhere in Mexico.

Shrub, more or less hirsute throughout; leaflets oblong-linear, 3 to 5 mm. long; flowers white; fruit flat, thin, about 5 cm. long and 1 cm. wide.

It is possible that the name *filicioides* really applies to the plant here listed as *A. villosa*, but Cavanilles's plate seems to agree better with the present plant.

48. *Acacia elegans* Schlecht. Linnaea 12: 569. 1838.

Tepic to Guerrero and Morelos; type from Regla, Hidalgo.

Shrub or small tree, 2.5 to 5 meters high, unarmed; leaflets linear, 3 to 5 mm. long; flowers white; fruit thin, flat, straight, about 1 cm. wide.

49. *Acacia cuspidata* Schlecht. Linnaea 12: 573. 1838.

Chihuahua to Zacatecas and Puebla; type collected near Mexico City. Texas to Arizona.

Low shrub, unarmed; leaflets oblong, 2 to 4 mm. long; flowers white; fruit thin, flat, about 6 mm. wide, brown.

It is not certain that the name *cuspidata* really belongs to the plant to which it is applied here.

50. *Acacia angustissima* (Mill.) Kuntze, Rev. Gen. Pl. 3²: 47. 1898.

Mimosa angustissima Mill. Gard. Dict. ed. 8. *Acacia* no. 19. 1768.

Acacia glabrata Schlecht. Linnaea 12: 569. 1839.

Acacia elegans Mart. & Gal. Bull. Acad. Brux. 10²: 312. 1843.

Acacia insignis Mart. & Gal. Bull. Acad. Brux. 10²: 315. 1843.

Distributed almost throughout Mexico; type from Campeche. Central America; southern United States.

Shrub or small tree, 2 to 4 meters high, unarmed, pubescent or glabrate; leaflets mostly 3 to 5 mm. long; flowers white, the heads axillary or racemose; fruit thin, flat, brown. The following names are reported for this and the closely related species (nos. 42-48): "Xaax" (Yucatán, Maya); "timbe" (Baja California, Oaxaca, San Luis Potosí); "cantemó" (Tabasco); "guajillo" (Sinaloa); "palo de pulque" (Oaxaca).

In Oaxaca the bark is used for tanning skins and for inducing fermentation in *tepache*.

51. *Acacia laevis* Standl. Contr. U. S. Nat. Herb. 20: 185. 1919.

Known only from the type locality, near Guadalajara, Jalisco.

Plants glabrous, unarmed; leaflets numerous, 4 to 5 mm. long, pale beneath; flower heads in long racemes.

52. *Acacia penicillata* Standl. Contr. U. S. Nat. Herb. 20: 185. 1919.

Jalisco and Oaxaca; type from Cerro de San Felipe, Oaxaca.

Pinnae 3 to 5 pairs, the leaflets 8 to 13 mm. long; flower heads racemose, about 2 cm. in diameter; fruit flat, about 8 cm. long and 1.2 cm. wide, glabrous, glaucescent.

53. *Acacia tequilana* S. Wats. Proc. Amer. Acad. 22: 409. 1887.

Durango, Jalisco, and San Luis Potosí; type from Tequila, Jalisco.

Glabrous shrub, 1.5 to 3 meters high, unarmed; leaflets 0.8 to 2.5 cm. long; flowers white, the heads in long naked racemes; fruit 4.5 cm. long and nearly 1 cm. wide, flat, thin, glaucescent.

54. *Acacia paniculata* Willd. Sp. Pl. 4: 1074. 1806.

Acacia picachensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 179. 1915.

Michoacán to Oaxaca. West Indies and South America; type from Brazil.

Shrub or small tree, sometimes scandent, armed with short recurved spines; leaflets very numerous, 3 to 5 mm. long, glabrous; flowers white; fruit flat, 8 to 15 cm. long, 2 to 2.5 cm. wide, brown, glabrous. "Rabo de iguana" (Michoacán, Guerrero); "rabo de lagarto," "espino" (Oaxaca); "tocino" (Cuba).

55. *Acacia berlandieri* Benth. Lond. Journ. Bot. 1: 522. 1842.

Acacia tephroloba A. Gray, Pl. Wright. 1: 65. 1852.

Coahuila to Veracruz and Querétaro; type from Nuevo León. Western Texas.

Shrub, 1 to 4.5 meters high, pubescent, armed with short spines; leaflets numerous, 3 to 6 mm. long; flowers white, sweet-scented; fruit flat, 9 to 16 cm. long, 2 to 3 cm. wide, straight or curved, very densely velvety-puberulent.

"Huajillo" (Coahuila, Tamaulipas, Nuevo León, Texas; sometimes written "huajilla" or "guajilla"); "mimbres," "matorral" (Tamaulipas).

Wood sometimes used for tool handles and other small objects, also for fuel.

56. *Acacia glomerosa* Benth. Lond. Journ. Bot. 1: 521. 1842.

Veracruz. Central America and South America.

Shrub or small tree, often scandent, armed with numerous very short spines; leaflets numerous, about 1 cm. long; flower heads small, numerous, racemose-paniculate.

Acacia laccifera Villada (Naturaleza II. 2: 487. pl. 30. 1896) is probably a synonym of this species.

57. *Acacia subangulata* Rose, Contr. U. S. Nat. Herb. 5: 194. 1899.

Puebla and Oaxaca; type from limestone hills near Tehuacán, Puebla.

Tree, 4.5 to 6 meters high, armed with short stout straight spines; leaflets numerous, 7 to 13 mm. long; flower heads mostly racemose-paniculate; fruit about 10 cm. long and 2.5 cm. wide.

58. *Acacia riparia* H. B. K. Nov. Gen. & Sp. 6: 276. 1823.

Sinaloa to Guerrero, San Luis Potosí, and Yucatán. West Indies, Central America, and South America; type from Brazil.

Scandent shrub, armed with short recurved spines; leaflets 5 to 7 mm. long; flowers yellowish white; fruit about 9 cm. long and 2 cm. wide, flat, often glaucescent. "Tlahuitol" (San Luis Potosí, *Urbina*); "zarza" (Porto Rico); "rasga-rasga," "panelo," "toldillo" (Colombia); "yax-catzim" (Yucatán, Maya); "gatuño blanco" (Sinaloa).

59. *Acacia palmeri* S. Wats. Proc. Amer. Acad. 17: 350. 1882.

Known only from the type locality, in the Sierra Madre south of Saltillo, Coahuila.

Shrub, nearly glabrous, armed with short spines; pinnae 1 or 2 pairs, the leaflets 6 to 8 mm. long; flower heads axillary.

60. *Acacia malacophylla* Benth.; A. Gray, Pl. Wright. 1: 64. 1852.

Coahuila and Nuevo León. Western Texas (type locality).

Shrub, armed with short spines; leaflets about 7 mm. long; fruit flat, about 8 cm. long and nearly 2 cm. wide, glabrous.

61. *Acacia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 380. 1909.

Known only from the type locality, San Luis Tultitlanapa, Puebla.

Shrub, armed with short stout recurved spines; leaflets about 8 mm. long, glabrate, with prominent venation; fruit about 8 cm. long and 2 cm. wide, falcate, stipitate, glabrate.

62. *Acacia occidentalis* Rose, Contr. U. S. Nat. Herb. 8: 32. 1903.

Sonora (type locality) and Sinaloa; perhaps also in Chihuahua.

Shrub or tree, 2 to 12 meters high, armed with short stout dark spines; leaflets 2 to 3 mm. long; flowers white or nearly so; fruit thin, flat, about 7 cm. long and 2 cm. wide. "Désota" (tésota ?) (Sonora).

63. *Acacia micrantha* Benth. Trans. Linn. Soc. Bot. 30: 526. 1875.

Tamaulipas and San Luis Potosí.

Shrub, armed with short spines; leaflets 7 to 11 mm. long; flower heads slender-pedunculate, axillary or racemose; fruit flat, thin, about 6 cm. long and 1.8 cm. wide, glabrous, rounded at apex.

64. *Acacia roemeriana* Scheele, Linnaea 21: 456. 1848.

Chihuahua and Coahuila; Baja California. Western Texas (type locality).

Shrub, 1 to 2 meters high, armed with short, mostly recurved spines; leaflets 7 to 15 mm. long; flower heads mostly axillary; fruit flat, thin, about 7 cm. long and 1.5 cm. wide, often falcate, glabrous.

This is considered a valuable honey plant in western Texas.

DOUBTFUL SPECIES.

ACACIA CYLINDRIFLORA Mart. & Gal. Bull. Acad. Brux. 10³: 313. 1843. Type from Oaxaca. Probably a *Mimosa*.

ACACIA FEROX Mart. & Gal. Bull. Acad. Brux. 10³: 314. 1843.

ACACIA LANATA Mart. & Gal. Bull. Acad. Brux. 10³: 315. 1843. Type from Mixteca Alta.

ACACIA MOLLICULA Mart. & Gal. Bull. Acad. Brux. 10³: 315. 1843. Type from Tehuacán, Puebla. Flowers said to be pink. Probably of some other genus.

10. CALLIANDRA Benth. in Hook. Journ. Bot. 2: 138. 1840.

Unarmed shrubs or small trees, or sometimes herbs; leaves bipinnate, the leaflets small or large; stipules usually persistent; flowers in dense heads, often rather large and showy, red or white, the stamens long-exserted; fruit flat, usually straight, the valves recurved after dehiscence.

The names "plumita" (Oaxaca) and "gavia" (Durango) are reported for undetermined species of the genus.

Leaflets 2 to 4 to each pinna, mostly 2 to 7 cm. long; pinnae usually 2 pairs.

Leaflets pinnately nerved, lanceolate or narrowly lanceolate.....1. *C. laevis*.

Leaflets palmately nerved, with 2 or more distinct nerves rising from the base.

Corolla pubescent.....2. *C. canescens*.

Corolla glabrous.....3. *C. emarginata*.

Leaflets 5 to many to each pinna, often very small; pinnae 1 to many pairs.

Heads of flowers in long terminal racemes; flowers pedicellate; filaments red or purple.

Leaflets not falcate, rounded or very obtuse at apex; pinnae usually 15 to 20 pairs.

Corolla appressed-pilose.....4. *C. anomala*.

Corolla glabrous.....5. *C. calothyrsus*.

Leaflets falcate, usually acute; pinnae usually 7 to 12 pairs.

Corolla about 16 mm. long, white outside with dense appressed hairs.

6. *C. palmeri*.

Corolla 5 to 11 mm. long, not white outside, the pubescence mostly of brownish hairs.....7. *C. houstoniana*.

Heads of flowers mostly axillary, never racemose; flowers sessile or nearly so.

Pinnae one pair, the leaflets large, 1 to 2.5 cm. wide.....9. *C. konzattii*.

Pinnae 2 or more pairs, or if a single pair the leaflets 5 mm. wide or narrower.

Leaflets variously pubescent beneath.

Leaflets large, most of them 0.8 to 2.5 cm. wide, membranaceous.

17. *C. penduliflora*.

Leaflets small, less than 5 mm. wide, often coriaceous.

Plants low, less than 20 cm., woody only at the base.

16. *C. humilis*.

Plants usually large, woody throughout.

Leaflets oval or obovate-oval.....18. *C. malacophylla*.

Leaflets oblong or narrowly oblong.

Pinnae usually 8 to 10 pairs; leaflets somewhat tomentose beneath with somewhat matted, curled hairs.....8. *C. nitida*.

Pinnae 1 to 6 pairs; leaflets pilose beneath with mostly straight appressed hairs.

Corolla glabrous or nearly so, greenish.

Pinnae 1 or 2 pairs; leaflets 6 to 10 pairs...20. *C. angelica*.

Pinnae 4 to 6 pairs; leaflets 20 or more pairs...21. *C. laxa*.

Corolla copiously pubescent, usually purple.

Corolla 4 to 4.5 mm. long-----10. *C. eriophylla*.

Corolla 6 to 7 mm. long.

Leaflets usually 8 to 10 pairs, oblong--11. *C. californica*.

Leaflets usually 12 to 20 pairs, narrowly oblong.

Pods densely pubescent with spreading hairs; pinnae usually 3 or 4 pairs-----12. *C. cumingii*.

Pods sparsely pubescent with appressed hairs; pinnae 4 to 6 pairs-----13. *C. peninsularis*.

Leaflets glabrous beneath, but often ciliate.

Plants low, usually less than 20 cm. high, woody only at the base.

Pinnae 2 to 4 pairs; leaflets oval or broadly oblong, not conspicuously if at all ciliate-----15. *C. reticulata*.

Pinnae 5 to 9 pairs; leaflets oblong or narrowly oblong, often long-ciliate-----16. *C. humilis*.

Plants usually tall shrubs, often woody throughout.

Pinnae a single pair in all the leaves; leaflets very small, oval or obovate-oval-----19. *C. unijuga*.

Pinnae 2 or more pairs in all or most of the leaves (rarely a single pair, the leaflets then oblong).

Leaflets coriaceous; calyx shallowly dentate-----14. *C. bijuga*.

Leaflets membranaceous; calyx deeply lobate.

Branches quadrangular-----22. *C. tetragona*.

Branches terete.

Pinnae 2 pairs in most of the leaves.

Leaflets usually 10 to 13 pairs, oblong or narrowly oblong.

23. *C. oaxacana*.

Leaflets usually 5 to 7 pairs, oval to broadly oblong.

24. *C. formosa*.

Pinnae 3 or more pairs in most of the leaves.

Leaflets usually 8 to 15 pairs or more, 2 to 6 mm. wide.

25. *C. portoricensis*.

Leaflets 3 to 6 pairs, 10 to 20 mm. wide-----26. *C. capillata*.

1. *Calliandra laevis* Rose, Contr. U. S. Nat. Herb. 5: 194. 1899.

Sinaloa and Tepic; type from Colomas, Sinaloa.

Shrub; leaflets 4, lanceolate, 4.5 to 9 cm. long, bright green, glabrous.

2. *Calliandra canescens* (Schlecht. & Cham.) Benth. Lond. Journ. Bot. 3: 96. 1844.

Inga canescens Schlecht. & Cham. Linnaea 5: 592. 1830.

Calliandra purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 180. 1915.

Veracruz and Oaxaca; type collected near Puente del Rey. Guatemala.

Shrub, 1.5 to 2.5 meters high; leaflets 1 to 3.5 cm. long; flowers white.

3. *Calliandra emarginata* (Humb. & Bonpl.) Benth. Lond. Journ. Bot. 3: 95. 1844.

Inga emarginata Humb. & Bonpl.; Willd. Sp. Pl. 4: 1009. 1806.

Calliandra rupestris T. S. Brandeg. Zoe 5: 199. 1905.

Tamaulipas and Sonora to Oaxaca and Veracruz; type from Acapulco, Guerrero.

Shrub; leaflets 2 to 8.5 cm. long, very variable in shape, acute to rounded at apex; flowers purplish red or greenish; fruit about 12 mm. wide.

The specimens seen exhibit a large amount of variation, and it may be that several species are represented. Without more ample material it seems unwise to make any segregates.

4. *Calliandra anomala* (Kunth) Macbride, Contr. Gray Herb, n. ser. 59: 4 1919.

Inga anomala Kunth, Mimos. Pl. Légum. 70. pl. 22 1819-24.

Acacia callistemon Schlecht. Linnaea 12: 568. 1838.

Calliandra kunthii Benth. in Hook. Journ. Bot. 2: 139. 1840.

Chihuahua to Sinaloa, Mexico, and Chiapas. Guatemala.

Shrub, 1 to 4.5 meters high, with blackish bark; leaflets very numerous, linear-oblong, 2.5 to 5 mm. long; flowers purple, showy; fruit densely hirsute or hispid. "Cabeza de ángel" (Mexico); "cabellos de ángel" (Guanajuato, Costa Rica, Guatemala, Honduras); "pambetano" (Morelos, Valley of Mexico, Veracruz); "cabellitos de ángel" (Morelos); "cabellitos de una vara" (Morelos, Ramírez); "hierba del ángel," "lele" (various localities, Ramírez); "tepachera" "timbrillo" (Valley of Mexico, Ramírez); "tepexiloxochitl" or "tepejiloxochitl" (=mountain+corn silk+flower), "texoxochitl" "tlacoxiloxochitl" (=rod or bush+corn silk+flower), "tlamacazatzotl," "tzonxochitl," "xiloxochitl," "xiloxochicuahuatl" (the shrub) (Nahuatl); "canela," "hierba de canela" (Oaxaca, Reko); "coquito" Oaxaca, Seler); "carboncillo" (Costa Rica); "cabellito" (Sinaloa).

The plant is sometimes used for tanning. The root is used to retard fermentation in a drink, "tepache," made from pulque and coarse sugar. The plant is said to contain a glucoside, calliandrine. In domestic medicine it is used for fevers, especially malaria, although experiments have indicated that its reputation for this purpose is not justified.

The plant is treated at length by Hernández¹ in a chapter entitled "De *Tlacoxiloxochitl* flore Barbato," which is accompanied by three good figures. His account is as follows: "*Tlacoxiloxochitl*, which some call *Tentzonxochitl* [=beard-flower], some *Tlamacazcatacotl* [=priest-bush], and others *Tepexiloxochitl* or *Tlalxilochtl* [=dwarf hair-flower], is a shrub with leaves like mesquite. The flowers are like long red hair, and they come from round reddish berries. The root is fibrous, yellow outside, and red within when it is cut. The stalks are red and the pods yellow. It grows in level or mountainous places and sometimes along streams. The root bark is dry and astringent and somewhat glutinous; its nature is hot, in the third order, and its flavor sharp. The flowers, crushed, mixed with water, and used as drops, are a wonderful remedy for diseases of the eye, for they correct inflammation and remove morbid growths, and heal ulcers. If the decoction or infusion of the juice is drunk, it stops diarrhoea and dysentery, stimulates the appetite, and relieves indigestion. There be those who say also that it soothes the chest, relieves the belly, removes the bile by vomiting, and is also a remedy for coughs."

This species has usually been known as *Calliandra grandiflora* (L'Hér) Benth., but as pointed out recently by Macbride² that name can scarcely apply to the common Mexican species. Macbride states that "There is no reasonable doubt but that it is rather referable to *C. houstoni* (L'Hér.) Benth.," but the same objections that prevent its application to the common Mexican plant also prevent its reference to synonymy under the latter species.

5. *Calliandra calothyrsus* Meissn. Linnaea 21: 251. 1848.

Chiapas, Central America and northern South America; type from Surinam.

Erect shrub, nearly glabrous; leaflets very numerous, 3 to 7 mm. long, linear.

6. *Calliandra palmeri* S. Wats. Proc. Amer. Acad. 22: 410. 1887.

Known only from the type locality, Guadalajara, Jalisco.

¹ Thesaurus 104. 1651.

² Contr. Gray Herb. n. ser. 59: 5. 1919.

Shrub, 1 to 1.5 meters high, the stems densely white-pilose; leaflets 6 to 8 mm. long, coriaceous, lustrous on the upper surface, white-pilose beneath.

7. *Calliandra houstoniana* (Mill.) Standl.

Mimosa houstoniana Mill. Gard. Dict. ed. 8. *Mimosa* no. 16. 1768.

Mimosa houstoni L'Hér. Sert. Angl. 30. 1788.

Acacia houstoni Willd. Sp. Pl. 4: 1062. 1806.

Acacia metrosideriflora Schlecht. Linnaea 12: 567. 1838.

Calliandra houstoni Benth. in Hook. Journ. Bot. 2: 139. 1840.

Sonora to Tamaulipas and Chiapas; type from Veracruz. Guatemala and Honduras.

Shrub or small tree, 1 to 6 meters high, pubescent or glabrate; bark red-brown; leaflets 4 to 7 mm. long, the upper surface with a metallic luster; flowers purplish red, large and showy; fruit about 1.5 cm. wide, densely brown-hirsute. "Charamusco" (Tabasco); "hierba burro" (Chiapas); "pambotano" (southern Mexico); "day," "tabardillo" (Sinaloa). Probably the names reported for *C. anomala* apply also to this species.

The same properties are attributed to this as to *C. anomala*. The bark is chewed to harden the gums (in Sinaloa). According to the U. S. Dispensatory, the root bark, under the name of "pambotano bark" (sometimes written erroneously as "pandotano") has been highly recommended in Europe as an anti-periodic. It is said also to contain an alkaloid which produces death by systolic arrest of the heart.

8. *Calliandra nitida* S. Wats. Proc. Amer. Acad. 22: 410. 1887.

Zacatecas, Jalisco, and Tepic; type from Río Blanco, Jalisco.

Shrub, 1 meter high or less, copiously pubescent; leaflets 4 to 7 mm. long, with a metallic luster; flowers purplish red. "Potosina" (Jalisco).

9. *Calliandra konzattii* Standl. Contr. U. S. Nat. Herb. 20: 188. 1919.

Known only from the type locality, Río de Pillas, Oaxaca, altitude 300 meters.

Leaflets 5 to 7, obliquely ovate or elliptic, 2.5 to 6 cm. long, acute or obtuse, bright green, glabrate; flowers very small, greenish.

Perhaps not of this genus but rather a *Pithecollobium*.

10. *Calliandra eriophylla* Benth. Lond. Journ. Bot. 3: 105. 1844.

Calliandra chamaedrys Engelm.: A Gray, Mem. Amer. Acad. II. 4: 39. 1849.

Calliandra conferta Benth.; A. Gray, Pl. Wright. 1: 63. 1852.

Sonora to Coahuila and Puebla; type from Chila. Puebla. Western Texas to southern Arizona.

Shrub, commonly about 30 cm. high, usually densely branched, the branches stiff, gray; leaflets few, 3 to 4 mm. long; heads few-flowered, the flowers purple; fruit 5 mm. wide, pubescent.

11. *Calliandra californica* Benth. Bot. Voy. Sulph. 14. pl. 11. 1844.

Baja California, on dry stony hillsides, often abundant; type from Magdalena Bay.

Stiff, densely branched shrub, 1 to 2 meters high; leaflets 4 to 13 mm. long, thick, pale; flowers purplish red; fruit about 7 mm. wide.

12. *Calliandra cumingii* Benth. in Hook. Journ. Bot. 2: 140. 1840.

Calliandra cumingii galeottii Benth. Lond. Journ. Bot. 3: 106. 1844.

Inga speciosa Mart. & Gal. Bull. Acad. Brux. 10²: 320. 1843.

Puebla and Oaxaca. Type from Colombia.

Shrub, 30 to 60 cm. high; leaflets 1 cm. long or shorter; flowers purplish red, the heads long-pedunculate.

The writer has seen no Colombian material, and it may be that the Mexican plant represents a different species. If so, the name published by Martens and Galeotti is available.

13. *Calliandra peninsularis* Rose, Contr. U. S. Nat. Herb. 5: 135. 1897.

Baja California; type from La Paz.

Densely branched shrub; leaflets 4 to 9 mm. long; flowers purple; fruit about 8 mm. wide. "Tabardillo," "zapotillo."

Roots used as a remedy for fevers.

14. *Calliandra bijuga* Rose, Contr. U. S. Nat. Herb. 5: 135. 1897.

Jalisco to Veracruz and Chiapas; type from Acapulco, Guerrero.

Shrub or tree, the trunk sometimes attaining a diameter of 20 cm.; pinnae 1 or 2 pairs, the leaflets numerous, 7 to 16 mm. long, bright green, lustrous; flowers purple; fruit about 1 cm. wide.

Closely related to *C. magdalenae* (Bert.) Benth., and doubtfully distinct.

15. *Calliandra reticulata* A. Gray, Pl. Wright. 2: 53. 1853.

Chihuahua to Jalisco and Puebla. Southern Arizona and New Mexico; type from Santa Rita, New Mexico.

Leaflets 4 to 10 mm. long, very thick, with prominent venation; flowers purple; fruit about 7 mm. wide, glabrous.

This and *C. humilis* are low plants, usually 10 to 20 cm. high, and scarcely deserve to be classed as shrubs, being herbaceous except at the base.

16. *Calliandra humilis* (Schlecht.) Benth. Lond. Journ. Bot. 5: 103. 1846.

Acacia humilis Schlecht. Linnaea 12: 567. 1838.

Calliandra herbacea Engelm.; A. Gray, Mem. Amer. Acad. II. 4: 39. 1849.

Sonora to Zacatecas and Jalisco; type from Regla, Hidalgo. Southern Arizona and New Mexico.

Leaflets 6 mm. long or shorter; fruit about 6 mm. wide, pubescent or glabrate.

17. *Calliandra penduliflora* Rose, Contr. U. S. Nat. Herb. 5: 193. 1899.

Durango to Oaxaca and Veracruz; type from Bolaños, Jalisco.

Shrub, 1.5 to 4.5 meters high; leaflets mostly 1 to 3 cm. long, rounded at apex; flowers white, the heads slender-pedunculate, the stamens very long and slender; fruit 6 to 10 cm. long, about 7 mm. wide, glabrous.

18. *Calliandra malacophylla* Benth. Lond. Journ. Bot. 3: 100. 1844.

Calliandra unijuga pueblensis Macbride, Contr. Gray. Herb. n. ser. 59: 4. 1919.

Puebla and Oaxaca; type from Monte San Felipe.

Stiff, densely branched shrub with brownish bark; leaflets few, 5 to 7 mm. long, pubescent; flowers white.

19. *Calliandra unijuga* Rose, Contr. U. S. Nat. Herb. 50: 193. 1899.

Puebla and Oaxaca; type from Cuicatlán, Oaxaca.

Shrub, 1 to 2.5 meters high.

Very similar to the last species except in the lack of pubescence, and probably only a form of it. The two plants sometimes grow together, for on one sheet examined (Rose 9885, from Puebla) both are associated under the same number.

20. *Calliandra angelica* Benth. Lond. Journ. Bot. 3: 100. 1844.

Known only from the type locality, Regla, Hidalgo.

Not seen by the writer. Vernacular name given as "cabellito de ángel."

21. *Calliandra laxa* Benth. Trans. Linn. Soc. Bot. 30: 551. 1875.

Acacia laxa Willd. Sp. Pl. 4: 1069. 1806.

Acacia rubescens Mart. & Gal. Bull. Acad. Brux. 10²: 315. 1843.

Calliandra xalapensis Benth. Lond. Journ. Bot. 3: 106. 1844.

Veracruz to Guerrero and Oaxaca. Northern South America; type from Venezuela.

Erect shrub, pubescent or glabrate; leaflets 4 to 7 mm. long; flowers white.

- 22. *Calliandra tetragona*** (Willd.) Benth. in Hook. Journ. Bot. **2**: 139. 1840.

Acacia tetragona Willd. Sp. Pl. **4**: 1069. 1806.

Michoacán to Chiapas. Central America and northern South America; type from Caracas.

Shrub or small tree, 1.5 to 4.5 meters high; leaflets numerous, 4 to 10 mm. long, bright green; flowers white; fruit about 1 cm. wide.

- 23. *Calliandra oaxacana*** Rose, Contr. U. S. Nat. Herb. **5**: 193. 1899.

Zacatecas to Oaxaca; type from Tomellín Canyon, Oaxaca.

Shrub 1 to 1.5 meters high; leaflets numerous, 4 to 11 mm. long; flowers white or pink.

- 24. *Calliandra formosa*** (Kunth) Benth. Lond. Journ. Bot. **3**: 98. 1844.

Acacia formosa Kunth, Mimos. Pl. Légum. 102. *pl.* 32. 1819-24.

Acacia gracilis Mart. & Gal. Bull. Acad. Brux. **10**³: 311. 1843.

Calliandra coulteri S. Wats. Proc. Amer. Acad. **17**: 352. 1882.

Baja California to Chihuahua, Colima, and Yucatán.

Shrub or small tree, nearly glabrous; leaflets 0.5 to 2.5 cm. long, bright green; flowers white. "Tepeguaje" (Guanajuato).

C. coulteri may be distinct, but probably is not. The name "ébano" is reported as applied to this species, but the writer is doubtful whether the plant so referred to (said to be a large tree) is correctly identified.

- 25. *Calliandra portoricensis*** (Jacq.) Benth. Lond. Journ. Bot. **3**: 99. 1844.

Mimosa portoricensis Jacq. Icon. Pl. Rar. **3**: 20. *pl.* 633. 1793.

Sinaloa to San Luis Potosí, Yucatán, and Oaxaca. Widely distributed in tropical America; type from Porto Rico.

Shrub or small tree, 1 to 4.5 meters high, nearly glabrous; leaflets 1.8 cm. long or shorter, thin, bright green; flowers pink or white; fruit about 8 mm. wide, glabrous. "Pich" (Yucatán, Maya); "moruro de costa," "soplillo" (Cuba); "cojobillo," "acacia," "zarza boba" (Porto Rico); "granolino" (Santo Domingo).

- 26. *Calliandra capillata*** Benth. Lond. Journ. Bot. **3**: 98. 1844.

Guerrero and Puebla to Chiapas; type from Mount San Felipe, Oaxaca. Reported from Guatemala.

Shrub, 1 to 2.5 meters high, glabrous; leaflets few, 1.2 to 4 cm. long, thin, bright green; flowers white or pink.

DOUBTFUL SPECIES.

CALLIANDRA HIRSUTA (Don) Benth. Trans. Linn. Soc. Bot. **30**: 554. 1875. *Inga hirsuta* Don, Hist. Dichl. Pl. **2**: 395. 1832. Believed to have come from Mexico.

CALLIANDRA LAMBERTIANA (Don) Benth. Lond. Journ. Bot. **3**: 100. 1844. *Acacia lambertiana* Don in Lindl. Bot. Reg. **9**: *pl.* 721. 1823. Described from cultivated plants said to have come from Mexico. Perhaps the same as *C. laxa*.

CALLIANDRA TETRAPHYLLA (Don) Benth. Trans. Linn. Soc. Bot. **30**: 544. 1875. *Inga tetraphylla* Don, Hist. Dichl. Pl. **2**: 392. 1832. Described from Mexico.

CALLIANDRA FULGENS Hook. f. in Curtis's Bot. Mag. **124**: *pl.* 7626. 1898. Described from cultivated plants believed to have come from Mexico. Apparently related to *C. emarginata*, but with more numerous (6) leaflets.

- 11. *LYSILOMA*** Benth. Lond. Journ. Bot. **3**: 82. 1844.

Unarmed trees or shrubs; leaves bipinnate, with few and large or usually numerous and small leaflets; flowers small, capitate or spicate; fruit flat, broad. the valves thin, separating from the persistent margin.

Flowers in spikes-----1. *L. acapulcensis*.

Flowers in globose heads.

Pinnae 1 or 2 pairs.

Leaflets usually 3 to each pinna, 4 to 9 cm. long; stipules persistent, large.

2. *L. tergemina*.

Leaflets numerous, 2 cm. long or shorter; stipules minute, deciduous.

3. *L. candida*.

Pinnae 3 to many pairs.

Pinnae 20 to 25 pairs-----4. *L. aurita*.

Pinnae 3 to 13 pairs.

Leaflets oval, 8 to 12 mm. wide-----9. *L. sabicu*.

Leaflets oblong, less than 5 mm. wide.

Leaflets pubescent beneath.

Leaves pubescent with appressed hairs-----5. *L. microphylla*.

Leaves hirtellous with spreading hairs-----6. *L. watsoni*.

Leaflets glabrous beneath.

Pinnae 6 to 13 pairs; leaflets 7 mm. long or shorter.

7. *L. divaricata*.

Pinnae usually 3 or 4 pairs; leaflets about 10 mm. long.

8. *L. bahamensis*.

1. *Lysiloma acapulcensis* (Kunth) Benth. Lond. Journ. Bot. 3: 83. 1844.

Acacia acapulcensis Kunth, Mimos. Pl. Légum. 78. pl. 24. 1819-24.

Acacia desmostachya Benth. Pl. Hartw. 13. 1839.

Lysiloma desmostachya Benth. Lond. Journ. Bot. 3: 84. 1844.

Lysiloma acapulcensis brevispicata Rose, Contr. U. S. Nat. Herb. 1: 100. 1891.

Sonora to San Luis Potosí and Chiapas; type from Acapulco. Guerrero. Guatemala.

Shrub or tree, sometimes 15 meters high, with very hard wood; leaves pubescent, at least when young, the leaflets very numerous, linear-oblong, 8 mm. long or shorter; stipules large, sometimes persistent; spikes 4 to 6 cm. long; fruit 2.5 to 4.8 cm. wide. "Tepeguaje" or "tepehuaje" (Michoacán, Guerrero, Oaxaca, Sinaloa, Veracruz, Sonora); "tepeoaxin" (Ramírez); "laagula" (Oaxaca, Zapotec, Reko).

The bark is astringent and is used in domestic medicine. It is sometimes chewed to harden the gums. The gum which exudes from the bark is used like gum arabic.

L. acapulcensis brevispicata Rose, from Sonora, differs only in its short spikes.

2. *Lysiloma tergemina* Benth. Trans. Linn. Soc. Bot. 30: 534. 1875.

Guerrero, Morelos, and Puebla; type from Acatlán, Puebla.

Small tree, 3 to 4.5 meters high; leaflets obliquely oval, rounded or obtuse at apex, bright green, glabrous; stipules reniform; flowers white; fruit 10 to 15 cm. long, 3.5 to 4.5 cm. wide, glaucescent.

3. *Lysiloma candida* T. S. Brandeg. Proc. Calif. Acad. II. 2: 153. 1889.

Southern Baja California, in canyons and on rocky slopes; type from Purísima.

Tree, sometimes 7.5 meters high, with a trunk 15 to 30 cm. in diameter (often with several trunks), the bark smooth, white; leaflets oblong or oval, obtuse or rounded at apex; stamens yellow; fruit 8 to 15 cm. long, 2.5 to 3 cm. wide, the valves thin and papery. "Palo blanco."

The bark is much used locally for tanning, and is an article of export. For an illustration of a grove of the trees see Contr. U. S. Nat. Herb. 16: pl. 113.

4. *Lysiloma aurita* (Schlecht.) Benth. Lond. Journ. Bot. 3: 83. 1844.*Acacia aurita* Schlecht. Linnaea 12: 572. 1838.

Veracruz and Chiapas; type from Malpais de Naulinco, Veracruz. Guatemala and Nicaragua.

Leaves pubescent, the leaflets about 3 mm. long; fruit 10 to 12 cm. long, 2 to 2.5 cm. wide, dark reddish brown.

5. *Lysiloma microphylla* Benth. Lond. Journ. Bot. 3: 83. 1844.

Guanajuato to Chiapas; type from León, Guanajuato.

Tree, 9 meters high; leaflets 4 to 6 mm. long; fruit about 13 cm. long and 2.5 cm. wide.

Most of the material recently referred to this species is rather *L. divaricata*, if Bentham's descriptions are reliable.6. *Lysiloma watsoni* Rose, Contr. U. S. Nat. Herb. 1: 99. 1891.

Known only from the vicinity of the type locality, Alamos, Sonora.

Shrub or small tree, 3 meters high, the trunk 7.5 cm. in diameter; leaflets 5 mm. long; fruit 2.5 cm. wide.

7. *Lysiloma divaricata* (Jacq.) Macbride, Contr. Gray Herb. n. ser. 59: 6. 1919.*Mimosa divaricata* Jacq. Pl. Hort. Schoenbr. 3: 76. pl. 395. 1798.*Lysiloma schiedeana* Benth. Lond. Journ. Bot. 3: 83. 1844.

Baja California and Sonora to Veracruz and Oaxaca. Reported from Nicaragua and Costa Rica.

Shrub or tree, 3 to 18 meters high, the trunk sometimes almost a meter in diameter, the wood very hard; flowers white; fruit 9 to 15 cm. long, 1.5 to 3 cm. wide. "Quiebracha" (Michoacán, Guerrero); "tepeguaje" (Sinaloa).

The wood is used for various purposes and the bark is employed for tanning.

8. *Lysiloma bahamensis* Benth. Lond. Journ. Bot. 3: 82. 1844.

Yucatán. West Indies and southern Florida; type from the Bahamas.

Tree, sometimes 16 meters high, with a trunk 1.2 meters in diameter, the crown broad, the bark smooth, gray or brownish; flowers white; fruits 8 to 15 cm. long, 2.5 cm. wide; wood hard, tough, close-grained, dark reddish brown, its specific gravity about 0.64.

The wood is used in the West Indies for making boats. The species has been reported from Yucatán as *L. latisiliqua* (L.) Benth.9. *Lysiloma sabicu* Benth. Kew Journ. Bot. 6: 236. 1854.

Reported from Yucatán. Cuba (type locality) and the Bahamas.

Tree 6 meters high; wood hard, heavy, compact, fine-grained, brown, its specific gravity said to be about 0.90. "Xiasek" (Yucatán, Maya); "sabicú," "jigüe," "jigüe blanco," "moruro de costa" (Cuba).

The wood is of good quality and very durable in water. Formerly it was much used in Cuba for shipbuilding, and was exported to England to be used for the same purpose, as well as for making bobbins and shuttles. It is employed also for cabinetwork.

12. *ALBIZZIA* Durazz. Mag. Tosc. 34: 11. 1772.

Some of the Old World species yield useful gums and others furnish tanbark.

1. *Albizzia occidentalis* T. S. Brandeg. Proc. Calif. Acad. II. 3: 222. 1892.

Baja California and Sinaloa; Tres Mariás Islands; type from San José del Cabo, Baja California.

Tree 5 to 15 meters high, with a trunk sometimes 80 cm. in diameter, the bark smooth, gray; leaves bipinnate, the pinnae about 4 pairs, the leaflets few, obliquely oblong or oval, 2 to 4.5 cm. long, nearly glabrous; flowers yellowish white, capitate; fruit flat, 13 to 20 cm. long, 3 to 4 cm. wide. "Palo escopeta" (Baja California); "palo fierro," "bolillo," "arellano" (Sinaloa).

This tree is very common in some localities. The wood is used in carpentry.

Albizzia lophantha Benth., a native of Australia, with spicate flowers, narrow leaflets, and small pods, is cultivated in central Mexico.

13. ENTEROLOBIUM Mart. Flora 20^a: Beibl. 117. 1837.

1. *Enterolobium cyclocarpum* (Jacq.) Griseb. Fl. Brit. W. Ind. 226. 1860.

Mimosa cyclocarpa Jacq. Fragm. Bot. pl. 34, f. 1. 1809.

Mimosa parota Sessé & Moc. Pl. Nov. Hisp. 177. 1887.

Sinaloa to Tamaulipas, Veracruz, and Chiapas. Central America, West Indies, and northern South America.

Large unarmed tree, 12 to 30 meters high or larger, with broad spreading crown, the trunk 0.6 to 2.5 meters in diameter; bark rough; leaves bipinnate, the leaflets very numerous, linear-oblong, 10 to 12 mm. long, acute or obtuse; flowers small, white, sessile in dense heads; fruit flat, coiled, 8 to 11 cm. in diameter, dark brown, lustrous; seeds dark brown or black, about 12 mm. long; wood hard, resistant, elastic, grayish tinged with yellow, sometimes livid and mottled. "Orejón" (Veracruz); "huinecaztle," "huanacaxtle" (Sinaloa); "parota" (Michoacán, Jalisco, Guerrero); "piche" (Tabasco); "cuanacaxtle," "nacaxtle" (Oaxaca, from the Nahuatl *cuau-nacaxtli*, "ear-tree"); "cascabel sonaja" (Tamaulipas); "guanacaste" (Guatemala, Nicaragua, Honduras, Costa Rica); "nacaxtle" (Veracruz); "conacaste" (Guatemala); "anjera," "carlito," "carita" (Colombia); "caro hembra" (El Salvador, Venezuela); "oreja de judío," "árbol de las orejas" (Cuba).

The tree grows rapidly and makes an excellent shade tree because of its broad top. The large trunks are used for canoes, water troughs, etc., and the wood is very durable in water. It is employed in carpentry and cabinetwork. The pods are said to be an excellent feed for cattle, and the seeds as well as the young pods are sometimes cooked to be used for human food. The fruit and bark are rich in tannin. Rose reports that in Sinaloa the bark and fruit are used as a substitute for soap in washing woolen goods and that a syrup made from the bark is used for colds. The fruit is used as a soap substitute in Venezuela also. The gum which exudes from the trunk is employed in Sinaloa as a remedy for bronchitis.

14. PITHECOLLOBIUM Marat. Flora 20^a: Beibl. 114. 1837.

REFERENCE: Benth. Trans. Linn. Soc. Bot. 30: 570-598. 1875.

Shrubs or trees, spiny or unarmed; leaves bipinnate, the leaflets few or numerous, the petioles usually glanduliferous; peduncles mostly axillary and solitary or fasciculate, or sometimes terminal and racemose, the flowers capitate or spicate; fruit very variable.

Pithecollobium multiflorum Benth. has been reported from Mexico at various times, but apparently it is not found there.

Leaflets large, 0.7 to 2.5 cm. wide or larger, if less than 1 cm. wide the blades rounded and nearly as broad as long; leaflets always few (1 or 2 pairs).

Plants very spiny.

Flowers in long spikes.

Calyx less than one-fourth as long as the corolla. Stamen tube very long-exserted.-----1. *P. macrosiphon*.

Calyx almost or fully half as long as the corolla.

Stamen tube included or short-exserted; bracts deltoid, minute, about as broad as long; valves of the fruit comparatively thin.

2. *P. lanceolatum*.

- Stamen tube long-exserted; bracts lanceolate, conspicuous, elongate;
valves of the fruit very thick-----3. *P. calostachys*.
Flowers capitate.
Spines ascending; flowers densely pubescent; leaves pale green.
4. *P. dulce*.
Spines divaricate; flowers glabrate; leaves usually bright green.
5. *P. unguis-cati*.
Plants unarmed.
Petiole winged-----6. *P. furcatum*.
Petiole not winged.
Leaflets acute or acuminate; flowers subspicate-----7. *P. cognatum*.
Leaflets rounded at apex; flowers capitate-----8. *P. guadalupense*.
Leaflets small, the largest 5 mm. wide, usually much longer than broad; leaflets
numerous.
Pinnae one pair.
Valves of the fruit very hard and woody, 2.5 to 3 cm. wide--17. *P. confine*.
Valves of the fruit not woody, less than 2 cm. wide.
Leaflets revolute, oblong-----9. *P. revolutum*.
Leaflets not revolute, oval or suborbicular.
Leaflets pubescent-----10. *P. elastichophyllum*.
Leaflets glabrous-----11. *P. compactum*.
Pinnae 2 or more pairs.
Corolla about 1.5 cm. long, densely white-sericeous.
Calyx pilose; leaflets 2 to 2.5 mm. wide-----12. *P. acatlense*.
Calyx glabrous; leaflets 4 to 7 mm. wide-----13. *P. leiocalyx*.
Corolla less than 1 cm. long.
Gland present on the rachis at the point of insertion of the lowest pair
of pinnae.
Plants unarmed; valves of the pod contorted after dehiscence. Flowers
capitate-----14. *P. arboreum*.
Plants armed with numerous spines; valves not contorted.
Spines recurved; flowers capitate. Leaflets narrowly oblong.
15. *P. leptophyllum*.
Spines straight; flowers capitate or spicate.
Flowers spicate-----16. *P. flexicaule*.
Flowers capitate.
Leaflets 4 or 5 pairs, oval or rounded-obovate, rounded at apex.
17. *P. confine*.
Leaflets 10 to 15 pairs, oblong, acute-----18. *P. schaffneri*.
Gland borne on the petiole below the pinnae.
Calyx glabrous or nearly so; pods constricted between the seeds.
19. *P. tortum*.
Calyx densely pubescent; pods not constricted.
Pinnae 4 to 6 pairs in most of the leaves.
Leaflets mostly 5 to 7 mm. wide; plants unarmed.
20. *P. tomentosum*.
Leaflets 1.5 to 2.5 mm. wide; plants usually armed with spines.
Pods stipitate, 1.4 to 1.7 cm. wide-----21. *P. brevifolium*.
Pods sessile or nearly so, 2.5 cm. wide-----22. *P. albicans*.
Pinnae 2 or 3 pairs in most of the leaves.
Corolla densely sericeous; pinnae and leaflets crowded; spines
strongly recurved; pods pubescent-----23. *P. sonorae*.
Corolla glabrate; pinnae and leaflets not crowded; spines nearly
straight; pods glabrous or nearly so-----24. *P. mexicanum*.

1. *Pithecollobium macrosiphon* Standl. Contr. U. S. Nat. Herb. 20: 191. 1919.
Known only from the type locality, between Tumbala and El Salto, Chiapas.
Spiny tree; leaflets 4 to 6 cm. long, obtuse.

2. *Pithecollobium lanceolatum* (Humb. & Bonpl.) Benth. Lond. Journ. Bot. 5: 105. 1846.

Mimosa ligustrina Jacq. Fragm. Bot. Illustr. 29. pl. 32, f. 6. 1809. Not *M. ligustrina* Vahl, 1807.

Inga lanceolata Humb. & Bonpl.; Willd. Sp. Pl. 4: 1005. 1806.

Pithecollobium ligustrinum Klotzsch; Benth. Trans. Linn. Soc. Bot. 30: 571. 1875.

Sinaloa to Chiapas, Veracruz, and Tabasco; reported from San Luis Potosí. Central America and northern South America; type from Cumaná, Venezuela.

Tree 3.5 to 5 meters high or larger, armed with short stout spines; pinnae one pair, the leaflets one pair, oblique, 3.5 to 8 cm. long, obtuse, bright green, thick, glabrate; flowers small, white; fruit terete, about 10 cm. long. "Timuche" (Michoacán, Guerrero); "tucuy" (Tabasco, San Luis Potosí); "pichejumo" (San Luis Potosí); "conchi" (Sinaloa); "espino," "chimlango" (Colombia); "bobo" (Venezuela); "abracade" (El Salvador).

3. *Pithecollobium calostachys* Standl. Contr. U. S. Nat. Herb. 20: 190. 1919.

Tamaulipas and San Luis Potosí to Tabasco and Chiapas; type from Tampico, Tamaulipas.

Tree 4.5 to 6 meters high or larger.

This has been referred commonly to the preceding species but seems specifically distinct by the characters given in the key.

4. *Pithecollobium dulce* (Roxb.) Benth. Lond. Journ. Bot. 3: 199. 1844.

Mimosa dulcis Roxb. Pl. Coromand. 1: 67. pl. 99. 1795.

Acacia obliquifolia Mart. & Gal. Bull. Acad. Brux. 10²: 317. 1843.

Baja California to Chihuahua, Tamaulipas, and Chiapas; often cultivated. Central America and Colombia; naturalized in the East Indies and elsewhere in the tropics of the Old World; type from Coromandel.

Tree, 4.5 to 20 meters high or larger, very spiny; trunk often 60 to 80 cm. in diameter, the bark grayish; pinnae one pair, the leaflets one pair, 2.5 to 5 cm. long or larger, obtuse, pale green, glabrate; flowers yellowish or greenish white; fruit long and narrow, reddish, pubescent, much coiled and twisted; seeds black, surrounded by a white or reddish aril; wood moderately heavy, flexible, strong, reddish brown. "Huamúchil," "cuamúchil," or "guamúchil" (used widely in Mexico; from the Nahuatl names, which are given variously as *cuaumochtli*, *quauhmochtli*, *coacamachalli*, or *quamochitl*); "guamúchitl," "guamuche," "humo" (Tamaulipas); "guaymachile" (Guerrero, Palmer); "guamachi" (Guerrero); "pinzan" (Guerrero, Oaxaca, Veracruz); "cuamóchil," "huamúchil costeño," "guamuche," "huamuche," "muchite" (Oaxaca); "yaga-bixihul," "yaga-biguichi" (Oaxaca, Zapotec, Reko); "glamuchil" (Durango, Patoni); "buamúchil" (Alcocer); "espino de playa" (Nicaragua); "mochigüiste" (Costa Rica); "guachimole," "mongollano" (El Salvador); "jaguay" (Guatemala); "inga" (Cuba); "camachile" (Guam, Philippines).

It is of interest to note that the Nahuatl name was introduced, along with the plant itself, into Guam and the Philippines by the Spaniards. The word has been modified there into such forms as "camanchil," "camonsil," "kama-chiles," and "camachile." From the Philippines the tree was carried to India, where it is now much planted. The pods are known in India as "Manila tamarinds."

The tree is very resistant to drought. It is nearly evergreen, but loses its old leaves as the new ones appear. The wood is widely employed for general

construction purposes, for fence posts, and for fuel. The bark yields a yellow dye, and is much used for tanning skins; it is used in domestic medicine, also, because of its astringent properties. The gum exuding from the trunk is transparent and deep reddish brown; dissolved in water it makes good mucilage. The flowers are much frequented by bees and yield a good quality of honey. The fruit is highly esteemed in Mexico and is a common article in the markets. The acidulous aril surrounding the seeds is eaten and is used in the preparation of a beverage similar to lemonade. Stock of all kinds are fond of the pods, and in India monkeys are said to eat them greedily.

The tree is treated by Hernández¹ in a chapter entitled "*De Coaca machalli, seu Maxilla Colubri.*" This name ("snake-jaws"), he states, is given because the pair of leaflets somewhat resemble the jaws of a snake. "The leaves," he says, "applied as plasters, allay pain, even those of venereal sores, and relieve convulsions. In flavor they are astringent, sweet, and somewhat glutinous, and in temper to a certain extent cold, or moderately warm." The tree is treated on page 94 of the same work, in a chapter headed "*De Quamochitl, seu arbore fructus crepitantis.*" In this account he states that the root bark is good for dysentery; the leaves, with salt, cure indigestion, and also produce abortion; the juice of the seeds, sniffed into the nose, draws off humors from the head; and the pulverized seeds (especially if mixed with rue) cleanse internal ulcers.

5. *Pithecollobium unguis-cati* (L.) Mart. Hort. Monac. 188. 1829.

Mimosa unguis-cati L. Sp. Pl. 517. 1753.

Chiefly in coastal thickets, Tamaulipas to Yucatán; Sinaloa. West Indies; northern South America; type from Jamaica.

Shrub or small tree, sometimes 9 meters high, with a trunk 30 cm. in diameter, very spiny, the bark reddish brown or gray, shallowly fissured; leaves more or less persistent, the pinnae one pair, the leaflets one pair, obliquely obovate or oval, 2 to 4 cm. long; flowers greenish yellow, sweet-scented, the long stamens purplish; fruit 8 to 12 cm. long, 0.6 to 1.2 cm. wide, twisted, reddish brown; seeds dark brown or blackish, surrounded by a red aril; wood very hard, close-grained, red or purple, with yellow sapwood, its specific gravity about 0.90. "Tzim-ché," "tzin-ché" (Yucatán, Maya, *Seler*); "espino de playa" (Nicaragua); "espinuelo" (Venezuela); "dinde" (Colombia); "manca montero" (Cuba); "uña de gato" (Nicaragua, Cuba, Porto Rico); "rolon" (Porto Rico).

The English names applied to the plant are "cat's-claw," "black-bead," and "bread-and-cheeses."

The bark is astringent, and diuretic and tonic properties are ascribed to it; it has been used for fevers and kidney diseases as well as for treating sores. Barham reports that the plant was much used in Jamaica in domestic medicine, and that it was "a sovereign remedy for the stone and gravel," as well as for affections of the liver and spleen. The Spaniards, he relates, said that the black seeds resembled the kidneys and the white aril the fat surrounding those organs, hence, by the doctrine of signatures, the belief that the plant was a remedy for kidney affections. The fruit is said to be rich in tannin and to yield a yellow dye.

6. *Pithecollobium furcatum* Benth. Lond. Journ. Bot. 5: 106. 1846.

Known only from the type locality, on the banks of the Río Teapa, Tabasco.

Plants glabrate; pinnae one pair, the leaflets one pair, obliquely obovate-oblong, 7.5 to 10 cm. long, obtuse-acuminate.

7. *Pithecollobium cognatum* (Schlecht.) Benth. Lond. Journ. Bot. 5: 107. 1846.

Inga cognata Schlecht. Linnaea 12: 560. 1838.

¹Thesaurus 90. 1651.

Veracruz, the type from Colipa. Central America.

Tree, sometime 8 meters high; pinnae 1 pair, the leaflets 1 pair, lanceolate or narrowly oblong, usually 8 to 11 cm. long, thick, lustrous, glabrous. "Soto caballo" (Costa Rica).

8. *Pithecollobium guadalupense* (Pers.) Chapm. Fl. South. U. S. 116. 1860.

Mimosa guadalupensis Pers. Syn. Pl. 2: 262. 1807.

Yucatán. West Indies and Florida Keys; type from Guadeloupe.

Unarmed shrub or tree, sometimes 6 meters high, with a trunk 15 cm. in diameter, the bark dark gray, slightly fissured; leaves persistent, the 4 leaflets obliquely obovate to suborbicular, 4 to 7 cm. long, lustrous; flowers pink; fruit compressed, 10 to 15 cm. long, dark brown, twisted; seeds black, with a red aril.

The writer has seen no material from the Lesser Antilles, and does not feel certain that the name here used really applies to the present plant. The Yucatán specimens, however, are of the same species as the Cuban plant to which the name is now applied.

9. *Pithecollobium revolutum* Rose, Contr. U. S. Nat. Herb. 10: 96. pl. 28. 1906.

Known only from the type locality, near Higuerillas, Querétaro.

Low dense shrub; leaflets 6 to 10, about 3 mm. long; fruit flat, curved, 5 to 7 cm. long, pubescent.

10. *Pithecollobium elasticophyllum* A. Gray; S. Wats. Proc. Amer. Acad. 17: 352. 1882.

Coahuila, Nuevo León, and San Luis Potosí; type from Monterrey.

Low spiny shrub with very stiff interlaced branches; leaflets few, 3 to 4 mm. long, coriaceous; flowers reddish, the heads nearly sessile; fruit flat, 1.5 cm. wide, curved, puberulent.

11. *Pithecollobium compactum* Rose, Contr. U. S. Nat. Herb. 8: 33. 1903.

Pithecollobium purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 85. 1919.

Puebla; type from Tehuacán.

Low shrub, usually 30 to 50 cm. high, compact, very spiny; leaflets 5 to 7 pairs, 3 to 4 mm. long, lustrous; flowers greenish, tinged with red, subcapitate; fruit curved, compressed, 1.2 cm. wide, puberulent; seeds brownish black.

12. *Pithecollobium acatlense* Benth. Trans. Linn. Soc. Bot. 30: 593. 1875.

Durango to Puebla and Oaxaca; type from Acatlán, Puebla.

Shrub or small tree, 3 to 4.5 meters high; pinnae 2 or 3 pairs, the leaflets rather numerous, 6 to 10 mm. long, obtuse or acute, pubescent or glabrate; flowers capitate, the heads nearly sessile; fruit flat, straight, about 14 cm. long and 2.5 cm. wide, densely pubescent.

13. *Pithecollobium leiocalyx* Standl. Contr. U. S. Nat. Herb. 20: 189. 1919.

Known only from the type locality, Salina Cruz, Oaxaca.

Leaflets 6 to 14 mm. long, obliquely oval or obovate, pubescent.

14. *Pithecollobium arboreum* (L.) Urban, Symb. Antill. 2: 259. 1900.

Mimosa arborea L. Sp. Pl. 519. 1753.

Pithecollobium filicifolium Benth. Lond. Journ. Bot. 3: 205. 1844.

Samanea arborea Ricker in Bailey, Stand. Cycl. Hort. 3066. 1917.

Veracruz and Oaxaca. West Indies and Central America; type from Jamaica.

Tree, sometimes 4 meters high, with a trunk a meter in diameter, the bark thick, gray, very rough; leaves large, often 40 cm. long, bright green, glabrate, with numerous pinnae and leaflets, the latter linear, 12 to 15 mm. long; flowers white; fruit subterete, constricted, bright red, puberulent, twisted after dehiscence, blood-red within; seeds black; wood hard, fine-grained, taking

a good polish. "Coralillo" (Oaxaca); "frijolillo" (Veracruz); "loro," "lorito," "conchido" (Costa Rica); "moruro," "moruro prieto," "tengue" (Cuba); "cojóbana," "cojoba" (Porto Rico); "cola de marano," "cola de mico," "quebracho" (Guatemala, Honduras, *Blake*).

The wood is said to be of excellent quality, and is much used in some parts of the West Indies and Central America for flooring, ceiling, posts, etc.

15. *Pithecollobium leptophyllum* (Cav.) Daveau, Bull. Soc. Bot. France **59**: 635. 1912.

Mimosa leptophylla Cav.; Lag. Gen. & Sp. Nov. 16. 1803.

Pithecollobium palmeri Hemsl. Diag. Pl. Mex. 50. 1880.

Pithecollobium palmeri recurvatum S. Wats. Proc. Amer. Acad. **23**: 272. 1888.

Durango to San Luis Potosí and Puebla; perhaps also in Sonora; type from somewhere in Mexico.

Shrub, 0.6 to 1.5 meters high, very spiny; leaves small, the pinnae few, the leaflets numerous, 3 to 4 mm. long; fruit flat, brown, puberulent, curved, 1 to 1.5 cm. wide.

16. *Pithecollobium flexicaule* (Benth.) Coulter, Bot. Gaz. **15**: 270. 1890.

Acacia flexicaulis Benth. Lond. Journ. Bot. **1**: 505. 1842.

Siderocarpus flexicaulis Small, Bull. N. Y. Bot. Gard. **2**: 91. 1901.

Samanea flexicaulis Macbride, Contr. Gray Herb. n. ser. **59**: 2. 1919.

Tamaulipas and Nuevo León. Southwestern Texas.

Spiny shrub or tree, sometimes 15 meters high, with a trunk 1.2 meters in diameter, the branches irregular and spreading; leaves persistent, the pinnae 2 or 3 pairs, the leaflets 3 to 5 pairs, oblong or obovate, 5 to 12 mm. long, thick, lustrous; flowers yellow, fragrant; fruit somewhat flattened, hard and woody, 10 to 15 cm. long, 2.5 cm. wide, brown or black; wood hard, close-grained, dark red or purplish brown, with yellowish sapwood, its specific gravity about 1.04. "Ebano" (Tamaulipas, Nuevo León).

The wood is very durable and is used for fence posts, wagons, cabinetwork, fuel, etc. The green seeds are cooked and eaten, and when ripe they are often roasted and eaten or used as a substitute for coffee.

17. *Pithecollobium confine* Standl. Contr. U. S. Nat. Herb. **20**: 191. 1919.

Baja California; type from Cape San Lucas.

Shrub or small tree, 1.5 to 3 meters high, similar to the last species but with capitate flowers. "Palo fierro."

18. *Pithecollobium schaffneri* S. Wats. Proc. Amer. Acad. **17**: 352. 1882.

Samanea schaffneri Macbride, Contr. Gray Herb. n. ser. **59**: 2. 1919.

Known only from the mountains about San Luis Potosí.

Shrub, very spiny, pubescent; pinnae 2 to 4 pairs, the leaflets 2 to 3 mm. long, acute; fruit 7.5 to 12.5 cm. long, 1 cm. wide, straight or somewhat curved densely pubescent.

19. *Pithecollobium tortum* Mart. Herb. Fl. Bras. 114. 1837.

Baja California and Sonora to Oaxaca; Veracruz and Yucatán. Central America, West Indies, and South America; type from Brazil.

Slender shrub or tree, 3 to 9 meters high, armed with stout spines, the bark smooth, brown; leaflets oblong or obovate, 7 to 15 mm. long, pubescent or glabrous; fruit 7 to 10 mm. wide, often 20 cm. long or longer, glabrous. "Porolana" (Guerrero); "guayacán" (Honduras).

20. *Pithecollobium tomentosum* Micheli, Mém. Soc. Phys. Hist. Nat. Genève **34**: 285. pl. 28. 1903.

Jalisco to Guerrero; Yucatán; type from banks of the Espíritu Santo, altitude 600 meters.

Tree, 6 to 8 meters high; leaflets 1 to 1.8 cm. long, oblong, puberulent; flowers white. "Parotillo" (Michoacán, Guerrero).

The writer has seen no fruit of this plant, which may belong to some other genus.

21. *Pithecollobium brevifolium* Benth.; A. Gray, Pl. Wright. 1: 67. 1852.

Havardia brevifolia Small, Bull. N. Y. Bot. Gard. 2: 92. 1901.

Coahuila, San Luis Potosí, and Tamaulipas; type collected between Cerralvo and Monterrey, Nuevo León. Southwestern Texas.

Tree, sometimes 9 meters high, with a trunk 15 cm. in diameter, the bark thin, smooth, gray; leaves persistent, the pinnae 2 to 5 pairs, the leaflets 10 to 20 pairs, 4 to 8 mm. long, pubescent or glabrate; flowers yellowish white; fruit flat, straight, 7 to 12 cm. long, about 1.5 cm. wide; wood hard, close-grained, dark reddish brown, very heavy. "Tenaza" (Nuevo León, Tamaulipas); "huajillo" (Texas); "guajilla" (Tamaulipas).

The tree is of some importance for forage, the leaves being eaten by goats and sheep in winter. The wood is used for various purposes. Specimens collected in Oaxaca probably belong to this species, and others from Sinaloa (where the plant is known as "carbonera") are probably conspecific.

22. *Pithecollobium albicans* (Kunth) Benth. Trans. Linn. Soc. Bot. 30: 592. 1875.

Acacia albicans Kunth, Mimos. Pl. Légum. 87. pl. 27. 1819-24.

Yucatán and Campeche; type from Campeche.

Tree, sometimes 20 meters high; leaflets numerous, 3 to 6 mm. long; fruit about 10 cm. long. "Chucum" (Yucatán); "huisache" (Campeche, Ramírez).

The tree is said to produce a gum similar to that of mezquite. The fruit is reported to contain 18 per cent of tannin, and to yield a black dye.

It is probable that the present material is referred here correctly, although it does not quite agree with Bentham's description, especially in regard to the fruit. The type collection was without fruit, and Bentham's description of it was based, presumably, upon specimens from Hidalgo, which may have belonged to some other species.

23. *Pithecollobium sonorae* S. Wats. Proc. Amer. Acad. 24: 49. 1889.

Dry plains or hillsides, Sonora and Sinaloa; type from Guaymas, Sonora.

Shrub or small tree, 3 to 6 meters high, with very hard wood; leaflets numerous, 3 to 4 mm. long; fruit flat, straight, 7 to 9 cm. long, 1.5 to 2 cm. wide. "Uña de gato" (Sonora); "palo gato" (Sinaloa).

24. *Pithecollobium mexicanum* Rose, Contr. U. S. Nat. Herb. 1: 100. 1891.

Baja California, Sonora, and Sinaloa; type from Alamos, Sonora.

Tree, 4.5 to 9 meters high or larger, or often only a shrub, with smooth brownish bark, armed with short spines; leaflets few, oblong, about 5 mm. long, pale green; fruit flat, thin. "Chino" or "palo chino."

The wood is used for furniture, etc.

15. *INGA* Scop. Intr. Hist. Nat. 298. 1777.

REFERENCES: Bentham, Lond. Journ. Bot. 4: 577-622. 1845; Pittier, Contr. U. S. Nat. Herb. 18: 173-223. pl. 81-105. 1916.

Unarmed trees or shrubs; leaves even-pinnate, the leaflets few, large, the petiole often winged; stipules small; flowers large, spicate or capitate; fruit large, the seeds imbedded in a pulp.

The fleshy pulp surrounding the seeds is edible, and the pods are often seen in the markets. The wood is said to be weak and fibrous, with a specific gravity of 0.54 to 0.67, and to be of little value except for charcoal and firewood. Some of the species are often planted to shade coffee bushes and as windbreaks to

protect cacao plantations. The names "chalahuitl" (San Luis Potosí), "chelele" (Tabasco), "hulándini" (Michoacán), and "coyuacate" (Veracruz) are reported for unidentified species of the genus. Belmar gives the Mixe name as "tahk."

Rachis of the leaf not winged.

Flowers spicate.

Spikes long, slender, interrupted; flowers glabrous or nearly so.

1. *I. laurina*.

Spikes very short, headlike, dense; flowers densely sericeous.

2. *I. leptoloba*.

Flowers capitate.

Flowers sessile; stipules deciduous-----3. *I. jinicuil*.

Flowers pedicellate; stipules persistent.

Corolla 7.5 mm. long or shorter; fruit 9 to 12 cm. long----4. *I. paterno*.

Corolla 8 to 9 mm. long; fruit sometimes 40 cm. long-----5. *I. radians*.

Rachis of the leaves winged.

Corolla 10 to 16 mm. long.

Leaflets glabrate on the upper surface; corolla scarcely 10 mm. long.

6. *I. pringlei*.

Leaflets copiously pubescent on the upper surface; corolla about 15 mm. long.

Calyx 4 to 6 mm. long-----7. *I. edulis*.

Calyx about 10 mm. long-----8. *I. xalapensis*.

Corolla 20 to 25 mm. long.

Calyx very slender, the tube 2 to 3 mm. thick, thinly pubescent.

9. *I. purpusii*.

Calyx broad, the tube 3.5 to 5 mm. thick, densely sericeous.

Calyx lobes more than half as long as the tube; leaflets 6 pairs.

10. *I. fissicalyx*.

Calyx lobes less than half as long as the tube; leaflets usually 5 pairs.

Calyx 10 to 12 mm. long, covered with loose fulvous hairs; bracts ovate; leaflets obtuse or acutish-----11. *I. eriocarpa*.

Calyx about 15 mm. long, with a fine, close pubescence; bracts linear or nearly so; leaflets acuminate-----12. *I. spuria*.

1. *Inga laurina* (Swartz) Willd. Sp. Pl. 4: 1018. 1806.

Mimosa laurina Swartz, Fl. Ind. Occ. 2: 978. 1800.

Jalisco and Guerrero. Central America and the West Indies; type from St. Kitts.

Tree, 7.5 to 15 meters high, with large broad crown; leaflets 4 or 6, elliptic or obovate, 6 to 14 cm. long, acute or acuminate, bright green, glabrous; flowers white, sweet-scented; fruit flat, about 15 cm. long, 3 to 3.5 cm. wide. "Guamá" (Porto Rico).

2. *Inga leptoloba* Schlecht. Linnaea 12: 560. 1838.

Veracruz, Tabasco, and Oaxaca; type from Hacienda de la Laguna, Veracruz. Central America.

Tree, or often a shrub 2 to 3 meters high; leaflets usually 6, 8 to 18 cm. long, acute or acuminate, glabrous; spikes paniculate. "Vainillo" (Veracruz).

Planted in Costa Rica as shade for coffee.

3. *Inga jinicuil* Schlecht. Linnaea 12: 559. 1838.

Veracruz; type from Jalapa.

Large or small tree, often planted to shade coffee; leaflets 6, lanceolate to elliptic, glabrous, 8 to 11 cm. long, acute, lustrous; flowers white. "Jinicuil," "cuajinicuil."

4. *Inga paterno* Harms, Repert. Sp. Nov. Fedde 13: 419. 1914.

Oaxaca. Guatemala (type locality) to Costa Rica.

Medium-sized tree; leaflets 8 or 10, elliptic to lanceolate, 4 to 17 cm. long, obtuse or acute, glabrous; flowers white; fruit flat, 9 to 12 cm. long, 4 to 5 cm. wide, 2 or 3-seeded. "Paterno" (Guatemala); "cuajinicuil" (Costa Rica).

Often planted, like the other species, for coffee shade.

5. *Inga radians* Pittier, Contr. U. S. Nat. Herb. 18: 178. 1916.

Oaxaca and Chiapas; type from Tapachula, Chiapas.

Tree; leaflets usually 6, elliptic or ovate, 7 to 18 cm. long, acuminate, glabrous; fruit sometimes 40 cm. long, 6.5 to 8.5 cm. wide, about 3 cm. thick. "Cuajinicuil" (Chiapas).

6. *Inga pringlei* Harms, Repert. Sp. Nov. Fedde 13: 526. 1915.

Known only from the type locality, Jalapa, Veracruz.

Small tree; leaflets 10 or 12, lance-oblong, 4 to 7.5 cm. long, acuminate, thinly pilose beneath.

7. *Inga edulis* Mart. Flora 20: Beibl. 113. 1837.

Veracruz. Central America and South America; type from Brazil.

Small or large tree, sometimes 15 meters high, with broad spreading crown and gray bark; leaflets usually 6 or 8, very variable in form, mostly 10 to 20 cm. long; fruit short, angled, densely pubescent, with edible pulp. "Guayaniquil" (Costa Rica).

8. *Inga xalapensis* Benth. Lond. Journ. Bot. 4: 616. 1845.

Sinaloa and Jalisco to Veracruz; type from Jalapa, Veracruz. Central America.

Small tree, 6 to 8 meters high, the trunk 50 to 60 cm. in diameter, the bark ashy brown; leaflets 10 to 16, oblong or lance-oblong, 6 to 17 cm. long, acute or obtuse; fruit 10 to 15 cm. long, about 1 cm. wide. "Cuajiniquil" (Jalisco); "vainillo" (Sinaloa); "cuje" (Guatemala).

Wood used in Sinaloa for fence posts.

9. *Inga purpusii* Pittier, Contr. U. S. Nat. Herb. 18: 199. 1916.

Known only from the type locality, Finca Yolanda, Chiapas.

Tree; leaflets 4 or 6, ovate or oblong, 10 to 18 cm. long, acute, pubescent on both surfaces.

10. *Inga fissicalyx* Pittier, Contr. U. S. Nat. Herb. 18: 213. 1916.

Veracruz and Tabasco; type from Zacuapan, Veracruz. Guatemala.

Leaflets lance-oblong, 3 to 11 cm. long, acute, pubescent on both surfaces. "Bitze," "chelele," "guatope" (Tabasco).

11. *Inga eriocarpa* Benth. Lond. Journ. Bot. 4: 615. 1845.

Sinaloa and Jalisco to Michoacán, Oaxaca, and Veracruz; type collected between San Blas and Guadalajara.

Tree, often 12 meters high, with spreading crown and rough black bark; leaflets about 10, oblong to oval-obovate, 4 to 9 cm. long, very thick; flowers white; fruit subterete, tomentose. "Vainillo" (Michoacán, Sinaloa); "aguatope" (Oaxaca, from the Nahuatl *ahua-topochtli*, "white stamens").

12. *Inga spuria* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1011. 1806.

Tepic to Tamaulipas, Veracruz, and Chiapas. Central America and South America; type from Venezuela.

Large or small tree, sometimes 15 meters high, with wide-spreading crown; leaflets about 10, 5 to 13 cm. long, pubescent; flowers white; fruit subterete, short or elongate, tomentose. "Vainillo" (Veracruz); "jiniculle" (Guerrero); "timbre" (Veracruz); "cuje" (Guatemala); "guama" (Venezuela); "cuajinicuil" (Jalisco, Costa Rica).

DOUBTFUL SPECIES.

INGA CORIACEA Don, Hist. Dichl. Pl. 2: 390. 1832. Described from somewhere in Mexico.

INGA FLEXUOSA Schlecht. Linnaea 12: 559. 1838. *I. schiedeana* Steud. Nom. Bot. ed. 2. 1: 810. 1840. Based upon leaf specimens from Jalapa; perhaps the same as *I. xalapensis* Benth.

66. CAESALPINIACEAE. Senna Family.

Trees or shrubs, often armed with spines: leaves simple, pinnate, or bipinnate; flowers usually large and showy, mostly racemose, regular or irregular; petals usually 5; stamens commonly 10; fruit a legume but very variable in form.

Leaves pinnate, bifoliolate, or simple, never bipinnate.

Anthers erect. Leaves pinnate-----1. **CASSIA**.

Anthers versatile.

Leaves with numerous leaflets.

Calyx lobes 4; fruit thick-----2. **TAMARINDUS**.

Calyx lobes 5; fruit very flat and thin-----3. **POEPPIGIA**.

Leaves simple or of 2 leaflets.

Petals very unequal; fruit winged on the upper suture; leaves simple.

4. **CERCIS**.

Petals subequal; fruit not winged; leaves simple or bifoliolate.

Flowers 7 mm. long or shorter. Fruit indehiscent; leaves bifoliolate.

5. **CYNOMETRA**.

Flowers more than 1 cm. long.

Calyx lobes 4; fruit indehiscent. Leaves bifoliolate.

6. **HYMENAEA**.

Calyx lobes 5; fruit dehiscent-----7. **BAUHINIA**.

Leaves bipinnate, at least some of them.

Calyx lobes strongly imbricate; seeds without endosperm.

Leaves partly pinnate. Trees or large shrubs----8. **HAEMATOKYLUM**.

Leaves all bipinnate.

Plants low shrubs, chiefly herbaceous, unarmed; fruit thin, elastically bivalvate-----9. **HOFFMANSEGGIA**.

Plants large shrubs or trees, often spiny; fruit thin and bivalvate or often very thick-----10. **CAESALPINIA**.

Calyx lobes valvate or slightly imbricate; seeds with endosperm.

Plants unarmed.

Flowers red; fruit very broad, thick, and hard-----11. **DELONIX**.

Flowers yellow; fruit narrow, thin-----12. **CONZATTIA**.

Plants armed with spines. Fruit narrow, thin.

Fruit linear, constricted between the seeds; rachis of the leaf spinose.

13. **PARKINSONIA**.

Fruit linear-oblong, not constricted; rachis of the leaf not spinose.

14. **CERCIDIUM**.

1. **CASSIA** L. Sp. Pl. 376. 1753.

REFERENCE: Benthams, Trans. Linn. Soc. Bot. 21: 503-591. pl. 60-63. 1871.

Unarmed trees or shrubs; leaves pinnate, the leaflets large or small; flowers usually yellow, commonly large and showy, racemose, paniculate, or solitary; fruit very variable in form, dehiscent or indehiscent.

Besides the species enumerated here, a large number of herbaceous ones also occur in Mexico.

Fruit elastically bivalvate. Anthers dehiscent by short terminal slits.

Flowers mostly in terminal racemes, sometimes also in the upper axils; plants hispid or viscid-pubescent, or both.

Petioles equaling or slightly longer than the rachis; leaflets oval to oblong or obovate.....1. *C. pauciflora*.

Petioles usually twice as long as the rachis or longer; leaflets rounded-obovate or suborbicular.

Fruit hispid with long spreading hairs; plants prostrate or procumbent.

2. *C. hispidula*.

Fruit pilose with short appressed hairs; plants erect.....3. *C. enneandra*.

Flowers solitary or clustered in the axils; plants neither hispid nor viscid.

Leaflets 2 or 4.....4. *C. diphylla*.

Leaflets more than 2.

Leaflets 3 or 4 pairs.

Venations of the leaflets conspicuously reticulate.....5. *C. greggii*.

Venation of the leaflets not reticulate.....6. *C. macdougaliana*.

Leaflets numerous pairs.

Costa of the leaflet very close to the margin.....7. *C. cinerea*.

Costa of the leaflet remote from the margin.

Stems glabrate or puberulent.....8. *C. flexuosa*.

Stems pilose with spreading hairs.....9. *C. picachensis*.

Fruit indehiscent or dehiscent, never elastically bivalvate.

Gland of the petiole borne at the base of the petiole.

Fruit 15 to 25 cm. long, 2 to 3 mm. wide.....10. *C. leptocarpa*.

Fruit 7.5 to 12.5 cm. long, 5 to 8 mm. wide.....11. *C. occidentalis*.

Glands borne between the leaflets or none.

Anthers partly dehiscent by basal pores, pubescent.....12. *C. grandis*.

Anthers all dehiscent at or near the apex, usually glabrous.

A. Fruit turgid, terete, subterete, tetragonous, or articulate-compressed and strongly constricted between the seeds.

Seeds longitudinal.

Plants glabrous or nearly so; leaflets usually 3 pairs.....13. *C. tora*.

Plants sericeous or stellate-tomentose; leaflets 3 to 5 pairs.

Plants sericeous.....14. *C. ornithopoides*.

Plants stellate-tomentose.....15. *C. villosa*.

Seeds transverse.

Leaflets 2 pairs.

Racemes axillary, much shorter than the leaves.

Leaflets glabrous.....16. *C. inaequilatera*.

Leaflets pubescent beneath.

Leaflets obtuse.....17. *C. berlandieri*.

Leaflets acute.....18. *C. densiflora*.

Racemes mostly arranged in a large terminal panicle.

Leaflets densely pubescent beneath.....19. *C. oxyphylla*.

Leaflets glabrous beneath or obscurely puberulent.

Gland present between the lowest pair of leaves; stipules setaceous.....20. *C. fruticosa*.

Glands present between both pairs of leaflets; stipules lanceolate.....21. *C. undulata*.

Leaflets 3 or more pairs.

Leaflets 6 to 18 pairs.

Leaflets 6 to 8 pairs, rounded at apex, tomentose beneath.

22. *C. tomentosa*.

Leaflets 8 to 15 pairs, acute, glabrous.....23. *C. spectabilis*.

- Leaflets 3 to 5 pairs.
- Leaflets acute, usually glabrous-----24. *C. laevigata*.
 Leaflets obtuse or rounded at the apex, often pubescent.
 Leaflets densely sericeous-----25. *C. argentea*.
 Leaflets glabrous or nearly so-----26. *C. bicapsularis*.
- AA. Fruit strongly compressed, flat, not articulate, or if articulate not much constricted between the seeds.
- B. Gland present between the lowest pair of leaflets, large and conspicuous.
- Fruit breaking into 1-seeded joints-----27. *C. skinneri*.
 Fruit not jointed.
- Leaflets 2 or 3 pairs.
- Fruit linear-oblong, about 12 mm. wide-----28. *C. purpusi*.
 Fruit linear, less than 8 mm. wide.
 Anthers erostrate-----29. *C. botteriana*.
 Anthers partly rostrate.
 Interior sepals 12 mm. long; plants usually pubescent.
 30. *C. leiophylla*.
 Interior sepals 6 mm. long; plants glabrous.
 31. *C. holwayana*.
- Leaflets 4 to 40 pairs.
- Leaflets 18 to 40 pairs, linear-oblong-----32. *C. multijuga*.
 Leaflets 4 to 15 pairs, usually broader.
 Leaflets small, 4 to 6 mm. long-----33. *C. polyphylla*.
 Leaflets 7 to 20 mm. long or longer.
 Petals about 7 mm. long; flowers in long racemes; leaflets densely pilose beneath-----34. *C. chiapensis*.
 Petals 15 to 20 mm. long or larger; flowers clustered or in very short few-flowered racemes; leaflets usually glabrous or sparsely pubescent.
 Leaflets acuminate-----35. *C. tonduzii*.
 Leaflets rounded or very obtuse at apex.
 Leaflets oblong, 9 to 12 pairs-----36. *C. quiedondilla*.
 Leaflets obovate to oval, usually 4 to 8 pairs.
 37. *C. biflora*.
- BB. Glands none or minute and inconspicuous.
- Leaflets 1 pair-----38. *C. unijuga*.
 Leaflets 3 to 15 pairs.
- Leaflets small, 3 to 7 mm. wide or narrower.
- Fruit winged on the margins.
 Leaflets 4 to 7 pairs, obovate-oval-----39. *C. galeottiana*.
 Leaflets 8 to 14 pairs, elliptic-oblong-----40. *C. polyantha*.
 Fruit not winged.
 Fruit 9 to 15 cm. long, the valves thin-----41. *C. wislizeni*.
 Fruit 14 to 25 cm. long, the valves thick-----42. *C. pringlei*.
- Leaflets large, 1 to 6 cm. wide or larger.
- Valves of the fruit winged-----43. *C. alata*.
 Valves of the fruit not winged.
- Leaflets 3 to 5 pairs.
- Leaflets acute or acutish, soft-pubescent beneath.
 44. *C. atomaria*.
 Leaflets rounded or very obtuse at the apex.
 Leaflets oblong-----45. *C. peralteana*.
 Leaflets oval, oval-ovate, or rounded.

Fruit and ovary glabrous or nearly so.

46. *C. emarginata*.

Fruit and ovary pubescent-----47. *C. andrieuxii*.

Leaflets 6 to 15 pairs.

Leaflets glabrous; stipules large, reniform.

48. *C. nicaraguensis*.

Leaflets pubescent; stipules lanceolate to linear.

Fruit glabrous; leaflets usually acute---49. *C. racemosa*.

Fruit pubescent, at least when young; leaflets very obtuse or rounded at the apex.

Leaflets 1.8 to 3 cm. long; bracts lanceolate.

50. *C. liebmanni*.

Leaflets mostly 5 to 12 cm. long; bracts rounded-oval.

51. *C. reticulata*.

1. *Cassia pauciflora* H. B. K. Nov. Gen. & Sp. 6: 360. 1823.

Cassia punctulata Hook. & Arn. Bot. Beechey Voy. 420. 1841.

Sinaloa to Guerrero; type from La Venta del Peregrino. Central America; Brazil.

Shrub 0.6 to 2.5 meters high, viscid-hirsute; leaflets 2 pairs, 1.5 to 4.5 cm. long, obtuse or rounded at apex; petals yellow, nearly 2 cm. long; fruit about 3 cm. long, nearly 1 cm. wide. "Bejuco" (Sinaloa).

2. *Cassia hispidula* Vahl, Eclog. Amer. 3: 10. 1807.

Durango to Veracruz and Chiapas. Central America and South America.

Plants procumbent, usually herbaceous, but sometimes fruticose, very viscid; leaflets 2 pairs, 1 to 2 cm. long; petals bright yellow, 1.5 to 2 cm. long; fruit flat, hirsute, 3 to 4.5 cm. long, 8 mm. wide. "Nahuapate" (Costa Rica).

The plant is used medicinally in Costa Rica. The seeds are reported to contain abrin, the principle found in the seeds of *Abrus precatorius*.

3. *Cassia enneandra* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 179. 1915.

Oaxaca and Chiapas; type from Cerro de Picacho, Oaxaca. Guatemala.

Slender shrub, 1 to 2 meters high; leaflets 2 pairs, 1 to 1.8 cm. long, thinly pilose; flowers about 1.8 cm. long.

4. *Cassia diphylla* L. Sp. Pl. 376. 1753.

Veracruz to Guerrero and Oaxaca. Widely distributed in tropical America.

Plants essentially annual and usually herbaceous, but often frutescent, prostrate, glabrous; leaflets and large stipules finely parallel-veined.

5. *Cassia greggii* A. Gray, Pl. Wright. 1: 59. 1852.

Chamaecrista greggii Pollard; Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.

Nuevo León (type locality) and Tamaulipas.

Low shrub, nearly glabrous, with gray or brownish branches; leaflets oblong, about 1 cm. long; flowers 1.5 cm. long; fruit flat, 4 cm. long, 6 mm. wide, puberulent.

6. *Cassia macdougaliana* Rose, Contr. U. S. Nat. Herb. 12: 267. 1909.

San Luis Potosí to Puebla; type from Tehuacán, Puebla.

Densely branched shrub, 30 to 60 cm. high; leaflets 4 to 8 mm. long, bright green, thick; flowers large, deep yellow, long-pedicellate.

7. *Cassia cinerea* Cham. & Schlecht. Linnaea 5: 559. 1830.

Chamaecrista cinerea Pollard; Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.

Tamaulipas, Veracruz, and Oaxaca, often on seashores; type collected between Tecolutla and Villa Rica, Veracruz.

Ascending or prostrate shrub, the stem sometimes 2 meters long; leaflets small, pubescent.

8. *Cassia flexuosa* L. Sp. Pl. 379. 1753.*Chamaecrista flexuosa* Greene, Pittonia 4: 27. 1899.*Chamaecrista amplistipulata* Rose, Contr. U. S. Nat. Herb. 12: 267. 1909.

Yucatán to Guerrero and Oaxaca. Central America and northern South America; type from Brazil.

Low erect shrub, with small coriaceous leaflets and large stipules.

9. *Cassia picachensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 180. 1915.

Guerrero to Oaxaca; type from Cerro de Picacho, Oaxaca.

Very closely related to the preceding species, and probably only a pubescent form of it.

10. *Cassia leptocarpa* Benth. Linnaea 22: 528. 1849.

Sinaloa to Chihuahua, Veracruz, and Oaxaca. Central America and South America.

More commonly, perhaps, herbaceous, but sometimes shrubby and 2.5 meters high, ill-scented, variable in pubescence, sometimes glabrous but often pilose; leaflets about 5 pairs, ovate, 3 to 10 cm. long, acute or acuminate; flowers large and showy, paniculate; fruit subterete, 15 to 25 cm. long. "Viche" (Sinaloa).

11. *Cassia occidentalis* L. Sp. Pl. 377. 1753.

Chihuahua to Sinaloa, Chiapas, and Yucatán. Widely distributed in tropical and subtropical America; type from Jamaica.

Herbaceous or shrubby, sometimes 2.5 meters high, ill-scented; leaflets 4 to 7 pairs, ovate, 2 to 8 cm. long, acute or acuminate, usually glabrous; flowers large and showy, mostly axillary; fruit flat, glabrous, with thick margins. "Habilla," "habilla prieta" (Michoacán, Guerrero); "bricho" (Jalisco, San Luis Potosí); "mezquitillo" (Jalisco, Oaxaca); "hediondillo" (Oaxaca); "vainillo" (Oaxaca); "ecapatli" or "ecapacle" (Nahuatl); "frijolillo" (El Salvador, Panama, Nicaragua); "pico de pájaro" (Costa Rica, Nicaragua); "hierba de la potra," "hierba de gallinazo," "aitera," "bicho," "furrusca," "comida de murciélago," "chilinchile" (Colombia); "brusca" (Colombia, Venezuela, Cuba); "hierba hedlonda," "martinica" (Cuba).

The seeds are sometimes employed as a substitute for coffee. The plant is used in domestic medicine for its reputed tonic, diuretic, stomachic, and febrifuge properties. It is employed especially for dropsy, rheumatism, fevers, and venereal diseases. An infusion of the leaves has been employed by the regular physicians of the French colonies of western Africa in the treatment of yellow fever, with good results according to reports.¹ The plant is used also, in the form of an ointment, as a remedy for ringworm, eczema, and other cutaneous diseases.This species is figured by Hernández,² and described in a chapter entitled "De *Ecapatli*, seu parva Sambuco." His account is as follows: "*Ecapatli*, which some call *Tlaloaxin*, some *Totoncaxihoitl*, or hot medicine, some *Xomontontli*, or little elder, and others *Xiopatli*, is a hairy shrub, with leaves like the almond, and smooth, purplish, slender, round stems. On the tips of the branches are borne the yellow flowers, from which spring the pods, which are slender, round, and long, filled with purplish seeds, like lentils but smaller, of heavy odor and bitter flavor. The shrub grows in fields of the hot and temperate regions, and is often cultivated about houses and gardens because of its medicinal virtues. Its nature is hot and dry and somewhat astringent. It cures tumors and ulcers and calms ear-ache. The leaves, crushed and applied as a plaster to the belly, benefit infants who vomit their milk; and¹ See Heckel, Les plantes utiles de Madagascar, p. 266. 1910.² Thesaurus 112. 1651.

applied likewise to the head they alleviate pain; and applied everywhere to the body, or taken in the quantity of a handful, they relieve fever chills. Some say that in this manner it cures indigestion also, that its application helps that form of leprosy which the Indians call *Xiotl*."

12. *Cassia grandis* L. f. Suppl. Pl. 230. 1791.

Collected at Acapulco, but perhaps only cultivated; reported from Tabasco. Central America, West Indies, and South America.

Tree, 4 to 10 meters high or larger; leaflets large, oblong, 10 to 20 pairs, pubescent; flowers large and showy, racemose, white or pink; fruit 45 to 60 cm. long, about 3.5 cm. in diameter. "*Cañafístula grande*" (Tabasco); "*cañafístula*" (Guerrero); "*carao*" (Costa Rica, Nicaragua, El Salvador); "*sandal*" (Costa Rica); "*cargo*" (El Salvador, Honduras); "*cañafístula gruesa*," "*cañandonga*" (Colombia); "*carámano*" (Nicaragua); "*cañafístula cimarrona*" (Porto Rico).

The fruit is filled with a bitter pulp, which has laxative properties and is used in the treatment of fevers.

It is probably this species which has been reported frequently from Mexico as *C. fistula* L. The writer has seen no Mexican specimens of the latter, although it may occur in Mexico, at least in cultivation. The following Mexican names are reported for *C. fistula*: "*Cañafístula*," "*quauhayo-huachtli*," "*quauhuayo*." It has been reported from Oaxaca, Campeche, Morelos, and Veracruz.

13. *Cassia tora* L. Sp. Pl. 376. 1753.

Baja California and Sonora to Chiapas and Veracruz. Widely distributed in the tropics of both hemispheres.

Plants ill-scented, glabrous or nearly so, usually herbaceous but sometimes fruticose and a meter high; leaflets obovate or rounded-obovate, 2 to 5 cm. long, rounded at apex; flowers large, yellow; fruit 15 to 20 cm. long, 3 to 4 mm. wide. "*Dormilón*" (Costa Rica); "*biche manso*" (Sinaloa); "*ejotil*" (Guatemala, Honduras, *Blake*).

The leaves are said to have the purgative properties of the senna of commerce. In the Old World tropics they are sometimes cooked and eaten. In India the plant bears a great reputation as a remedy for ringworm and other cutaneous diseases. It is sometimes cultivated there for the seeds, which are used as a mordant in dyeing cloth blue. The seeds are sometimes employed in Mexico as a substitute for coffee, and it is said that they have been imported into Europe from the tropics for use in adulterating that article. In India the leaves are fried in castor oil (oil of *Ricinus communis*) and applied to ulcers; they are also crushed and used to relieve the pain of insect stings, and employed as poultices to boils to hasten suppuration. In the same country the seeds, ground and mixed with buttermilk, are employed to relieve itching eruptions of the skin.

14. *Cassia ornithopoides* Lam. Encycl. 1: 466. 1783.

Cassia sericea Swartz, Fl. Ind. Occ. 724. 1797.

Tamaulipas to Sonora, Guerrero, and Yucatán. Central America, West Indies, and South America.

Plants usually herbaceous, but sometimes fruticose and a meter high, sericeous with rufous or fulvous hairs; flowers small, yellow; fruit short, tetragonous, constricted between the seeds. "*Ovilla*" (Michoacán, Guerrero); "*xtuab*" (*Ramírez*).

Seeds used in Brazil as a substitute for coffee, the leaves as poultices for wounds, and the roots as a remedy for dropsy.

15. *Cassia villosa* Mill. Gard. Dict. ed. 8. *Cassia* no. 4. 1768.

Cassia astroites Cham. & Schlecht. Linnaea 5: 597. 1830.

Cassia articulata Rose, Contr. U. S. Nat. Herb. 12: 266. 1909.

Baja California; Oaxaca; Yucatán.

Shrub 1 to 2 meters high, easily recognized by the stellate pubescence; leaflets 3 or 4 pairs, ovate, 2.5 to 6.5 cm. long, acute or acuminate; flowers yellow; fruit 4 to 5 mm. wide, densely pubescent, deeply constricted between the seeds.

16. *Cassia inaequilatera* Balb.; DC. Prodr. 2: 490. 1825.

Reported from Oaxaca by Benth. Colombia and Venezuela; type from Santa Marta, Colombia.

Leaflets ovate, acuminate; flowers in axillary racemes.

17. *Cassia berlandieri* Benth. Trans. Linn. Soc. Bot. 27: 520. 1871.

Tamaulipas and Veracruz; type from Tampico.

The writer has seen no material of this species.

18. *Cassia densiflora* Mart. & Gal. Bull. Acad. Brux. 12: 304. 1843.

Durango to Veracruz, Oaxaca, and Chiapas; type from Guatulco, Oaxaca.

Leaflets obliquely ovate, 6 to 15 cm. long, obtuse or acute, thin, bright green; flowers yellow, in axillary racemes.

19. *Cassia oxyphylla* Kunth, Mimos. Pl. Légum. 129. pl. 39. 1819-24.

Cassia hartwegii Benth. Pl. Hartw. 117. 1843.

Sinaloa to Chiapas. Central America and northwestern South America; type from Venezuela.

Shrub, 2 to 4.5 meters high; leaflets oblique, oblong to obovate-oval, 6 to 18 cm. long, usually short-acuminate; flowers large, pale yellow; fruit subterete, about 14 cm. long and 1 to 1.5 cm. in diameter, the valves thin, smooth. "Candelillo" (Costa Rica); "frijol de monte" (Panama); "casia fistula" (Sinaloa).

The plant is used in Sinaloa as a vomitive.

20. *Cassia fruticosa* Mill. Gard. Dict. ed. 8. *Cassia* no. 10. 1768.

Cassia bacillaris L. f. Suppl. Pl. 231. 1781

Guerrero to Chiapas, Yucatán, and Veracruz. West Indies, Central America, and northern South America.

Slender, erect or scandent shrub; leaflets ovate, oblong, or obovate, oblique, 7 to 18 cm. long, usually acuminate; flowers yellow, large and showy; fruit terete, 14 to 35 cm. long, 1 cm. or less in diameter. "Quitegato" (Guerrero); "quelite" (Tabasco, *Rovirosa*); "vainillo" (Nicaragua); "sen de palillos" (Costa Rica).

This is probably the species reported by Sessé and Mocino¹ as *C. viminea*.

21. *Cassia undulata* Benth. in Hook. Journ. Bot. 2: 76. 1840.

Michoacán and Guerrero to Tabasco. Central America and northern South America.

Erect or scandent shrub, 2 to 4 meters high; leaflets obliquely lanceolate or ovate, 4.5 to 9 cm. long, long-acuminate, bright green, lustrous; flowers yellow, large and showy.

22. *Cassia tomentosa* L. f. Suppl. Pl. 231. 1781.

Querétaro to Hidalgo and Oaxaca; often cultivated. Central America and South America.

Shrub or small tree, 1 to 4.5 meters high, tomentose throughout; leaflets oblong, 2 to 6.5 cm long; flowers large and showy; fruit subterete, tomentose,

¹ Pl. Nov. Hisp. 63. 1887.

about 11 cm. long, with thin valves. "Retama" (Guerrero, *Ramírez*); "alcaparro" (Colombia).

23. *Cassia spectabilis* DC. Cat. Hort. Monsp. 90. 1813.

Reported from Veracruz. Central America, West Indies, and Colombia.

Tree, sometimes 9 meters high; leaflets lanceolate, 4.5 to 8 cm. long, attenuate; fruit 25 to 30 cm. long, terete, glabrous, transversely sulcate, with thick hard valves. "Canchín" (Veracruz, *Ramírez*).

It may be that this is one of the species which, in Mexico, have been confused with *C. fistula* L.

24. *Cassia laevigata* Willd. Enum. Pl. 441. 1809.

Sinaloa to Tamaulipas, Veracruz, and Chiapas. Widely distributed in the tropics of both hemispheres.

Plants herbaceous or fruticose, sometimes 2.5 meters high, or occasionally a small tree, glabrous or nearly so; leaflets usually ovate, 4 to 8 cm. long, acute or acuminate; flowers yellow; fruit subcompressed, 6 to 10 cm. long, 6 to 8 mm. in diameter. "Duerme de noche" (Durango); "retama" or "retamo" (Veracruz, Durango, Oaxaca); "café del país," (Veracruz, Oaxaca); "sen del país," "hierba hedionda macho" (Porto Rico); "frijolillo" (Guatemala, Honduras, *Blake*).

Seeds sometimes used as a substitute for coffee. The plant is said to have purgative properties, and is used in Mexico as an emmenagogue. Sornay states that the plant has been suspected to be poisonous.

This species is figured by Hernández¹ and discussed in a chapter entitled "*De Chatalhuic Cassia Silvestri*." The figure applies to this plant, but the description does not agree in all particulars. He speaks of it as "*chatalhuic*, which some call *Cacaoatl* or *Casia fistula*." "The bark," he says, "which is hot and dry in the fourth degree, is light or dark in color; powdered and drunk in the quantity of two drachms in water in the morning it purges the bile and phlegm, and expels worms if there are any in the body. It is esteemed as an excellent drug by the natives. The same bark, mixed with *Axin* and supplied behind the ears, cures earache. The rind of the fruit, which is sweet and in flavor similar to that of *Cassia fistula*, drunk in the same manner and quantity, purges the bile and phlegm, soothes the belly, and acts as a gentle purgative. The same rind, pulverized and infused in water (a comb being wetted with it), restores the hair and makes it grow long. The seeds, ground and mixed with water and drunk, soothe fevers. All of which things have been proved by a thousand experiments." On page 376 of the same work there is figured, without description, "*Ecapatli altera*," which also is probably of this species.

25. *Cassia argentea* H. B. K. Nov. Gen. & Sp. 7: 358. 1823.

Known only from the type locality, banks of the Río Mescala.

Said to be a shrub about a meter high, although the related species are much lower and herbaceous. No material seen by the writer.

26. *Cassia bicapsularis* L. Sp. Pl. 376. 1753.

Cassia ovalifolia Mart. & Gal. Bull. Acad. Brux. 12: 305. 1843.

Cassia manzanilloana Rose, Contr. U. S. Nat. Herb. 1: 325. 1895.

Sonora to Tamaulipas, Yucatán, and Chiapas. Widely distributed in tropical America; also adventive in the Old World.

Shrub, 1.5 to 3 meters high, or often herbaceous, glabrous or pubescent; leaflets oval or obovate, 1.5 to 4 cm. long; flowers pale yellow, very large and showy; fruit subterete, about 11 cm. long and 1 cm. in diameter, smooth. "Bricho" or "bicho" (Jalisco, San Luis Potosí); "alcaparrillo" (Oaxaca,

¹Thesaurus 70. 1651.

Guatemala, Peru); "cochimbo" (Oaxaca, Tabasco); "sen del país" (Cuba, Porto Rico); "hoja de sen" (Porto Rico); "hierba del burro" (Argentina).

Leaves reported to have purgative properties. The wood is said to have been used in Brazil for paper making.

27. *Cassia skinneri* Benth. Trans. Linn. Soc. Bot. 27: 542. 1871.

Cassia nelsoni Rose, Contr. U. S. Nat. Herb. 5: 135. f. 1. 1897.

Cassia trichoneura T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 179. 1915.

Guerrero to Morelos and Chiapas. Guatemala (type locality).

Shrub or tree, 2 to 6 meters high; leaflets usually 5 pairs, oval, oblong, or obovate, 2 to 4.5 cm. long, rounded at apex, pubescent beneath; flowers yellow, the petals about 3.5 cm. long, conspicuously veined; fruit flat, about 14 cm. long and 1 cm. wide, puberulent. "Parocata" (Guerrero).

28. *Cassia purpusi* T. S. Brandeg. Zoe 5: 234. 1906.

Baja California; type from Calmallí.

Low shrub with dark branches; leaflets oval, 1 to 2 cm. long, rounded at apex, glaucescent; flowers yellow; fruit 5 or 6 cm. long, glabrate.

29. *Cassia botteriana*¹ Benth. Trans. Linn. Soc. Bot. 27: 541. 1871.

Veracruz and Tepic; type from Orizaba, Veracruz.

No material seen by the writer.

30. *Cassia leiophylla* Vog. Gen. Cass. Syn. 25. 1837.

Veracruz; reported from Tabasco. Central America and South America; type from Brazil.

Low shrub, or sometimes wholly herbaceous; leaflets broadly obovate, 3 to 5 cm. long, rounded at apex; flowers yellow, the petals 3 cm. long; fruit about 10 cm. long and 5 mm. wide, falcate, glabrate. "Hormiguera" (Tabasco, *Rovirosa*).

31. *Cassia holwayana* Rose, Contr. U. S. Nat. Herb. 8: 301. 1905.

Cassia multiflora Mart. & Gal. Bull. Acad. Brux. 10²: 307. 1843. Not *C. multiflora* Vog. 1837.

Puebla, Oaxaca, and Chiapas; type from the city of Oaxaca.

Shrub, 1 to 3.5 meters high, glabrous; leaflets oval or oblong, 2 to 7.5 cm. long, rounded at the apex; flowers yellow, very large and showy; fruit flat, 7 to 11 cm. long, 5 to 7 mm. wide. "Retamo" (Oaxaca, *Villada*).

32. *Cassia multijuga* L. Rich. Act. Soc. Hist. Nat. Paris 108. 1792.

Puebla and Chiapas. South America; West Indies.

Tree, about 6 meters high; leaflets linear, 10 to 15 mm. long, glabrous; flowers large, yellow; fruit flat, 15 cm. long, 1.5 cm. wide, glabrous.

33. *Cassia polyphylla* Jacq. Coll. Bot. 4: 104. 1790.

Yucatán. West Indies; type from Porto Rico.

Shrub, 2 to 4 meters high, or sometimes a tree of 15 meters; leaflets few, oval or obovate; flowers yellow, mostly solitary; fruit flat, linear. "Hediondilla," "retama," "retama prieta" (Porto Rico).

34. *Cassia chiapensis* Standl. Contr. U. S. Nat. Herb. 19: 215. 1919.

Chiapas; type from Teopisca.

Probably a shrub, densely pilose throughout; leaflets oval, 2 to 4 cm. long, rounded at apex; flowers small, yellow, racemose; fruit short, flat, thin, glabrate.

¹Mateo Botteri, a Dalmatian, was sent to Mexico by the Horticultural Society of London about 1850. Later he collected on his own account, and made very extensive series of specimens, which were widely distributed. These came chiefly, if not entirely, from the region of Orizaba, where he settled and later died.

35. *Cassia tonduzii* Standl. Contr. U. S. Nat. Herb. 20: 215. 1919.

Chiapas. Costa Rica (type locality).

Tree; leaflets elliptic or oblong, 3 to 8 cm. long; flowers yellow, about 3 cm. long; fruit flat, 15 to 18 cm. long, 6 mm. wide, glabrate.

36. *Cassia quiedondilla* Michell, Mém. Soc. Phys. Hist. Nat. Genève 34: 272. pl. 19. 1903.

Guerrero; type from Los Fresnos. Guatemala to Costa Rica.

Shrub; leaflets 1.2 to 3 cm. long, rounded at apex, pale beneath, glabrate; flowers yellow, the petals 3 to 3.5 cm. long. "Quiedondilla" (Guerrero).

Probably not essentially different from some of the forms of *C. biflora*.

37. *Cassia biflora* L. Sp. Pl. 378. 1753.

Cassia acapulcensis H. B. K. Nov. Gen. & Sp. 6: 353. 1823.

Cassia geminiflora Moc. & Sessé; Collad. Hist. Nat. Méd. Cass. 103. pl. 3. 1816.

Baja California to Chihuahua, Yucatán, and Chiapas. Widely distributed in tropical America.

Slender shrub, 0.5 to 2.5 meters high; leaflets 1 to 3.5 cm. long, rounded or sometimes emarginate at apex, glabrous or nearly so; flowers yellow, 2 to 3 cm. long; fruit flat, 5 to 11 cm. long, 4 to 5 mm. wide, straight or curved. "Flor de San José" (Oaxaca); "ahumada," "montenegrito" (Nicaragua); "retama" (Porto Rico); "brucha" (Venezuela); "abejón," "biche silvestre" (Sinaloa).

Said to have been used in the Bahamas as a remedy for venereal diseases.

38. *Cassia unijuga* Rose, Contr. U. S. Nat. Herb. 5: 195. 1899.

Puebla; type from Tehuacán.

Densely branched shrub, 30 to 90 cm. high; leaflets rounded, 6 to 11 mm. long, subretuse at apex, pubescent; flowers axillary, yellow, 2.5 cm. long; fruit flat, glabrous, about 10 cm. long and 7 mm. wide.

39. *Cassia galeottiana* Martens, Bull. Acad. Brux. 10²: 305. 1843.

Puebla and Oaxaca (type locality).

Shrub or small tree, 2 to 4.5 meters high; leaflets 5 to 9 mm. long, rounded at the apex, glabrate; flowers yellow, 1 to 1.5 cm. long; fruit about 7 cm. long and 2 cm. wide, flat and thin, glabrous, narrowly winged, breaking into short joints.

40. *Cassia polyantha* Moc. & Sessé; Collad. Hist. Nat. Méd. Cass. 112. pl. 2. 1816.

Cassia browniana Kunth, Mimos. Pl. Légum. 135. pl. 41. 1819-24.

Cassia goldmani Rose, Contr. U. S. Nat. Herb. 10: 98. 1906.

Baja California; Guanajuato to Oaxaca.

Shrub or small tree, 3 to 4.5 meters high; leaflets 1 to 2 cm. long, rounded at apex, glabrate in age; flowers yellow, about 1 cm. long; fruit similar to that of the preceding species.

41. *Cassia wislizeni* A. Gray, Pl. Wright. 1: 60. 1852.

Chihuahua (type locality) to Tamaulipas, San Luis Potosí, and Querétaro. Southern New Mexico and Arizona.

Shrub, 1 to 3 meters high; leaflets obovate or rounded, 4 to 15 mm. long, rounded at apex, thinly and minutely sericeous; petals yellow, 2 cm. long; fruit flat, 6 to 8 mm. wide, glabrous, lustrous. "Pinacate" (Zacatecas).

42. *Cassia pringlei* Rose, Contr. U. S. Nat. Herb. 5: 194. 1899.

Cassia morelensis Greenm. Proc. Amer. Acad. 39: 79. 1903.

Colima to Morelos and Oaxaca; type from Tomellín, Oaxaca.

Shrub or small tree, 1 to 6 meters high; leaflets oblong, obovate, or oval, 5 to 8 mm. long; flowers 2 to 2.5 cm. long; fruit flat, 6 mm. wide.

43. *Cassia alata* L. Sp. Pl. 378. 1753.

Guerrero; reported from Yucatán, Oaxaca, and Tabasco, but chiefly cultivated, probably. Widely distributed in tropical America.

Shrub, 1 to 4 meters high; leaflets oval to oblong, 6 to 17 cm. long, rounded at apex, glabrate; flowers large, lemon-yellow, racemose; fruit about 15 cm. long, each valve with a broad thin wing. "Flor del secreto" (Yucatán, Oaxaca); "taratana" (Oaxaca, Tabasco); "soroncontil" (Nicaragua); "bajagua," "lucutema," "mocuteno," "majagüillo" (Colombia); "laureño" (Panama); "guacamaya francesa" (Cuba); "barajo" (Guatemala, Honduras, Blake); "talantola," "talantro" (Porto Rico); "guajavo" (Santo Domingo).

In Jamaica the plant is known as "ringworm shrub." It is a very handsome shrub when in flower. In Guam and the Philippines it is called "Acapulco," doubtless from the fact that it was introduced into those islands by the ships which sailed between Acapulco and Manila. In the Philippines this name has also been modified as "Capulco" and "Capurco." Reko refers the Nahuatl name "ecapatli" to this species, and states that the plant was employed by the Aztecs for syphilis. He refers here also the name "totoncaxihuitl" ("fever-herb"), and states that the plant found use also as a remedy for fevers.

The leaves are said to have purgative, diuretic, and sudorific properties, and they are employed widely as a remedy for ringworm and other cutaneous diseases. The decoction of the plant has been used in the West Indies for venereal diseases, as a remedy for snake bites, and to destroy chiggers. Drury reports that it is widely used by Hindoo physicians for all sorts of poisonous bites. For an illustration of the plant see Contr. U. S. Nat. Herb. 8: pl. 39.

44. *Cassia atomaria* L. Mant. Pl. 68. 1767.

Sinaloa to Chiapas. Central America and South America.

Tree, 5 to 12 meters high; leaflets oblong, elliptic, or ovate, 4.5 to 12 cm. long, densely pubescent beneath; flowers large, yellow, racemose; fruit flat, 14 to 40 cm. long or more, 1 to 1.5 cm. wide. "Quediondillo" (Michoacán, Guerrero; doubtless a corruption of "hediondilla").

45. *Cassia peralteana* H. B. K. Nov. Gen. & Sp. 6: 356. 1823.

A very doubtful species; known only from the original collection obtained near Campeche.

Leaflets oblong, 1 to 3 cm. long, appressed-puberulent beneath; flowers in axillary racemes.

46. *Cassia emarginata* L. Sp. Pl. 376. 1753.

Cassia arborescens Mill. Gard. Dict. ed. 8. *Cassia* no. 15. 1768.

Nearly throughout Mexico. West Indies, Central America, and northern South America.

Tree, 3.5 to 7 meters high, or larger; trunk often 25 to 30 cm. in diameter; bark dark brown; leaflets oblong to rounded-oval, 2 to 13 cm. long, pubescent beneath; flowers large, pale yellow or orange, racemose; fruit like that of *C. atomaria*. "Flor de San José," "alcaparro," "vara de San José," "chile perro" (Oaxaca); "xtuab" (Yucatán); "palo de zorrillo" (Baja California); "palo hediondo" (Veracruz); "mora hedionda" (Sinaloa); "vainillo" (Nicaragua); "brucha macho" (Venezuela); "guacamaya amarilla," "Júpiter amarillo" (Cuba); "palo de chivo" (Santo Domingo).

Reported to have purgative properties and to be used in Jamaica as a dye-wood. In Sinaloa the leaves are applied to allay the pain of insect stings. The flowers are very abundant and showy.

47. *Cassia andrieuxii* Benth. Trans. Linn. Soc. Bot. 27: 548. 1871.

Cassia fulva T. S. Brandeg. Zoe 5: 233. 1906.

Puebla (type locality) and Oaxaca.

Shrub or small tree; leaflets oval or obovate-oval, 1 to 3.5 cm. long, densely pubescent on both surfaces; flowers yellow, racemose; fruit 15 cm. long, about 8 mm. wide.

48. *Cassia nicaraguensis* Benth. Trans. Linn. Soc. Bot. **27**: 552. 1871.

Cassia seleriana Harms, Bull. Herb. Boiss. **7**: 551. 1899.

Guerrero to Oaxaca. Central America; type from Nicaragua.

Tree, 4 to 6 meters high, glabrous; stipules very large, semireniform, persistent; leaflets numerous, oblong, 3 to 7 cm. long, obtuse or rounded at apex; flowers yellow, in long racemes; fruit 8 to 11 cm. long, nearly 1.5 cm. wide, lustrous, the valves prominently mamillate over the seeds. "Candelita" (Costa Rica); "sambrán" (El Salvador).

49. *Cassia racemosa* Mill. Gard. Dict. ed. 8. *Cassia* no. 19. 1768.

Yucatán. South America.

Tree, 6 to 18 meters high; leaflets oblong to oval-elliptic, 3 to 6 cm. long; flowers large, orange or yellow, in short dense racemes; fruit about 6.5 cm. long and 1 cm. wide, flat.

50. *Cassia liebmanni* Benth. Trans. Linn. Soc. Bot. **27**: 549. 1871.

Known only from the type locality, Santiago Estola, Oaxaca.

51. *Cassia reticulata* Willd. Enum. Pl. 443. 1809.

Chiapas; reported from Yucatán and Tabasco. Central America and South America.

Tree, 3.5 to 8 meters high; leaflets oblong to obovate, rounded at apex; flowers large, yellow, in long racemes; fruit very flat, 12 to 18 cm. long, 1.3 to 2 cm. wide, the valves thin. "Sambrán," "sambrán de río" (El Salvador); "saragundín" (Costa Rica); "sorocontil" (Nicaragua); "tarantán" (Venezuela).

2. **TAMARINDUS** L. Sp. Pl. 34. 1753.

1. ***Tamarindus indicus* L.** Sp. Pl. 34. 1753.

Widely cultivated in Mexico, as well as elsewhere in tropical America, and often growing without cultivation. Native of the tropics of the Old World.

Large unarmed tree, sometimes 15 meters high or more, with widely spreading crown, the bark brown; leaves pinnate, the leaflets numerous, oblong, 1 to 2 cm. long; flowers large, yellow, striped with red, racemose; fruit large, brown, rough, thick, indehiscent, the 4 to 7 brown seeds surrounded by a juicy red pulp; wood fine-grained, dirty white or yellowish, its specific gravity said to be about 0.94. Known generally as "tamarindo;" the name "huaje" or "hoaxin" is said to be used in some localities.

The tamarind was introduced into Mexico soon after the Conquest, and is now a common tree in many regions. The wood is of some local importance. It is valuable for building purposes and furnishes excellent charcoal for the manufacture of gunpowder. In India the leaves are used to give a yellow dye and the seeds, young leaves, and flowers are eaten. The fruit is the most important product of the tree, the juicy, acidulous pulp being eaten and employed generally in tropical America in the preparation of cooling beverages. It is made also into various kinds of sweetmeats. In some parts of tropical America a fermented drink is made from the pulp.

In India the fruit is much used for flavoring curries, and the seeds are often cooked and eaten. The young seedlings also are boiled as a vegetable, likewise the leaves and flowers.

The pulp of the fruit is official in the U. S. Pharmacopoeia. It contains sugar and acetic, tartaric, and citric acids. Its fluid extract is laxative and

refrigerant, and an infusion is employed as a beverage in febrile diseases. The supply of the fruit for the United States comes chiefly from the West Indies; that for Europe from India, the West Indies, and Ecuador. For shipment the outer shell is stripped off and the pulp preserved with sugar or syrup. In Madagascar a decoction of the bark is employed for asthma and amenorrhoea, and a decoction of the leaves for intestinal worms and derangements of the stomach.

The tamarind is described at length by Hernández.¹ For an illustration of the leaves and fruit see Contr. U. S. Nat. Herb. 9: pl. 66.

Ceratonia siliqua L., the carob or St. John's-bread ("algarrobo"²), a native of the Old World, is cultivated at Guaymas, Sonora, and probably elsewhere. It has pinnate leaves with large oval leaflets, and large brown pods containing a thick edible pulp.

3. POEPPIGIA Presl, Symb. Bot. 1: 15. 1830.

1. *Poeppigia procera* Presl, Symb. Bot. 1: 16. pl. 8. 1830.

Guerrero and Oaxaca. Cuba, Central America, and South America.

Nearly glabrous tree, 4 to 5 meters high, unarmed; leaves pinnate, the leaflets numerous, linear-oblong, 1 to 2 cm. long, glabrate; flowers yellow, showy, paniculate; fruit flat and thin, narrowly winged on the upper suture, 4 to 9 cm. long, 1 to 1.5 cm. wide; wood hard, the sapwood white, the heartwood reddish, beautifully veined. "Quiebra-hacha," "bicho" (Oaxaca); "tengue," "abey hembra" (Cuba).

4. CERCIS L. Sp. Pl. 374. 1753.

1. *Cercis canadensis* L. Sp. Pl. 374. 1753.

Coahuila to San Luis Potosí. Eastern United States.

Large shrub or small tree, 3 to 12 meters high, the trunk sometimes 30 cm. thick; bark smooth, light brown; leaves deciduous, reniform or ovate-orbicular, 5 to 9 cm. wide, glabrous or pubescent beneath; flowers pink or purplish, clustered, appearing before the leaves; fruit flat, thin, 6 to 10 cm. long, 1 to 1.5 cm. wide, bronze, somewhat glaucous; wood hard, close-grained, yellowish brown, its specific gravity about 0.70. "Pata de vaca" (San Luis Potosí).

Palmer reports that in San Luis Potosí the flowers are fried and eaten, being considered a great delicacy. The bark has mild but very active astringent properties, and has been recommended for the treatment of chronic diarrhoea and dysentery.

C. reniformis Engelm. (*C. texensis* Sarg.) has been reported from Mexico. That species does not appear to be very clearly distinct from *C. canadensis*. The Mexican material at hand seems to represent a single species, and agrees better with *C. canadensis* than with the material that has been referred to *C. reniformis*.

5. CYNOMETRA L. Sp. Pl. 382. 1753.

1. *Cynometra oaxacana* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 180. 1915.

Guerrero and Oaxaca; type from Cerro de Picacho, Oaxaca.

Unarmed tree, 8 to 10 meters high; leaves nearly sessile, bifoliate, the leaflets very oblique, 3 to 6.5 cm. long, obtuse, thick, lustrous, glabrous; flowers

¹ Thesaurus 83-84, with figure. 1651. For other accounts see Popenoe in Bailey, Stand. Cycl. Hort. 3306-3307. f. 3768. 1917; Safford, Contr. U. S. Nat. Herb. 9: 383. 1905; Cook, Contr. U. S. Nat. Herb. 8: 248. 1903.

² This is the tree to which the name "algarrobo" is applied in Spain. The Spaniards who came to Mexico in early days applied the name to various similar, more or less closely related plants.

small, white, in short racemes, long-pedicellate; fruit ellipsoid, compressed, 2.5 to 3 cm. long.

6. **HYMENAEA** L. Sp. Pl. 1192. 1753.

Some of the species occurring along the East African coast furnish valuable gums which are exported as "copal gum" for the manufacture of varnish. The gum is exuded chiefly about the roots, and in some localities deposits of "fossil" gum are found, where the trees themselves have disappeared. From 800,000 to 1,200,000 pounds of the gum are said to be exported annually from Zanzibar.

1. **Hymenaea courbaril** L. Sp. Pl. 1192. 1753.

Hymenaea candolleana H. B. K. Nov. Gen. & Sp. 6: 323. pl. 566. 1823.

Tepic to Chiapas, Veracruz, and Tabasco. Widely distributed in Central America, the West Indies, and South America.

Unarmed tree, 5 to 25 meters high, or even larger, the trunk sometimes 2 meters in diameter, sometimes furnished with buttresses, the bark thin, whitish; leaves bifoliolate, persistent, the leaflets obliquely ovate, oblong, or oval, 5 to 10 cm. long, obtuse to acuminate, thick and leathery, gland-dotted; flowers large, whitish or purplish, corymbose-paniculate; fruit large, brown, rough, usually 2-seeded, indehiscent, the valves very thick and hard. "Cuapinol," "cuapinole," "cuapinoll," "coapinol," "guapinol," "guapinole" (Tabasco, Oaxaca, Veracruz, Jalisco, Central America, etc.; from the Nahuatl *cua-pinolli*, sometimes written *quauhpinoll*); "nere" (Oaxaca, Zapotec, *Reko*); "copinol" (Guatemala, El Salvador); "algarrobo" (El Salvador, Cuba, Porto Rico, Panama, Venezuela); "quiebra-hacha," "curbaril" (Cuba); "palito colorado" (Guatemala, Honduras, *Blake*).

The name "courbaril" is said to be employed in British Guiana and "jatoba" in Brazil. The wood is very hard, tough, and heavy (the specific gravity reported as 0.90 and 1.06), and is colored somewhat like mahogany; it is employed for general construction, ship building, furniture, sugar mills, etc., and is sometimes exported. The Indians of Brazil use both the trunks and the bark for making canoes. The seeds are surrounded by a sweet pulp, which becomes mealy when the fruit is ripe. This pulp is edible; it is mixed with water to prepare a kind of "atole," which is said to be very nutritious, and is sometimes fermented to produce an alcoholic beverage. A pale yellow or reddish gum ("resina de cuapinole," "goma animé de México," "ámbar del país," "ámbar de cuapinole," "succino del país," "succino criollo," "goma de la tierra," "incienso de la tierra," "incienso de Petapa") exudes from the trunk, and is found more abundantly on the roots. In Mexico this has been much used for incense in churches, and is employed in making varnish for furniture, patent leather, etc. It is sometimes collected in Mexico for export, and this tree is supposed to be the source of the "gum animé," of which large quantities are shipped from Brazil. This was formerly used in official medicine, especially in the preparation of ointments and plasters, but now it is employed only in the manufacture of varnish and incense. The fruit contains large resin pockets whose contents harden into gum. In the regions where the tree is native the gum is sometimes smoked to relieve asthma and is employed locally for rheumatism, catarrh, ulcers, and venereal diseases. The decoction of the bark is reputed to act as an arterial sedative and to have purgative vermifuge and carminative properties.¹ For an illustration of the fruit see Contr. U. S. Nat. Herb. 8: pl. 41.

7. **BAUHINIA** L. Sp. Pl. 374. 1753.

Trees or shrubs, often armed with spines, sometimes scandent, the stems often compressed; leaves simple and palmately nerved, entire or bilobate,

¹ See Noriega, Bol. Dir. Estud. Biol. (Mexico) 2: 357-363. f. 1-3. 1918.

or sometimes bifoliolate; flowers racemose, usually large and showy, the racemes often paniculate; fruit flat, indehiscent or bivalvate.

There are many species of the genus in the East Indies, some of which are cultivated in tropical America because of their very showy flowers. Some of the Old World representatives yield a gum which, however, is of little importance, and the bark of certain species is used for tanning. Others have bark which furnishes dyes or from which rope is made, some are said to be employed as fish poisons, and some have edible flowers and seeds. Vermifuge properties are ascribed to certain species, and others are employed as remedies for liver affections.

The following names are reported for Mexican species whose identification is uncertain: "Timbe" (Jalisco); "hierba de la vaca" (Durango); "papalocuahuite" (San Luis Potosí).

Stamens 10, all or 5 of them perfect.

Plants armed with spines.

- Lobes of the leaves acute.....1. *B. leptopetala*.
Lobes rounded.....2. *B. longiflora*.

Plants unarmed.

- Leaves bifoliolate.....3. *B. heterophylla*.
Leaves simple.
Fruit elliptic-oblong.....4. *B. glabra*.
Fruit linear.

Leaves 3.5 cm. long or shorter, the lobes broadly rounded.

5. *B. andrieuxii*.

Leaves 4 to 11 cm. long, the lobes acute or acutish.....6. *B. unguolata*.

Stamens, except one or two, sterile and reduced to staminodia.

Leaves all or mostly bifoliolate.

Leaflets 2-nerved; flowers solitary.....7. *B. ramosissima*.

Leaflets 3-nerved; flowers racemose.

Leaflets less than 2.5 cm. long.....8. *B. unguicularis*.

Leaflets 2.5 to 5 cm. long.....9. *B. uniflora*.

Leaves simple.

Petals 2, much shorter than the calyx lobes.....10. *B. dipetala*.

Petals 5, equaling or much longer than the calyx lobes.

Leaves not bilobate.....11. *B. jenningsii*.

Leaves all or mostly bilobate.

Leaves lobed more than halfway to the base.

Leaves coriaceous, reticulate-veined, deeply cordate at base.

14. *B. pes-caprae*.

Leaves membranaceous, not reticulate-veined, shallowly or not at all cordate at base.

Pedicels less than 5 mm. long, stout; pubescence of the petals appressed.....15. *B. lunarioides*.

Pedicels 7 to 12 mm. long, slender; claws of the petals pilose with spreading white hairs.

Leaves broader than long, about 3 cm. long.....16. *B. lunaria*.

Leaves as long as broad or longer, 7 to 15.5 cm. long.

17. *B. pringlei*.

Leaves lobed less than halfway to the base, or barely to the middle.

Petals nearly sessile, the claw very short.....18. *B. coulteri*.

Petals borne on long slender claws.

Petals densely pilose or tomentose, at least on the claw and lower part of blade.

Blades of the petals 2.5 mm. wide or narrower.

19. *B. subrotundifolia*.

Blades of the petals nearly 1 cm. wide.

Leaves 9-nerved, lobed halfway to the base, 5 cm. wide or narrower ----- 12. *B. macranthera*.

Leaves 7-nerved, lobed less than halfway to the middle, 6 to 8 cm. wide ----- 13. *B. retifolia*.

Petals glabrous or nearly so.

Leaves glabrous.

Leaves 5 to 10 cm. long, all deeply bilobate.

20. *B. unilateralis*.

Leaves 10 to 22 cm. long, shallowly bilobate, or some of them often entire ----- 21. *B. pansamalana*.

Leaves pubescent.

Leaves green beneath, almost concolorous, with numerous small glands, the lobes usually acute or acuminate.

22. *B. mexicana*.

Leaves pale beneath, nearly or wholly without glands.

Pubescence of the lower surface of the leaves, between the veins, of closely appressed hairs.

Leaves large, usually 5 to 8 cm. long, deeply lobed, the lobes divaricate, usually pointed ----- 23. *B. divaricata*.

Leaves small, 1.5 to 5.5 cm. long, shallow lobed, the lobes not divaricate, rounded ----- 24. *B. spathacea*.

Pubescence of the lower surface of the leaves of soft spreading hairs.

Petals purplish ----- 25. *B. schlechtendalliana*.

Petals white ----- 26. *B. latifolia*.

1. *Bauhinia leptopetala* DC. Prodr. 2: 513. 1825.

Described from Mexico. Known to the writer only from Mocifio and Sessé's plate.¹

Leaves cordate at base, glabrous; flowers greenish, the petals linear, acute.

2. *Bauhinia longiflora* Rose, Contr. U. S. Nat. Herb. 10: 97. 1906.

Bauhinia chlorantha T. S. Brandeg. Zoe 5: 200. 1905.

Sinaloa to Guerrero; type from Imala, Sinaloa.

Spreading shrub or tree, 3 to 9 meters high, armed with short stout spines; leaves 2.5 to 6 cm. wide, green, sparsely pubescent beneath; flowers large, greenish; fruit 15 to 20 cm. long, 1 to 1.5 cm. wide, borne on a very long slender stipe.

Perhaps not different from *B. pauletia* Pers. (*Pauletia aculeata* Cav.), a species described from Panama.

3. *Bauhinia heterophylla* Kunth, Mimos. Pl. Légum. 46. 1919-24.

Yucatán. West Indies and northern South America; type from Venezuela. Scandent shrub, 3 to 4.5 meters high.

4. *Bauhinia glabra* Jacq. Stirp. Amer. 119. pl. 173, f. 3. 1763.

Yucatán; Colima; reported from Veracruz. Central America and northern South America; type from Cartagena, Colombia.

Scandent shrub; leaves 5 to 7.5 cm. long, long-petiolate, the lobes obtuse, thinly brown-sericeous beneath; fruit 5 to 7 cm. long, nearly 2 cm. wide, 1 or 2-seeded, very thin, brown-sericeous.

The Mexican plant may be specifically distinct.

¹DC. Calq. Dess. Fl. Mex. pl. 223.

5. *Bauhinia andrieuxii* Hemsl. Diag. Pl. Mex. 48. 1880.

Oaxaca; type from the city of Oaxaca.

Shrub with reddish brown branches; leaves mostly 2 to 3 cm. wide, pubescent beneath; flowers few.

6. *Bauhinia unguolata* L. Sp. Pl. 374. 1753.

Pauletia inermis Cav. Icon. Pl. 5: 6. pl. 409. 1799.

Bauhinia inermis Pers. Syn. Pl. 1: 455. 1805.

Bauhinia cavanillei Millsp. Field Mus. Bot. 1: 364. 1898.

Tepic to Veracruz, Tabasco, and Chiapas. Central America.

Erect shrub or small tree, unarmed, the branches slender, reddish brown; leaves 3 to 10 cm. wide, brown-pubescent and gland-dotted beneath; flowers 4 to 5 cm. long, white or greenish; stamens white; fruit 15 to 20 cm. long, about 1 cm. wide, minutely puberulent or glabrate. "Pato de venado" (Oaxaca, Michoacán, Guerrero); "calzoncillo" (Tabasco); "casco de venado" (Costa Rica); "cocla" (Panama).

Leaves said to have sudorific properties.

7. *Bauhinia ramosissima* Benth.; Hemsl. Biol. Centr. Amer. Bot. 1: 339. 1880.

Coahuila to Hidalgo; type from Zimapán, Hidalgo.

Densely branched shrub; leaflets about 1.5 cm. long, rounded at apex, bright green, glabrous; flowers 2.5 cm. long; fruit 1 to 1.5 cm. wide, short-stipitate.

8. *Bauhinia unguicularis* Benth.; Hemsl. Biol. Centr. Amer. Bot. 1: 340. 1880.

Known only from the type locality, Zimapán, Hidalgo.

Densely branched shrub; leaflets rounded at apex, glabrate; petals 3 cm. long.

9. *Bauhinia uniflora* S. Wats. Proc. Amer. Acad. 21: 451. 1886.

Coahuila and San Luis Potosí; type from Jimulco, Coahuila.

Large, densely branched shrub; leaflets oval or rounded, glabrate, thick; flowers purplish, about 3 cm. long.

10. *Bauhinia dipetala* Hemsl. Diag. Pl. Mex. 48. 1880.

Veracruz, Puebla, and Oaxaca; type from Valley of Córdoba, Veracruz.

Shrub or small tree, 3 to 4.5 meters high; leaves 3.5 to 12 cm. long, puberulent or glabrate beneath, the lobes rounded or obtuse; flowers purplish, the stamens long-exserted; fruit about 15 cm. long and 1 to 1.5 cm. wide, long-stipitate.

11. *Bauhinia jenningsii* P. Wilson, Bull. Torrey Club 43: 463. 1916.

Yucatán. Isle of Pines, Cuba (type locality).

Leaves ovate-oblong or ovate, sometimes subhastate, 4.5 to 10 cm. long, acute or obtuse at apex, subcordate at base, pale beneath; flowers about 1.5 cm. long; fruit 8 cm. long and 1.2 cm. wide.

12. *Bauhinia macranthera* Benth.; Hemsl. Biol. Centr. Amer. Bot. 1: 338. 1880.

Known only from the type locality, Zimapán, Hidalgo.

Leaves pubescent beneath, the lobes rounded; flowers subsolitary, the petals 3 cm. long; fruit about 12 cm. long, glabrous.

13. *Bauhinia retifolia* Standl., sp. nov.

Type from Rascón, San Luis Potosí (*Purpus* 5268; U. S. Nat. Herb. no. 463835).

Young branches stout, ferruginous-tomentulose, unarmed; petioles 1.5 to 2.5 cm. long, sparsely tomentose at first but soon glabrate; leaf blades 5.5 to 9.5 cm. long, 6 to 8 cm. wide, openly cordate or subcordate at base, 7 or 9-nerved, bilobate at the apex for about one-third the total length, the lobes deltoid, obtuse or rounded at apex, coriaceous, bright green, concolorous, the venation very

prominent and closely reticulate on both surfaces, lustrous above, glabrous, obscurely puberulent beneath along the nerves but elsewhere glabrous; flowers racemose, the racemes axillary, short, dense, the pedicels short, stout, tomentulose; calyx spathaceous, 2 to 2.4 cm. long, thinly puberulent; the teeth short, subulate; petals 5, 3 to 4 cm. long, the blade oval, about 1.5 cm. long, thinly racemose, the racemes axillary, short, dense, the pedicels short, stout, thinly tomentose near the base but elsewhere glabrous, the claw slender, densely tomentose; ovary long-stipitate, densely tomentose.

Related to *B. macranthera* Benth. The writer has seen no material of that species, but according to the description it differs in having small, 9-nerved, deeply bilobate leaves, and much shorter petioles.

14. *Bauhinia pes-caprae* Cav. Icon. Pl. 5: 3. pl. 404. 1799.

Guerrero; type from Acapulco.

Small tree, 3.5 meters high or larger; leaves 3 to 8 cm. long, glabrous or nearly so, very thick, the lobes rounded at apex; flowers about 3 cm. long, the petals white-sericeous outside, pink within. "Pié de cabra."

15. *Bauhinia lunarioides* A. Gray; S. Wats. Bibl. Ind. N. Amer. Bot. 205. 1878.

Nuevo León and probably elsewhere.

Leaves 3.5 to 5.5 cm. long, more or less pubescent beneath, the lobes rounded at apex; flowers about 3 cm. long.

16. *Bauhinia lunaria* Cav. Icon. Pl. 5: 4. pl. 407. 1799.

Known only from the type locality, Acapulco, Guerrero.

Shrub, 1.8 to 2.5 meters high; petals purplish.

17. *Bauhinia pringlei* S. Wats. Proc. Amer. Acad. 25: 147. 1890.

Jalisco to Guerrero; type from Guadalajara.

Slender shrub, 4.5 to 6 meters high; leaves 7.5 to 18 cm. wide, thin, bright green above, pale and glabrate beneath, the lobes rounded to acute; petals 3 cm. long, white, with a purple stripe along the costa; fruit about 12 cm. long and 1.3 cm. wide.

18. *Bauhinia coulteri* Macbride, Contr. Gray Herb. n. ser. 59: 22. 1919.

Bauhinia platypetala Benth.; Hemsl. Biol. Centr. Amer. Bot. 1: 339. 1880.

Not *B. platypetala* Burch. 1878.

San Luis Potosí and Hidalgo; type from Zimapan, Hidalgo.

Shrub, 30 to 60 cm. high, or perhaps larger; leaves 2 to 5 cm. wide, very shallowly lobed, the lobes broadly rounded; flowers about 2.5 cm. long; fruit 12 cm. long or shorter, 1.5 cm. wide.

19. *Bauhinia subrotundifolia* Cav. Icon. Pl. 5: 4. pl. 406. 1799.

Colima and Guerrero; type from Acapulco, Guerrero.

Shrub or tree, 2.5 to 6 meters high; leaves 3 to 5 cm. wide, puberulent or glabrate beneath, the lobes broadly rounded; flowers 1.5 cm. long, white; fruit 1.5 cm. wide, short, puberulent.

20. *Bauhinia unilateralis* Britten, Journ. Bot. Brit. & For. 35: 233. 1897.

Veracruz.

Leaves mostly 7-nerved, pale beneath; fruit about 15 cm. long, 1.5 cm. wide. "Pata de cabra."

21. *Bauhinia pansamalana* Donn. Smith, Bot. Gaz. 13: 27. 1888.

Chiapas. Guatemala; type from Pansamalá.

Shrub or small tree, 3 to 4 meters high; leaves 6 to 15 cm. wide, thin, bright green, glabrous, 7-nerved, some of them often entire but most of them with 2 short attenuate lobes; flowers purplish; fruit often 30 cm. long, 2 to 2.5 cm. wide.

22. *Bauhinia mexicana* Vog. Linnaea 13:299. 1839.*Bauhinia confusa* Rose, Contr. U. S. Nat. Herb. 10:97. 1906.

Tamaulipas to Veracruz and Puebla; type from Papantla, Veracruz.

Shrub or small tree, 2 to 4.5 meters high, the trunk sometimes 12 cm. in diameter, the bark gray, rough; leaves 3 to 6.5 cm. wide, puberulent or glabrate beneath; flowers 2 to 2.5 cm. long, white, often tinged with pink; fruit 1.2 to 1.5 cm. wide, straight or falcate. "Pata-vaca," "pata de vaca" (Tamaulipas).

Plant used in Tamaulipas as a remedy for jaundice.

23. *Bauhinia divaricata* L. Sp. Pl. 374. 1753.

San Luis Potosí to Tabasco and Yucatán. Central America and West Indies.

Shrub or tree, 1.8 to 9 meters high; leaves 3 to 9 cm. wide, subcordate at base, the lobes usually divaricate, obtuse or acutish; flowers white, about 2 cm. long; fruit 1 to 1.5 cm. wide. "Pata de vaca" (Yucatán, San Luis Potosí); "tzu luth" (Yucatán, Maya, *Seler*); "pata de res" (San Luis Potosí); "huamúchil" (San Luis Potosí, *Seler*); "pato de chivo" (Santo Domingo).

Wood used by the Indians for making bows. The species has been reported from Mexico as *B. porrecta* Swartz.

24. *Bauhinia spathacea* DC. Prodr. 2:512. 1825.

Oaxaca to Yucatán.

Shrub or small tree; leaves 2 to 5.5 cm. wide; flowers white. "Pata de vaca" (Yucatán).

The material referred here by the writer may not be correctly identified, and it is doubtful if it is specifically distinct from the preceding species. The plant has been reported from Yucatán as *B. porrecta* Swartz.

25. *Bauhinia schlechtendalliana* Mart. & Gal. Bull. Acad. Brux. 10²:308. 1843.*Bauhinia goldmani* Rose, Contr. U. S. Nat. Herb. 10:97. 1906.

Oaxaca and Chiapas; type from Río de las Vueltas, Oaxaca.

Tree, 6 to 8 meters high; leaves 4 to 5 cm. wide, the lobes obtuse or acute; flowers 2.5 cm. long; fruit about 12 cm. long and 1.2 cm. wide.

Doubtfully distinct from the next species.

26. *Bauhinia latifolia* Cav. Icon. Pl. 5:4. pl. 405. 1799.*Bauhinia amblyophylla* Harms, Bull. Herb. Boiss. 7:548. 1899.

Sinaloa to Oaxaca and Veracruz; type from Acapulco, Guerrero. Guatemala.

Shrub or tree, 2 to 6 meters high, the bark brownish gray, shallowly fissured; leaves 3.5 to 11 cm. wide, pubescent beneath, the lobes acute to rounded; fruit 1 to 1.5 cm. wide; wood nearly white. "Pata de venado" (Michoacán, Guerrero); "pié de venado" (Oaxaca); "pata de cabra," "pié de cabra," "guacimilla cimarróna" (Sinaloa).

8. HAEMATOKYLUM L. Sp. Pl. 384. 1753.

Trees or shrubs, glabrous or nearly so, armed with stout spines; leaves pinnate, the leaflets few, of medium size; flowers yellow, racemose, the racemes axillary; fruit flat, thin, dehiscent along the sides.

Petals 5 to 6 mm. long-----1. *H. campechianum*.Petals 7 to 9 mm. long-----2. *H. brasiletto*.**1. *Haematoxylum campechianum* L. Sp. Pl. 384. 1753.**

Tabasco, Campeche (type locality), and Yucatán. West Indies.

Tree, sometimes 15 meters high, the trunk and branches gnarled, flattened and irregularly fissured, covered with grayish or brownish, rough bark; leaflets broad, somewhat wedge-shaped, 1 to 3 cm. long, with numerous fine parallel veins, emarginate at apex; flowers ill-scented; wood hard, with characteristic odor, the sapwood yellowish, the heartwood reddish brown, becoming deep red on exposure, the specific gravity about 1.003. Known in Mexico as "palo de tinta," "tinto," "palo de Campeche."

The wood (logwood) is a well-known article of export and has been exported from Mexico, Central America, and the West Indies in vast quantities. Formerly its export was the chief industry of Yucatán and Tabasco, and it is still shipped in considerable amounts. It is stated that when Grandmont captured Campeche he burned more than a million logs stored there. The wood is used principally for dyeing, its properties being dependent upon the peculiar principle, haematoxylin or hematin, which it contains. Logwood is one of the few natural dyewoods which has not been replaced satisfactorily by synthetic dyes. Its properties were made known at an early date, and the wood was soon an important article of export to Spain from Mexico and the West Indies. Acosta relates that in 1587 130 quintals of it were shipped to Spain from Santo Domingo. The tree seems to be native in Hispaniola, but it was naturalized at an early date in Jamaica and the Bahamas, where it did not grow naturally.

The heartwood is official in the U. S. Pharmacopoeia, being used in medicine as a mild astringent, especially in diarrhoea and dysentery. The wood contains about 10 per cent of tannin. The seeds are sometimes employed to flavor food.

2. *Haematoxylum brasiletto* Karst. Fl. Columb. 2: 27. pl. 114. 1862-69.

Haematoxylum boreale S. Wats. Proc. Amer. Acad. 21: 426. 1886.

Chihuahua to Baja California, Oaxaca, and Morelos. Guatemala to Colombia (type locality); Haiti.

Tree, similar in habit to the last species, rarely more than 7 meters high, often only a shrub; bark dark brown; leaves persistent until the appearance of the new ones, the young leaflets usually tinged with bronze; leaflets oblong-oval to orbicular, often broadly cuneate, 0.5 to 2 cm. long, rounded or emarginate at apex; fruit 2.5 to 5.5 cm. long, 0.8 to 1.5 cm. wide, very thin, sessile, often red or purple. Known generally as "brasil" or "palo de brasil," but the names "palo de tinta" and "palo de Campeche" are applied in the south; "azulillo" (Oaxaca); "brasileto" (Colombia).

This species has often been confused with the preceding one, and in commerce no distinction is drawn between the two. The wood is equally valuable, and has been exported in large quantities from the west coast of Mexico. It is used locally for dyeing various objects and is employed as a remedy for jaundice and erysipelas. The plant is described by Hernández¹ in a chapter entitled "*De Curaqua, seu Brasilio Hispanorum.*" The accompanying figure is a very poor one and may represent some other plant. He states that the plant was called "curaqua" in Michoacán, "quamochitl" or "vitzquahuitl" by the Mexicans, and "brasil" by the Spaniards. "Its wood dyes thread red, for it is much like sandalwood. The decoction of the juice is at first yellow, but it turns red, and if it is boiled longer, purple, and if mixed with alum, red or vermillion. This tree is refrigerant, febrifuge, astringent, and corroborative."

9. **HOFFMANSEGGLIA** Cav. Icon. Pl. 4: 63. 1797.

Herbs or small shrubs, usually with glandular foliage; leaves bipinnate, the leaflets small; flowers yellow, racemose; fruit linear or oblong, flat, often falcate.

Several herbaceous species of this genus occur in Mexico.

Calyx without black glands; plants leafless or nearly so.

Stems and leaves puberulent or short-pilose-----1. *H. microphylla*.

Stems and leaves glabrous-----2. *H. intricata*.

Calyx with black sessile glands; plants usually copiously leafy.

¹ Thesaurus 121. 1651.

Leaflets reticulate-veined, glabrous, numerous, with few glands.

3. *H. caudata*.

Leaflets with obsolete venation, pilose, few, densely black-glandular.

Pubescence of spreading or reflexed hairs-----4. *H. melanosticta*.

Pubescence of appressed or incurved hairs-----5. *H. fruticosa*.

1. *Hoffmanseggia microphylla* Torr. U. S. & Mex. Bound. Bot. 58. 1859.

Sonora and Baja California, common in low sandy places. Southern California; type from the Colorado Desert.

Low, usually leafless shrub, 1 to 1.5 meters high, with green branches; flowers 6 to 7 mm. long; fruit 1.5 cm. long.

2. *Hoffmanseggia intricata* T. S. Brandeg. Proc. Calif. Acad. II. 2: 151. 1889.

Hoffmanseggia glabra Fisher, Contr. U. S. Nat. Herb. 1: 147. 1892.

Baja California (type locality) and Sonora.

Shrub, nearly leafless, with rigid spinose branches, forming clumps 45 cm. high; leaflets 1 to 2 mm. long.

3. *Hoffmanseggia caudata* A. Gray, Bost. Journ. Nat. Hist. 6: 179. 1850.

Occurring in Texas at various places along the Rio Grande, and doubtless also on the Mexican side; type collected between the Nueces and the Rio Grande.

Plants low, suffrutescent; leaflets small, pale, coriaceous; racemes few-flowered.

4. *Hoffmanseggia melanosticta* (Schauer) A. Gray, Pl. Wright. 1: 54. 1852.

Pomaria melanosticta Schauer, Linnaea 20: 748. 1847.

Hoffmanseggia melanosticta greggii Fisher, Contr. U. S. Nat. Herb. 1: 149. 1892.

Coahuila to Querétaro. Western Texas (type locality).

Low shrub, densely pubescent, closely covered with viscid black glands; leaflets oval, about 6 mm. long; flowers yellow, in long racemes.

5. *Hoffmanseggia fruticosa* S. Wats. Proc. Amer. Acad. 21: 451. 1886.

Known only from the type locality, Jimulco, Coahuila.

Shrub, about 1.8 meters high.

10. CAESALPINIA L. Sp. Pl. 380. 1753.

Trees or shrubs, sometimes scandent, usually unarmed but sometimes aculeate; leaves bipinnate, the leaflets large or small; flowers yellow or red, racemose, large and showy; fruit very variable, dehiscent or indehiscent.

Several species of *Caesalpinia* and *Poinciana* are described by Sessé and Mocino,¹ but the identification of most of them is doubtful. The following vernacular names are reported for species of uncertain determination: "Tzuraqua" (Michoacán, Ramírez); "cahuinga" (Michoacán); "chalate" (Oaxaca).

Fruit covered with long prickles; rachises of the leaves very spiny.

Leaves with foliaceous stipules; seeds gray-----1. *C. crista*.

Leaves without stipules; seeds yellow-----2. *C. jayabo*.

Fruit not prickly; rachises of the leaves nearly always unarmed.

Fruit thick and hard or fleshy, indehiscent or tardily dehiscent, or in a few species thin and dehiscent but some of the calyx lobes then pectinate-dentate.

Leaflets linear-oblong, less than 2 mm. wide; fruit curved or coiled.

3. *C. coriaria*.

¹ Pl. Nov. Hisp. 65-67. 1887.

Leaflets ovate-oblong to orbicular, 4 to 25 mm. wide or larger.

Calyx lobes entire or nearly so. Plants unarmed.

Leaflets 11 to 20 mm. wide----- 4. *C. vesicaria*.

Leaflets 4 to 8 mm. wide----- 5. *C. sclerocarpa*.

Calyx lobes, at least the outer one, pectinate-dentate.

Plants armed with spines; fruit thick and somewhat fleshy, usually less than 1.5 cm. wide----- 6. *C. cacalaco*.

Plants unarmed; fruit thin, 1.5 to 4 cm. wide.

Leaflets suborbicular, glabrous; fruit 1 or 2-seeded, 1.5 to 2.2 cm. wide----- 7. *C. gracilis*.

Leaflets ovate-oblong to oval, pubescent; fruit several-seeded, 2 to 4 cm. wide----- 8. *C. platyloba*.

Fruit thin, elastically bivalvate; calyx lobes entire.

Inflorescence densely ferruginous-tomentose with stellate hairs.

9. *C. eriostachys*.

Inflorescence not stellate-tomentose.

Leaves sessile; pinnae one pair; plants armed with spines.

10. *C. sessilifolia*.

Leaves petiolate; pinnae more than one pair; plants usually unarmed.

Leaflets 6 to 10 pairs or more.

Pinnae 3 or 4 pairs; young branches pilosulous----- 11. *C. laxa*.

Pinnae 5 to 11 pairs or more; branches glabrous----- 12. *C. pulcherrima*.

Leaflets usually 3 to 5, sometimes 6 pairs.

Pedicels furnished with sessile or stipitate glands.

Leaflets with black glands along the margins.

13. *C. melanadenia*.

Leaflets without black glands.

Pedicels and calyx glabrous but furnished with stipitate glands.

14. *C. pannosa*.

Pedicels and calyx pubescent as well as glandular.

Leaflets 2 to 4.5 mm. wide.

Leaflets oblong, about 2 mm. wide, usually 4 or 5 pairs.

15. *C. placida*.

Leaflets oval or orbicular, about 4 mm. wide, usually 3 pairs.

16. *C. phyllanthoides*.

Leaflets 5 to 25 mm. wide.

Pedicels very sparsely glandular; leaflets rhombic.

17. *C. gaumeri*.

Pedicels densely glandular; leaflets obovate, ovate, or oval.

Fruit very glandular; leaflets 3 or 4 pairs, 5 to 14 mm.

wide ----- 18. *C. caladenia*.

Fruit not glandular; leaflets 2 pairs, 10 to 23 mm. wide.

19. *C. acapulcensis*.

Pedicels without glands.

Pedicels jointed below the middle----- 20. *C. californica*.

Pedicels jointed above the middle, often at the base of the calyx.

Leaflets small, 2 to 5 mm. wide. Calyx densely pubescent.

----- 21. *C. palmeri*.

Leaflets large, most of them 6 to 20 mm. wide or larger.

Calyx tube 6 mm. wide or less; stamens about as long as the petals----- 22. *C. mexicana*.

Calyx tube 8 to 11 mm. wide; stamens often long-exserted.

Stamens long-exserted----- 23. *C. exostemma*.

Stamens about equaling the petals----- 24. *C. yucatanensis*.

1. *Caesalpinia crista* L. Sp. Pl. 380. 1753.*Guilandina bonduc* L. Sp. Pl. ed. 2. 545. 1762.*Caesalpinia bonduc* Fleming, Asiat. Res. 11: 159. 1810.

Along beaches on both coasts of Mexico. Widely distributed on tropical and subtropical coasts of both hemispheres.

Straggling or sprawling, armed with very numerous straight or recurved prickles; leaflets ovate to orbicular, 1.5 to 4 cm. long, rounded or obtuse at apex, pubescent when young, glabrate in age; flowers small, greenish yellow; fruit 6 to 8 cm. long and nearly as broad, densely prickly; seeds usually 2, gray, nearly 2 cm. in diameter. "Cojones de gato" (Yucatán); "jabilla" (Veracruz); "haba de San Antonio" (Veracruz, *Dugès*); "taray" (Veracruz, *Ramírez*); "brasil" (Oaxaca); "guacolote" (*Nueva Farmacopea Mexicana*); "guacolote prieto," "brasilete colorado," "palo fernambuco," (Cuba); "mato de playa," "mato azul" (Porto Rico).

A characteristic strand plant, often forming impenetrable thickets of considerable extent. The large seeds (known as "nicker-nuts") are so hard that it requires a heavy blow of a hammer to break them. They retain their vitality for a long time, and are transported by ocean currents for great distances, having been carried occasionally from tropical America to European shores. They contain about 23 per cent of oil, which has been extracted in some regions. They are very bitter and contain a principle known as bonducine, which is believed to possess tonic and antiperiodic properties. The seeds have been used in domestic medicine (and even employed in Europe in times past) as a substitute for quinine, and also as a remedy for dropsy, snake bites, and venereal diseases. They are often carried by the natives of tropical America as talismans or amulets, and are used by children as marbles.

It is presumably this species which has been reported from Mexico as *C. echinata* Lam., a Brazilian species, and said to be known as "brasil" and "hoitzquahuatl" or "huitzquahuatl." The writer has seen no specimens of the plant, which may be some other species. It is said to be exported as a dye-wood. For an illustration of the seeds see Contr. U. S. Nat. Herb. 9: pl. 15.

2. *Caesalpinia jayabo* Maza, Anal. Soc. Esp. Hist. Nat. 19: 234. 1880.

Reported from Veracruz by Urban,¹ but the writer has seen no Mexican specimens. West Indies and East Indies.

Prickly shrub, similar to the preceding but with large yellow seeds. Known in Cuba as "guacolote amarillo" and in Porto Rico as "mato amarillo."

This is *C. bonduc* of most authors, but scarcely *Guilandina bonduc* L., which is synonymous with the preceding species.

3. *Caesalpinia coriaria* (Jacq.) Willd. Sp. Pl. 2: 532. 1799.*Poinciana coriaria* Jacq. Stirp. Amer. 123. pl. 75. f. 36. 1763.

Sinaloa to Oaxaca. West Indies, Central America, and northern South America.

Unarmed shrub or tree, 3 to 9 meters high, the trunk sometimes 40 cm. in diameter, the crown broad and spreading; bark rough, gray; leaflets numerous, 4 to 8 mm. long, glabrate, dotted with black glands; flowers small, white or yellowish, in short racemes; fruit short, 1.5 to 2 cm. wide, dark brown, lustrous, curved or coiled; sapwood light orange yellow, the heartwood dark, sometimes nearly black, very hard, heavy, tough, close-grained, taking a fine polish. "Cascalote" (Oaxaca, Michoacán, Guerrero, Chiapas, Colima); "nacascolotl" (*Altamirano*); "nacascul" (Oaxaca, Guerrero); "nacascol" (Nicaragua, Costa Rica); "nacasolo" (Nicaragua); "nacasco-

¹ Symb. Antill. 2: 273. 1900.

lote" (Guatemala); "agallo" (Panama); "dibidibi" or "dividivi" (Cuba, Santo Domingo, Colombia, Venezuela; also the commercial name); "guatapán," "guatapanare" (Venezuela); "guatapaná" (Cuba, Santo Domingo); "guastapana" (Santo Domingo); "libidibi" (Colombia).

The pods contain 25 to 30 per cent of tannin. They are used locally for tanning and have been exported in large quantities from Mexico and other parts of tropical America for that purpose. They have been employed in Mexico for making ink and are said to have been so used by the early inhabitants. The pods yield a black dye and the wood is said to give a red one. The tree was introduced into India early in the nineteenth century and has been much planted there. One tree is said to yield as much as 100 pounds of the pods. These have been exported to England, under the name of "divi-divi" or "dibi-dibi," where they brought \$40 to \$65 per ton.

4. *Caesalpinia vesicaria* L. Sp. Pl. 381. 1753.

Yucatán. Cuba, Jamaica, and Curaçao.

Shrub or small tree, 3.5 to 4.5 meters high, unarmed; leaflets few, very broadly cuneate, 1 to 3 cm. long, usually emarginate, thick, lustrous, glabrous; flowers yellow; fruit 6 to 7 cm. long, about 1.5 cm. wide, thick and hard. Known in Cuba as "guacamaya de costa," "palo Campeche," or "palo negro."

5. *Caesalpinia sclerocarpa* Standl. Contr. U. S. Nat. Herb. 20: 214. 1919.

Sinaloa to Oaxaca; type collected between San Gerónimo and La Venta, Oaxaca.

Unarmed tree, 10 to 14 meters high, with a trunk 50 to 60 cm. in diameter; leaflets oblong or oval, 1 to 1.8 cm. long, glabrous; flowers yellow; fruit very hard, blackish, indehiscent, 5 to 8 cm. long, nearly 2 cm. wide. "Ébano" (Sinaloa).

The wood is valuable for carpenter work.

6. *Caesalpinia cacalaco* Humb. & Bonpl. Pl. Aequin. 2: 173. pl. 137. 1809.

Sinaloa to Puebla and Oaxaca; type collected between Chilpancingo and Zumpango, Guerrero.

Shrub or sometimes a large tree, often grown as a shade tree, usually very spiny; bark gray, very rough; leaflets few, oval or suborbicular, 1 to 2.5 cm. long, glabrous or nearly so; flowers large, in long racemes; fruit 10 to 15 cm. long, 1 to 1.5 cm. wide, red or reddish, somewhat succulent, somewhat constricted between the seeds. "Huisache" (Sinaloa; sometimes written "huizache"); "cascalote" (Michoacán, Oaxaca, Guerrero); "nacascul" (Guerrero, Oaxaca); "chalalá" (Oaxaca).

This tree is often confused in literature with *C. coriaria*, although the two species are very unlike in most of their characters. The fruit of *C. cacalaco* has the same properties as that of *C. coriaria*.

7. *Caesalpinia gracilis* Benth.; Hemsl. Diag. Pl. Mex. 9. 1878.

Sonora.

Slender unarmed shrub, 1 to 2 meters high, with reddish brown branches; leaflets few, 1 to 1.5 cm. long, glabrous; flowers few, yellow; fruit oval or rounded, about 3 cm. long, pale reddish brown, glabrous, usually with 2 large seeds. "Vara prieta."

The branches are sometimes used by the Indians for making baskets.

8. *Caesalpinia platyloba* S. Wats. Proc. Amer. Acad. 21: 425. 1886.

Chihuahua to San Luis Potosí, Oaxaca, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Shrub or small tree, 1.8 to 6 meters high, unarmed; leaflets 2 to 5.5 cm. long, pubescent; flowers yellow, the largest sepal pectinate-lobed; fruit 6 to 13 cm. long, flat, velvety-pubescent, thin but apparently indehiscent; seeds large, flat, brownish. "Palo colorado" (Chihuahua, Sinaloa).

A similar or perhaps the same species occurs in Yucatán, where it is known as "chacte." The writer has seen only flowering specimens, which matched those of *C. platyloba*; the fruit, however, may be different. One of the collections was determined by Greenman as *C. cubensis* Greenm., but that name is probably synonymous with *C. pectinata* Cav. (*Coullteria tinctoria* H. B. K.), a species in which the fruit is very different from that of *C. platyloba*.

9. *Caesalpinia eriostachys* Benth.; Seem. Bot. Voy. Herald 88. 1853.

Sinaloa to Guerrero. Central America; type from Costa Rica.

Shrub or small tree, sometimes 6 meters high, with an irregular trunk 20 cm. in diameter; leaflets numerous, oval or rhombic, 4 to 11 mm. long, dotted with black glands; flowers large, yellow, in long racemes; fruit 7 to 12 cm. long, 2 to 2.5 cm. wide, puberulent, flat, dehiscent. "Iguanero" (Michoacán, Guerrero); "iguano" (Sinaloa); "palo alejo" (Colima, Oaxaca); "zahino" or "zajino" (Costa Rica, Nicaragua).

It is reported that in Colima the crushed bark is thrown in water to stupefy fish.

10. *Caesalpinia sessilifolia* S. Wats. Proc. Amer. Acad. 21: 450. 1886.

Poinciana sessiliflora Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Coahuila and Durango; type from Bolsón de Mapimi.

Spiny shrub, 1 to 2 meters high; leaflets suborbicular, 6 to 13 mm. long, pale, glabrous; flowers few, yellow; fruit short and broad, glabrate.

11. *Caesalpinia laxa* Benth. Pl. Hartw. 60. 1840.

Type from Teojomulco, Oaxaca; reported also from Nuevo León.

Shrub, 0.9 to 1.2 meters high, nearly glabrous; leaflets 6 to 9 pairs, oval-elliptic, 6 to 8 mm. long, glabrous.

12. *Caesalpinia pulcherrima* (L.) Swartz, Obs. Bot. 166. 1791.

Poinciana pulcherrima L. Sp. Pl. 380. 1753.

Cultivated nearly throughout Mexico and often escaped from cultivation. Widely cultivated and naturalized in the tropics of both hemispheres, its native habitat unknown.

Glabrous shrub or small tree, 1 to 6 meters high, unarmed or prickly, the trunk rarely more than 10 cm. in diameter; bark thin, nearly smooth, brown; leaflets oblong to obovate, 1.5 to 2.5 cm. long, pale beneath; flowers very large, red, more or less variegated with yellow, or sometimes wholly yellow; fruit flat, about 10 cm. long and 2 cm. wide; wood soft and weak, orange, fine-grained. "Flor de San Francisco" (Guerrero); "tabachín," "tabachino," or "tabaquín" (Nuevo León, Guerrero, Durango, Sinaloa, Baja California); "tabachín amarillo" (Jalisco); "flor de guacamaya" (Oaxaca, Chiapas); "chacsickin," "kansickin" (yellow-flowered form) (Yucatán, Maya); "flor del camarón" (Veracruz, Guerrero); "chamolxochitl" (Nahuatl); "chalcasúchil" (from the Nahuatl *chacal-xochitl*, "shrimp-flower"); "sirundaniqua" (Michoacán, Tarascan, *Ramírez*); "xiloxóchitl" (Puebla, Nahuatl); "maravilla moreña" (Oaxaca); "tabachil" (Sinaloa); "guacamaya" or "guacamayo" (Nicaragua, Guatemala, Colombia, El Salvador); "clavellina" (Colombia, El Salvador, Costa Rica, Porto Rico); "hoja de sen" (Costa Rica); "flor barbona" (El Salvador, Guatemala); "flor de ángel," "florito," "flor de pavo" (Colombia); "hierba del espanto," "espanta-lobos," "gallito," "Santa Rosa," "flor de

chapa" (Guatemala); "cuacamaya" (Cuba); "malinche,"¹ "guacamaya pequeña" (Nicaragua); "barbón" (El Salvador); "caballero" (Philippines); "carzazo" (Santo Domingo).

The English names are "Barbados-flower," "Barbados-pride," "flower-fence," and "bird-of-paradise flower." The flowers are sweet-scented and are said to yield a good quality of honey. The fruit contains tannin and is sometimes used for tanning skins. It is said to give a yellow dye with alum and a black dye with iron salts, and the root is reported to yield a red dye. In India the charred wood is used to make ink. The large seeds are sometimes cooked and eaten when green. In Sinaloa it is reported that a kind of rubber is extracted from the seeds and made into balls or "pelotas." In domestic medicine the plant is employed in many ways. The leaves are sometimes used to adulterate senna. The early inhabitants of Mexico used a decoction of the leaves for liver affections and as a wash for ulcers of the mouth and throat. The flowers are reputed to have purgative, febrifuge, and emmenagogue properties, and a decoction is a popular remedy for erysipelas and for inflammation of the eyes. In Nicaragua the astringent infusion of the bark is used as a wash for the teeth and gums. Infusions of the leaves, roots, or bark are employed in various places for colds, fevers, cutaneous diseases, and as a purge, and are said even to induce abortion. It is reported that in Guatemala the leaves are thrown in water to stupefy fish.

A related species, *C. gilliesii* (Hook.) Wall., known as "bird-of-paradise flower," is sometimes cultivated in northern Mexico. It is distinguished by the copious pubescence and very viscid inflorescence.

13. *Caesalpinia melanadenia* (Rose) Standl.

Poinciana melanadenia Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Low shrub with reddish brown branches; leaflets oval or obovate, about 5 mm. long.

14. *Caesalpinia pannosa* T. S. Brandeg. Proc. Calif. Acad. II. 2: 150. 1889.

Poinciana pannosa Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Baja California; type from San Jorge.

Unarmed shrub, 0.6 to 1.2 meters high; bark white, peeling in thin sheets; leaflets oval, 7 to 15 mm. long, glabrous; flowers pale yellow, in lax racemes; fruit flat, about 4 cm. long and 1.5 cm. wide, bearing numerous small black glands.

15. *Caesalpinia placida* T. S. Brandeg. Proc. Calif. Acad. II. 3: 131. 1891.

Poinciana placida Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Baja California; type from La Paz.

Unarmed shrub, 1 to 3.5 meters high; bark dark brown; leaflets oblong, 4 to 6 mm. long, gland-dotted; inflorescence very glandular; flowers bright yellow, the calyx and pedicels dark red.

16. *Caesalpinia phyllanthoides* Standl., sp. nov.

Type from Hacienda Buena Vista, Tamaulipas (Wootton, June 18, 1919; U. S. Nat. Herb. no. 989730).

Low slender shrub with glabrous branchlets; leaves 5 to 9 cm. long, long-petioled, glabrous; pinnae 3 or 4 pairs, long-stalked; leaflets usually 3 pairs, 3 to 7 mm. long, 3 to 4.5 mm. wide, orbicular to oval, subcoriaceous, with rather

¹Derived from the Nahuatl, *malichtic*, a plume, especially one worn on the head (*panache*), referring to the long hairlike stamens. Malinche was also the name given to Cortés, because of his association with the Indian woman Malintzin or Marina, who during the Conquest acted as interpreter between the Mexicans and Spaniards.

prominent venation beneath, paler beneath, short-petiolulate, eglandular; racemes terminal, few-flowered; pedicels finely puberulent and furnished with scattered short-stipitate glands; sepals about 7 mm. long, puberulent and glandular, glandular-ciliate; petals only slightly exceeding the sepals; fruit flat, elastically dehiscent, 2.5 cm. long, 1.3 cm. wide, glabrous but with a few scattered dark glands.

17. *Caesalpinia gaumeri* Greenm. Field Mus. Bot. 2: 330. 1912.

Yucatán; type from Progreso.

Tree, 15 to 20 meters high, unarmed; leaflets 2 to 3 cm. long, glabrate; flowers yellow, in long racemes. "Xcitinche."

18. *Caesalpinia caladenia* Standl. Contr. U. S. Nat. Herb. 20: 214. 1919.

Sonora to Colima; type collected below Minas Nuevas, Sonora.

Unarmed shrub; leaflets oval, 1 to 3 cm. long, glabrous; flowers large, yellow; fruit flat, about 7 cm. long and 1.5 cm. wide, straight or falcate, bearing numerous small reddish glands.

19. *Caesalpinia acapulcensis* Standl. Contr. U. S. Nat. Herb. 20: 213. 1919.

Known only from Acapulco, Guerrero, the type locality.

Unarmed shrub; leaflets 2.5 to 4 cm. long, rounded at apex, glabrous, pale beneath; fruit 7 cm. long, 1.7 cm. wide, puberulent.

20. *Caesalpinia californica* (A. Gray) Standl.

Caesalpinia mexicana californica A. Gray, Proc. Amer. Acad. 5: 157. 1862.

Poinciana californica Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Baja California.

Unarmed shrub, 1 to 4.5 meters high; leaflets few, oval, 1 to 2 cm. long, glabrous; flowers yellow; fruit about 4.5 cm. long and 1.3 cm. wide, velvety-puberulent.

Perhaps not essentially different from *C. pannosa*.

21. *Caesalpinia palmeri* S. Wats. Proc. Amer. Acad. 24: 47. 1889.

Poinciana palmeri Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Baja California, Sonora, and Sinaloa; type from Guaymas, Sonora.

Shrub or small tree, 1 to 4.5 meters high; leaflets 4 to 15 mm. long, usually glabrous but sometimes pubescent; calyx pubescent; flowers yellow, in very short racemes; fruit about 5.5 cm. long and 1.5 cm. wide, velvety-puberulent, tinged with purple.

22. *Caesalpinia mexicana* A. Gray, Proc. Amer. Acad. 5: 157. 1862.

Caesalpinia mexicana pubescens Robins. & Greenm. Proc. Amer. Acad. 29: 386. 1894.

Poinciana mexicana Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Sinaloa to Tamaulipas and Guerrero; type from Nuevo León.

Unarmed shrub or small tree, 1.5 to 6 meters high; leaflets oblong to suborbicular, 1 to 2.5 cm. long; flowers rather large, yellow, in very long racemes; fruit flat, about 6 cm. long and 1.5 cm. wide. "Retamilla" (Nuevo León); "tabachín del monte" (Tamaulipas).

A rather variable species; calyx usually glabrous but sometimes pubescent. The form found on the Pacific Coast differs slightly from the more eastern one; intermediate forms occur also. Here probably belong sterile specimens of a Oaxaca tree known as "ébano" and "guayavillo."

23. *Caesalpinia exostemma* DC. Prodr. 2: 483. 1825.

Poinciana konzattii Rose, Contr. U. S. Nat. Herb. 13: 303. 1911.

Oaxaca; also reported to range from Jalisco to Chiapas. Guatemala to Nicaragua.

Small tree, 3 to 4.5 meters high, unarmed; leaflets oblong to oval, 1 to 3 cm. long, pubescent or glabrate; flowers large and showy, yellow; fruit 8 to

11 cm. long, 2 cm. wide, velvety-puberulent. "Hojasén," "hojasén del país," "sen," "sen del país," "yagati," "guete-règl" (Oaxaca, *Seler*).

24. *Caesalpinia yucatanensis* Greenm. Field Mus. Bot. 2: 252. 1907.

Veracruz and Yucatán; type from Izamal, Yucatán.

Shrub or tree; leaflets oblong to oval, 1.5 to 3.5 cm. long; flowers yellow, large and showy; fruit about 6.5 cm. long and 1.8 cm. wide, velvety-pubescent. "Xkanpocoleum" (Yucatán).

Doubtfully distinct from *C. exostemma*.

DOUBTFUL SPECIES.

ROBINIA PYRAMIDATA Mill. Gard. Dict. ed. 8. *Robinia* no. 7. 1708. Type from Campeche.

11. *DELONIX* Raf. Fl. Tellur. 2: 92. 1836.

1. *Delonix regia* (Boj.) Raf. Fl. Tellur. 2: 92. 1836.

Poinciana regia Boj.; Hook. in Curtis's Bot. Mag. pl. 2884. 1829.

Widely cultivated in Mexico as a shade tree and sometimes growing without cultivation. Native of Madagascar and tropical Africa, but planted commonly in all tropical regions.

Large tree, usually 10 to 20 meters high, with wide-spreading crown, the trunk sometimes a meter in diameter; bark thin, grayish brown, slightly furrowed; leaves bipinnate, deciduous, the leaflets numerous, oblong, 4 to 10 mm. long, pubescent; flowers racemose-corymbose, the petals 5 to 7 cm. long, orange-red or scarlet; fruit dark brown, flattened, often 60 cm. long; wood whitish or yellowish, close-grained but soft and weak, its specific gravity about 0.83. "Tabuchín" or "tabachín" (Oaxaca, Sinaloa); "framboyán" or "frambayano" (Veracruz; a corruption of the French "flamboyant"); "espuela de caballero," "flor del camarón" (Oaxaca, *Reko*); "árbol del fuego" (various parts of Mexico, Guam, Philippines); "pata león" (Tamaulipas); "caballero" (Philippines).

The English names are "flame-tree," "royal poinciana," and "peacock-flower." This is one of the most widely planted trees in the tropics, and when covered with its huge bunches of brilliant flowers it is extremely showy. When leafless the trees are rather unsightly, and their wood is so weak that they are often broken by wind. For an illustration of the tree see Contr. U. S. Nat. Herb. 8: pl. 54.

12. *CONZATTIA* Rose, Contr. U. S. Nat. Herb. 12: 407. 1909.

Shrubs or small trees, unarmed; leaves bipinnate, with numerous small leaflets; flowers showy, bright yellow, in long slender axillary racemes; fruit flat, few-seeded, very acute at both ends, narrowly winged along the edges.

The genus was named in honor of Dr. C. Conzatti, of Oaxaca, a botanist well known for his extensive collections and publications upon the Mexican flora.

Leaflets glabrous on the upper surface-----1. *C. multiflora*.
Leaflets sericeous on the upper surface-----2. *C. sericea*.

1. *Conzattia multiflora* (Robinson) Standl.

Caesalpinia multiflora Robinson, Proc. Amer. Acad. 27: 167. 1892.

Conzattia arborea Rose, Contr. U. S. Nat. Herb. 12: 408. 1909.

Michoacán to Puebla and Oaxaca; type from Monte León Pass, Michoacán.

Large shrub or small tree, nearly glabrous, 3 to 8 meters high, with broad spreading crown, the trunk 10 to 30 cm. in diameter; leaves large, with numerous small leaflets, these oblong, 1 to 1.8 cm. long, obtuse; flowers showy, yellow, in slender racemes; fruit 8 to 15 cm. long, 1 to 1.5 cm. wide, flat, very acute, with 3 or 4 seeds.

2. *Conzattia sericea* Standl., sp. nov.

Type from Río de Tamazula, Imala, Municipalidad de Culiacán, Sinaloa, altitude 80 meters (*J. G. Ortega* 4169; U. S. Nat Herb. no. 1,081,254).

Tree, 10 to 15 meters high, the trunk 50 to 75 cm. in diameter, the young branchlets at first puberulent but soon glabrate; leaves long-petiolate, the pinnae few, the leaflets about 9 pairs, oblong, 10 to 12 mm. long, obtuse and apiculate, sericeous on both surfaces, more densely so beneath; racemes 8 to 25 cm. long, glabrous, the pedicels 6 to 9 mm. long; sepals 5 mm. long, very obtuse; petals bright yellow, 7mm. long. "Navfo."

The pinnae and leaflets are less numerous than in *C. multiflora*.

13. *PARKINSONIA* L. Sp. Pl. 375. 1753.

Trees or shrubs, armed with spines; leaves pinnate, the leaflets numerous, small; flowers showy, yellow, in axillary racemes; fruit linear, nearly terete, constricted between the seeds.

Rachis of the leaves long, flat, winged; leaflets 20 to 30 pairs----1. *P. aculeata*.
Rachis of the leaves short, not winged; leaflets 4 to 6 pairs_2. *P. microphylla*.

1. *Parkinsonia aculeata* L. Sp. Pl. 375. 1753.

Common nearly throughout Mexico; often planted. Widely distributed in tropical America; western Texas.

Slender graceful shrub or tree, sometimes 12 meters high, the trunk 30 cm. or less in diameter; branches yellowish green, the bark brown in age, smooth; leaf rachis 20 to 40 cm. long, the leaflets 3 to 8 mm. long, pale green, deciduous, leaving the persistent naked rachis; flowers pale yellow, fragrant; pods 5 to 10 cm. long; wood hard, close-grained, light brown with yellowish sapwood, the specific gravity about 0.61. "Retama" (Nuevo León, Tamaulipas, Sinaloa, Texas, Costa Rica, Colombia); "retama de cerda" (Tamaulipas); "guacóporo" (Sonora, Tamaulipas, Guanajuato); "junco" (Guanajuato, San Luis Potosí); "palo verde" (Oaxaca, Tamaulipas); "mezquite extranjero" (Durango); "guichi-belle" (Oaxaca, Zapotec, *Reko*); "acacia de agüijote," "espino real de España" (Nicaragua); "calentano," "yabo" (Colombia); "flor de rayo," "palo de rayo" (Porto Rico); "junco marino," "espinillo" (Cuba); "espinillo de España" (Venezuela); "cambrón" (Santo Domingo).

The foliage and young branches are eaten by stock. The wood is used for fuel, and has been employed for making paper. The infusion of the leaves is employed locally as a febrifuge and sudorific, a remedy for epilepsy, and an abortefacient.

2. *Parkinsonia microphylla* Torr. U. S. Rept. Expl. Miss. Pacif. 4: 82. 1857.

Dry plains and hillsides, Sonora and Baja California. Southern California (type locality) and Arizona.

Spiny shrub or tree, 1 to 7.5 meters high, the trunk 30 cm. or less in diameter; bark smooth, yellowish green; leaflets 2 to 4 mm. long, pubescent; flowers pale yellow; fruit 5 to 8 cm. long; wood hard, close-grained, dark yellowish brown with yellow sapwood, with a specific gravity of about 0.74. "Retama," "lebón" (Baja California); "palo verde" (Sonora, California).

By the Pima Indians of Arizona the pods were eaten, either as gathered or after having been ground in a mortar. The coarse meal thus obtained was sometimes mixed with that of mesquite pods. The wood was used for making small articles, such as ladles.

14. *CERCIDIUM* Tulasne, Arch. Mus. Paris 4: 133. 1844.

Trees or shrubs, armed with axillary spines; leaves bipinnate, the leaflets few, small; flowers showy, yellow, few, in axillary racemes; fruit flat or swollen, finally dehiscent.

Pedicels glabrous or with few scattered appressed hairs.....1. *C. floridum*.
 Pedicels copiously pilose with very short spreading hairs.
 Younger branches densely pilose with short whitish hairs.

2. *C. peninsulare*.

Younger branches glabrous or nearly so, sometimes finely puberulent.

Pods turgid when mature; seeds 5 to 7 mm. wide.....3. *C. torreyanum*.

Pods very flat; seeds about 3.5 mm. wide.....4. *C. plurifoliolatum*.

1. *Cercidium floridum* Benth.; A. Gray, Pl. Wright. 1: 58. 1852.

Coahuila to Tamaulipas. Southwestern Texas.

Spiny tree with crooked branches, sometimes 6 meters high, the trunk up to 25 cm. thick; bark thin, green or greenish brown; leaflets 2 to 4 pairs, 4 to 6 mm. long; flowers golden yellow, about 2 cm. broad, sweet-scented, in short racemes; fruit 4 to 6 cm. long, brownish yellow; wood soft, close-grained, greenish yellow, with a specific gravity of about 0.54. "Retama" (Tamaulipas); "palo verde" (Texas).

The wood is of little use except for fuel.

2. *Cercidium peninsulare* Rose, Contr. U. S. Nat. Herb. 8: 301. 1905.

Southern Baja California, common at low and middle elevations; type from La Paz.

Shrub or small tree, 1 to 7.5 meters high, closely resembling the next species and doubtfully distinct from it; spines short and stout; leaflets 5 to 10 mm. long, pubescent. "Palo verde," "palo de púa."

The young branches are sometimes cut and fed to horses and mules. For an illustration of a tree see Contr. U. S. Nat. Herb. 16: pl. 114.

3. *Cercidium torreyanum* (S. Wats.) Sarg. Gard. & For. 2: 388. 1889.

Parkinsonia torreyana S. Wats. Proc. Amer. Acad. 11: 135. 1876.

Sonora to Tepic. Southern Arizona (type from the Lower Colorado River) and California.

Small tree, sometimes 9 meters high, with a trunk 50 cm. in diameter; bark bright green; leaflets 2 or 3 pairs, 3 to 6 mm. long; fruit 8 to 10 cm. long, about 1 cm. wide; wood soft, weak, close-grained, light brown, with yellow sapwood, the specific gravity about 0.65. "Palo verde" (Sonora, California, Arizona).

The Indians of Arizona ground the fruit in a mortar and used it for food, especially in the form of atole. The wood was employed for various purposes.

4. *Cercidium plurifoliolatum* Micheli, Mém. Soc. Phys. Nat. Hist. Genève 34: 269. pl. 18. 1903.

Cercidium goldmani Rose, Contr. U. S. Nat. Herb. 8: 301. 1905.

Cercidium unijuga Rose, Contr. U. S. Nat. Herb. 8: 301. 1905.

Michoacán to Puebla and Oaxaca; type from San Luis (Guerrero?).

Tree, 4.5 to 12 meters high, the green branches armed with stout spines; leaflets mostly 5 to 8 pairs, 5 to 8 mm. long, pubescent; fruit thin, 4 to 7 cm. long, 8 mm. wide. "Palo de berria," "mantecoso," "palo mantecoso" (Oaxaca).

67. FABACEAE. Bean Family.

Trees or shrubs, often scandent; leaves alternate, stipulate, usually compound; flowers often large and showy, very irregular; fruit a legume, sometimes variously modified.

One of the largest and most important groups of Mexican plants. Many herbaceous species occur also. Perhaps some species of genera not included here, especially of *Phaseolus*, deserve to be classed as shrubs. Two species of *Ormocarpum* have been reported from Mexico, but they are unknown to the

writer. *Copaifera*, also, has been reported, but there is no reason to believe that the genus belongs to the Mexican flora.

Coumarouna oleifera (Benth.) Taub.¹ was described, or rather mentioned, as the "Eboe-tree of the Mosquito shore." Hemsley gives the distribution as "Mexico; Honduras," but it is very doubtful whether the plant occurs in Mexico.

Stamens free.

Leaves digitately 3-foliolate.....III. Podalyrieae.

Leaves pinnate (rarely 1-foliolate).

Leaflets 1 to 3; petal 1.....I. Swartzieae.

Leaflets 5 or more; petals 1 or 5.....II. Sophoreae.

Stamens monadelphous or diadelphous.

Fruit breaking up into joints.....VI. Hedysareae.

Fruit continuous, not jointed.

Leaves digitately 3-foliolate.....IV. Genisteae.

Leaves pinnate or rarely simple.

Leaflets 3 (rarely 5); plants usually scandent; fruit bivalvate.

VIII. Phaseoleae.

Leaflets usually 7 or more, or the leaves simple; plants usually erect; fruit often indehiscent.

Leaves even-pinnate.

Plants scandent.....VII. Viciaeae.

Plants erect.....VI. Hedysareae.

Leaves odd-pinnate or simple.

Fruit large, indehiscent.....IX. Dalbergieae.

Fruit dehiscent, or very small and indehiscent.....V. Galegeae.

Tribe I. Swartzieae.

A single genus.....1. TOUNATEA.

Tribe II. Sophoreae.

Petal 1. Fruit short; ovules 2.....2. ATELEIA.

Petals 5.

Ovule 1.....3. TOLUIFERA.

Ovules 2 or more.

Stamens long-exserted.....4. SWEETIA.

Stamens not exserted.

Calyx short-dentate.....5. SOPHORA.

Calyx deeply lobate.....6. ORMOSIA.

Tribe III. Podalyrieae.

A single genus.....7. XYLOTHERMIA.

Tribe IV. Genisteae.

A single genus in Mexico.....8. CROTALARIA.

Tribe V. Galegeae.

Hairs of the pubescence usually attached by the middle; connective of the anther appendaged.....9. INDIGOFERA.

Hairs attached by the base; connective not appendaged.

Seeds usually 1 or 2; leaves gland-dotted.

Seed 1.....10. APOPLANESIA.

¹ Taub. Bot. Centralbl. 47: 389. 1891. *Dipteryx oleifera* Benth. in Hook. Journ. Bot. 2: 235. 1850.

Seeds 2 or rarely more.

Corolla of a single petal 11. **AMORPHA**.

Corolla of 5 petals.

Stamens diadelphous 12. **EYSENHARDTIA**.

Stamens monadelphous 13. **PAROSELA**.

Seeds several or numerous; leaves not gland-dotted.

Seeds with a small appendage (strophiole).

Stamens monadelphous 14. **HARPALYCE**.

Stamens diadelphous 15. **BRONGNIARTIA**.

Seeds not appendaged.

Inflorescence terminal or leaf-opposed.

Style bearded on the inner side 16. **BARBIERIA**.

Style glabrous or bearded only at apex 17. **CRACCA**.

Inflorescence axillary.

Fruit with 1 or 4 wings (the wings sometimes very narrow).

Fruit winged on the upper edge; plants usually spiny.

18. **ROBINIA**.

Fruit with 4 longitudinal wings; plants unarmed.

19. **DAUBENTONIA**.

Fruit not winged.

Fruit with inner cross-partitions.

Style glabrous 20. **SESBAN**.

Style bearded 21. **BENTHAMANTHA**.

Fruit 1-celled.

Fruit much inflated, bladder-like 22. **DIPHYSA**.

Fruit not inflated.

Style coiled. Plants glabrous or nearly so 23. **LENNEA**.

Style straight or slightly curved.

Style bearded.

Plants usually unarmed 24. **COURSETIA**.

Plants very spiny 25. **OLNEYA**.

Style glabrous or nearly so.

Stamens diadelphous 26. **GLIRICIDIA**.

Stamens monadelphous.

Leaves estipellate 27. **WILLARDIA**.

Leaves stipellate 28. **HESPEROTHAMNUS**.

Tribe VI. Hedysareae.

Leaflets 1 or 3 29. **MEIBOMIA**.

Leaflets 4 or more, often numerous.

Terminal joint of the fruit samara-like, with a large terminal wing. Plants scandent 30. **NISSOLIA**.

Terminal joint not winged.

Leaflets 4 or 6, emarginate at apex. Flowers large, yellow 31. **AMICIA**.

Leaflets 8 to many, rarely if ever emarginate.

Leaflets pungent-pointed, minute 32. **PICTETIA**.

Leaflets never pungent.

Fruit jointed 33. **AESCHYNOMENE**.

Fruit not jointed 34. **CLIMACORACHIS**.

Tribe VII. Viciae.

A single genus 35. **ABRUS**.

Tribe VIII. Phaseoleae.

Style bearded.

Calyx teeth subequal-----36. **RAMIREZELLA**.Calyx teeth very unequal-----37. **CLITORIA**.

Style glabrous.

Vexillar stamen free at the base but united above with the other stamens.

Lower calyx lobe well developed-----38. **DIOCLEA**.Lower calyx lobe minute-----39. **CANAVALIA**.

Vexillar stamen free, or united with the others at the base.

Plants erect.

Ovules 1 or 2. Flowers usually yellow.

Seeds transverse-----40. **ERIOSEMA**.Seeds longitudinal-----41. **DOLICHOLUS**.

Ovules usually numerous, at least more than 2.

Plants usually armed with spines; calyx very oblique, truncate, bilobate, or with very short teeth-----42. **ERYTHRINA**.

Plants unarmed; calyx deeply lobate or dentate.

Upper calyx lobe entire; leaflets not gland-dotted.

43. **GALACTIA**.

Upper calyx lobe bidentate; leaflets gland-dotted beneath.

44. **CAJANUS**.

Plants scandent or trailing.

Ovules 1 or 2-----40. **DOLICHOLUS**.

Ovules numerous.

Calyx bilobate, the lobes entire; fruit usually hispid with bristle-like hairs-----45. **MUCUNA**.

Calyx 4 or 5-lobate; fruit not hispid.

Upper 2 calyx lobes united into an entire lobe-----43. **GALACTIA**.

Upper 2 calyx lobes distinct or forming a bidentate lobe.

Bracts and bractlets striate, persistent-----46. **BRADBURYA**.

Bracts and bractlets not striate, caducous.

47. **CALOPOGONIUM**.

Tribe IX. Dalbergieae.

Fruit drupaceous, 1-seeded-----48. **ANDIRA**.

Fruit not drupaceous, usually with more than 1 seed.

Anther cells erect and dehiscent by a short terminal slit or divergent and dehiscent by longitudinal slits-----49. **AMERIMNON**.

Anther cells parallel, longitudinally dehiscent.

Leaflets alternate.

Calyx acute at base; fruit suborbicular or broadly oblong.

50. **PTEROCARPUS**.

Calyx obtuse at base; fruit circinate or samara-like.

Fruit circinate, not winged-----51. **DREPANOCARPUS**.Fruit winged, samara-like-----52. **MACHAERIUM**.

Leaflets opposite (rarely only 1).

Wing petals free from the keel. Ovule 1; fruit thin.

53. **PLATYMISCIUM**.

Wing petals adherent to the keel.

Fruit with 4 longitudinal wings-----54. **ICHTHYOMETHIA**.

Fruit not winged.

Fruit compressed-----55. **LONCHOCARPUS**.Fruit torulose, not compressed-----56. **MUELLERA**.

1. **TOUNATEA** Aubl. Pl. Guian. 1: 549. 1775.

Unarmed trees; leaves unifoliolate or 3 or 5-foliolate; flowers large, racemose; fruit coriaceous or fleshy, dehiscent or indehiscent.

Leaves unifoliolate-----1. **T. simplex**.

Leaves 3 or 5-foliolate-----2. **T. myrtifolia**.

1. **Tounatea simplex** (Swartz) Taub. Bot. Centralbl. 47: 391. 1891.

Possira simplex Swartz, Prodr. Veg. Ind. Occ. 82. 1788.

Rittera grandiflora Vahl, Eclog. Amer. 2: 37. pl. 9. 1798.

Swartzia grandiflora Willd. Sp. Pl. 2: 1220. 1800.

Swartzia simplex Spreng. Syst. Veg. 2: 567. 1825.

Tepic to Oaxaca. Central America, West Indies, and northern South America.

Glabrous tree, 3.5 to 5 meters high, resembling an orange tree; leaves oval or elliptic, 6 to 20 cm. long, acuminate, thick, lustrous; flowers large (the petal 3.5 cm. long), yellow; fruit 2.5 to 4.5 cm. long, rounded, long-stalked, with thick valves, containing one or two seeds. "Naranjillo" (Michoacán, Guerrero); "naranjito" (Oaxaca).

2. **Tounatea myrtifolia** (J. E. Smith) Taub. Bot. Centralbl. 47: 392. 1891.

Swartzia myrtifolia J. E. Smith in Rees, Cycl. 341. 1820.

Reported by Hemsley from Tabasco. Guatemala to Panama and northern South America; type from Venezuela.

2. **ATELEIA** Moc. & Sessé; DC. Mém. Légum. 394. pl. 57. 1825.

REFERENCE: Standley, The Mexican species of *Ateleia*, Contr. U. S. Nat. Herb. 20: 173-175. 1919.

Unarmed shrubs or trees; leaves pinnate, the leaflets large; flowers of medium size, white, racemose; fruit flat, stipitate, short and broad, indehiscent, more or less winged along the upper suture.

Wing of the fruit obsolete or nearly so; leaflets 1 to 1.6 cm. wide--1. **A. arsenii**.

Wing of the fruit well developed; leaflets 2.5 to 5.5 cm. wide.

Seeds 8 mm. long-----2. **A. insularis**.

Seeds 5 mm. long-----3. **A. pterocarpa**.

1. **Ateleia arsenii** Standl. Contr. U. S. Nat. Herb. 20: 174. 1919.

Known only from the type locality, Pico de Quinceo, near Morelia, Michoacán, altitude 2,800 meters.

Shrub; leaflets about 17, oblong, 2 to 5 cm. long, obtuse, puberulent beneath; petals about 1.3 cm. long; fruit 2.7 cm. long, 1.6 cm. wide.

2. **Ateleia insularis** Standl. Contr. U. S. Nat. Herb. 20: 175. 1919.

Known only from the type locality, María Madre Island, Tepic.

Leaflets ovate or oblong-ovate, 4.5 to 7 cm. long, obtuse, glabrate in age; fruit 3 cm. long and 2 cm. wide.

3. **Ateleia pterocarpa** DC. Prodr. 2: 419. 1825.

Pterocarpus ateleia Moc. & Sessé; DC. Prodr. 2: 419, 1825, as synonym.

Tepic; type from some unknown locality in Mexico.

Tree, about 6 meters high; leaflets oval or suborbicular, 3.5 to 8 cm. long, puberulent beneath, the venation finely reticulate; fruit 2 cm. long, 1.3 cm. wide.

3. **TOLUIFERA** L. Sp. Pl. 384. 1753.1. **Toluiфера pereirae** (Klotzsch) Baill. Hist. Pl. 2: 383. 1870.

Myroxylon pereirae Klotzsch, Bonplandia 1857: 274. 1857.

Veracruz and Oaxaca to Yucatán and Chiapas; reported from Michoacán. Central America and northern South America.

Unarmed tree, sometimes 17 meters high, with gray bark; leaves pinnate, the leaflets 7 to 11, ovate or oval, 3 to 7.5 cm. long, obtuse to acuminate, lustrous, coriaceous at maturity, with numerous translucent dots and lines; flowers whitish, racemose; fruit about 7 cm. long, 2 to 3 cm. wide, indehiscent, the apex thick and 1-seeded, the basal portion long and broadly winged. "Nabá" (Yucatán, Tabasco, Maya); "chucte" (Veracruz); "bálsamo," "árbol de bálsamo," "palo de bálsamo" (Veracruz, Chiapas, Guatemala, etc.); "bálsamo de Perú," "semillas del obispo," "cedro chino" (Oaxaca); "yaga-guiente" (Oaxaca, Zapotec, *Reko*); "hoitziloxitl" (Nahuatl); "bálsamo negro"; "bálsamo de San Salvador."

This tree furnishes the balsam of Peru or "balsamum Peruvianum" of commerce. The commercial article comes chiefly, if not wholly, from El Salvador. The balsam, which is obtained from the trunk of the tree, is a viscid, dark reddish brown, fragrant liquid, with a warm, somewhat bitter taste; it burns readily. It is an official drug of the United States Pharmacopoeia, having stomachic and expectorant properties. It has been employed for chronic catarrh, asthma, phthisis, etc., and for rheumatism and venereal diseases, but at the present time it is little employed by American physicians. The balsam is much used in Europe in the manufacture of perfumery.

In the collection of the balsam, the first step is the beating of a band around the trunk of the tree until the bark is thoroughly crushed, then cuts are made in the bark and fire is applied to the openings, whereupon the sap takes fire, but this is soon extinguished. The tree is then left for 15 days until the balsam begins to run, when it is collected on pieces of cotton thrust into the incisions. The juice is squeezed from these into jars of boiling water, upon which the balsam floats. The trees will produce one to two kilograms per week, but they are tapped only in the spring before the rainy season. The balsam is at first amber-colored but soon turns brown. It is obtained also from the fruit, this kind being of better quality and known as "bálsamo blanco." By a papal bull issued by Pius IV in 1562, and by another by Pius V in 1571, the clergy were authorized to use the "bálsamo negro" in the preparation of the chrism, and it was declared a sacrilege to injure or destroy the trees. The balsam is still widely used for this purpose.

The tree was well known to the early inhabitants of Mexico, by whom it was much used in medicine. It was one of the trees cultivated in the royal garden of Mexico, having been brought from the *tierra caliente*. Jars of the balsam were a regular article of tribute to the emperor. The balsam attracted the attention of the early Spanish explorers and was forwarded by them to Europe. Here the most extravagant properties were ascribed to it, and it sold at prices ranging from twenty to two hundred dollars an ounce. In early days much of the balsam is said to have reached Spain by way of Peruvian ports, hence the derivation of the misleading name of "balsam of Peru." An infusion of the fruit in alcoholic liquors is employed locally as a stimulant, diuretic, and anthelmintic, and as a lotion to remove freckles.

The tree is described and figured by Hernández¹ in a chapter entitled "De *Hoitziloxitl*, seu Arbore Balsami Indici." He states that the Panucans called the tree "chucte." An inferior kind of balsam, he states, was obtained by boiling the twigs in water.

4. **SWEETIA** Spreng. Syst. Veg. 2:171. 1825.

1. **Sweetia panamensis** Benth. Journ. Linn. Soc. Bot. 8:263. 1865.

Michoacán and Guerrero. Costa Rica and Panama (type locality).

¹ Thesaurus 51. 1651.

Tree, 8 to 12 meters high, unarmed; leaves pinnate, the leaflets ovate, 5 to 7.5 cm. long, coriaceous, obtuse or acutish, bright green and lustrous above; flowers white, 6 mm. long, racemose-paniculate; fruit flat, oblong or elliptic, 5.5 to 9 cm. long, 2 cm. wide, thin, with one or two seeds. "Huesillo" (Michoacán, Guerrero).

5. *SOPHORA* L. Sp. Pl. 373. 1753.

Trees or shrubs, unarmed; leaves pinnate, the leaflets large, thick; flowers racemose; fruit linear, terete or slightly compressed, constricted between the seeds, indehiscent or tardily dehiscent.

One herbaceous species, *S. sericea* Nutt., occurs in northern Mexico.

Leaflets 0.6 to 1 cm. long-----1. *S. purpusi*.

Leaflets 2 to 5 cm. long or longer.

Leaflets not reticulate-veined; racemes usually 20 cm. long or longer.

2. *S. tomentosa*.

Leaflets conspicuously reticulate-veined; racemes usually less than 10 cm. long.

Calyx conspicuously dentate; leaflets mostly oblong or elliptic-oblong, sericeous beneath, at least when young-----3. *S. secundiflora*.

Calyx subtruncate; leaflets oval or broadly oval, glabrous--4. *S. konzattii*.

1. *Sophora purpusi* T. S. Brandeg. Zoe 5: 235. 1906.

Coahuila and Zacatecas; type from Sierra de Parrás, Coahuila.

Shrub; leaflets about 17, oval or oblong, coriaceous, green and glabrate on the upper surface, sericeous beneath; racemes few-flowered, the flowers white, tinged or dotted with purple; fruit white-sericeous, 2 or 3-seeded.

2. *Sophora tomentosa* L. Sp. Pl. 373. 1753.

Known in Mexico only from Clarion Island, Baja California. Widely distributed on seashores in the tropics of both hemispheres.

Shrub, 1 to 3 meters high, leaves deciduous, the leaflets 15 to 21, oblong to orbicular, 2 to 4 cm. long, sericeous beneath, at least when young; flowers yellowish white, 2.5 cm. long; pods long and slender, strongly constricted between the seeds; seeds brown. "Tambalisa" (Cuba).

The plant is reputed to have diuretic, sudorific, and purgative properties, and is used in the West Indies as a remedy for venereal diseases. The seeds are commonly believed to be poisonous, and they, like other parts of the plant, contain a poisonous alkaloid. It is said, however, that in Madagascar the pods are fed to cattle.

3. *Sophora secundiflora* (Ortega) Lag.; DC. Cat. Hort. Monsp. 148. 1813.

Broussonetia secundiflora Ortega, Hort. Matr. Dec. 61. pl. 7. 1798.

Virgilia secundiflora Cav. Icon. Pl. 5: pl. 401. 1799.

Coahuila to San Luis Potosí. Western Texas and southern New Mexico.

Shrub or small tree, sometimes 12 meters high, with a trunk 20 cm. in diameter; leaves evergreen, the leaflets 7 to 11, 2.5 to 6 cm. long, lustrous on the upper surface, beneath sericeous, at least when young; flowers 2 to 3 cm. long, violet-blue, very fragrant; fruit hard and woody, sometimes 20 cm. long; seeds large, bright red; wood hard, close-grained, orange-red, with yellow sapwood, its specific gravity about 0.98. "Frijolillo" (Nuevo León, Texas); "colorín" (Coahuila, Nuevo León, Texas); "frijolito" (Texas).

The seeds contain a bitter poisonous alkaloid, sophorine, and one seed is said to be sufficient to cause death in a human being. The Indians of Texas and adjacent Mexico used small quantities of the powdered seeds to produce a sort of intoxication. Taken thus the seeds produce general excitement, delirium, and finally deep sleep lasting two or three days. Children have been poisoned fatally by eating the seeds. The wood is said to yield a yellow dye.

4. *Sophora konzattii* Standl., sp. nov.

Type from Cerro Espino, Distrito de Pochutla, Oaxaca, altitude 1,200 meters (*Konzattii*, Reko & Makrinius 3171; U. S. Nat. Herb. no. 763856).

Tree, the young branchlets puberulent; leaves persistent, the rachis 9.5 to 13 cm. long, puberulent at first but soon glabrate, the petiolules 2 mm. long; leaflets 7 or 9, oval or elliptic-oval, 3.5 to 5.5 cm. long, 2.2 to 3.5 cm. wide, rounded at base, rounded or very obtuse at apex, coriaceous, bright green, lustrous, glabrous, the venation prominent and reticulate on both surfaces; racemes about 5.5 cm. long, few-flowered, the rachis and pedicels minutely sericeous, the pedicels 6 to 8 mm. long, the flowers violet; calyx 6 mm. long and 8 mm. broad, minutely sericeous, the limb oblique, truncate or subundulate; petals glabrous, the standard 2.8 cm. long its claw 4 to 5 mm. long, the blades of the other petals about 18 mm. long; stamens glabrous; ovary densely sericeous. "Frijolillo."

6. **ORMOSIA** Jack, Trans. Linn. Soc. Bot. 10:360. 1825.

1. *Ormosia mexicana* Standl., sp. nov.

Type from Zacuapan, Veracruz (*Purpus* 6326; U. S. Nat. Herb. no. 566950).

Leaves large, brown-tomentose, finally glabrate, the petiolules stout, 7 mm. long; leaflets 13, oblong, oblanceolate-oblong, or ovate, 8 to 17 cm. long, 4.5 to 5.5 cm. wide, obtuse or rounded at the more or less unequal base, obtuse or acutish at apex, thin, green and glabrate on the upper surface, minutely pilose beneath with yellow hairs; racemes 10 to 17 cm. long, paniculate, the branches densely brown-tomentulose, the bracts and bractlets linear or lanceolate, 7 mm. long or shorter, subpersistent; calyx 1 cm. long, brown-tomentulose, the lobes about as long as the tube, lance-oblong, acute or acuminate; petals tomentulose outside, the standard short-clawed, 13 mm. long, 10 mm. wide; ovary densely brown-pilose, 3 or 4-ovulate.

No species of this genus has been reported previously from Mexico, and only two are recorded from Central America, both from Panama. *O. mexicana* is clearly distinct from the Panaman species. It resembles somewhat *Dussia martinicensis* Krug & Urban, of the Lesser Antilles, but the leaflets are so different that it may scarcely be referred to that species. The flowers, too, are smaller than in the Martinique plant.

7. **XYLOTHERMIA** Greene, Pittonia 2: 188. 1891.

1. *Xylothermia montana* (Nutt.) Greene, Pittonia 2: 188. 1891.

Pickeringia montana Nutt.; Torr. & Gray, Fl. N. Amer. 1: 389. 1840.

Xylothermia montana tomentosa Abrams, Bull. Torrey Club 34: 263. 1907.

California, the type from Santa Barbara; probably extending to northern Baja California.

Erect shrub with spinose branches; leaves sessile, digitately trifoliolate or unifoliolate, the leaflets elliptic or obovate, 1 to 2 cm. long; flowers reddish purple, nearly 2 cm. long, in short racemes; fruit linear, flat.

8. **CROTALARIA** L. Sp. Pl. 714. 1753.

Low erect shrubs, unarmed; leaves digitately trifoliolate or sometimes simple; flowers usually yellow, racemose; fruit short, inflated, bivalvate.

A number of herbaceous species occur in Mexico. Those listed here are more properly herbs than shrubs, but they are frequently suffrutescent. The seeds rattle about in the inflated fruit, giving the effect of a rattlebox, hence the generic name. The plants of the genus are of little economic importance, although some are of value for forage. Some species are cultivated in India for their fiber, which is of good quality.

Leaves simple-----1. *C. schiedeana*.

Leaves trifoliolate.

Leaflets densely pilose-sericeous on the upper surface.

Corolla copiously pilose-----2. *C. gloriosa*.

Corolla glabrous-----3. *C. mollicula*.

Leaflets glabrous or nearly so on the upper surface.

Pubescence of the fruit spreading.

Keel of the corolla about 8 mm. long-----4. *C. setifera*.

Keel 12 to 15 mm. long-----5. *C. eriocarpa*.

Pubescence of the fruit closely appressed.

Keel of the corolla with a long slender beak-----6. *C. longirostrata*.

Keel with a short stout beak.

Racemes mostly borne opposite the leaves-----7. *C. vitellina*.

Racemes mostly terminal.

Leaflets lanceolate to linear-oblong-----8. *C. maypurensis*.

Leaflets mostly ovate or elliptic-----9. *C. anargyroides*.

1. *Crotalaria schiedeana* Steud. Nom. Bot. 1: 445. 1840.

Crotalaria bracteata Cham. Linnaea 5: 575. 1830. Not *C. bracteata* Roxb. 1814.

Veracruz and Oaxaca; type from Zacuapan, Veracruz.

Low shrub or, as in most of the other species of the genus, chiefly or wholly herbaceous; leaves linear-oblong. 5 to 7 cm. long, subsessile, obtuse, sericeous; flowers 2 cm. long; fruit about 3 cm. long.

2. *Crotalaria gloriosa* Rose, Contr. U. S. Nat. Herb. 12: 273. 1909.

Known only from the type locality, mountains near Iguala, Guerrero.

Shrub, about 2 meters high, densely pilose; leaflets 4 to 6 cm. long, acute; corolla 1.5 cm. long; fruit densely sericeous.

3. *Crotalaria mollicula* H. B. K. Nov. Gen. & Sp. 6: 403. 1823.

Type from the vicinity of Guanajuato; reported also from Oaxaca.

Leaflets lanceolate, obtuse, 1.5 to 2 cm. long.

4. *Crotalaria setifera* DC. Prodr. 2: 131. 1825.

Jalisco to San Luis Potosí, Morelos, and Oaxaca.

Slender shrub, often a meter high; leaflets linear-oblong to elliptic, 1.5 to 4.5 cm. long, acute or obtuse; flowers 1.5 cm. long; fruit 1.5 to 2 cm. long.

5. *Crotalaria eriocarpa* Benth. Bot. Voy. Sulph. 80. 1844.

Crotalaria viminalis Rose, Contr. U. S. Nat. Herb. 8: 47. pl. 6. 1903.

Sinaloa to Morelos; type from Mazatlán, Sinaloa.

Shrub, 1.5 to 3 meters high, sometimes with long pendent branches; leaflets mostly elliptic, 2 to 5 cm. long, acute or obtuse; flowers yellow, 2.5 cm. long, in long racemes; fruit 2 to 3 cm. long. "Tronador," "cascabelito" (Sinaloa).

6. *Crotalaria longirostrata* Hook. & Arn. Bot. Beechey Voy. 285. 1836-39.

Jalisco (type locality) and Tepic to Chiapas. Guatemala and Nicaragua.

Slender shrub, about a meter high; leaflets oblong to elliptic-oval, 1 to 4.5 cm. long, obtuse or rounded at apex; flowers yellow, 1.5 to 2 cm. long. "Chapilín" or "chipilín" (Guatemala).

The young branches are used in Guatemala as a pot herb.

7. *Crotalaria vitellina* Ker, Bot. Reg. 6: pl. 447. 1820.

Sinaloa and Jalisco to Veracruz, Tabasco, and Chiapas. Central America and South America; type from Brazil.

Slender shrub, about a meter high; leaflets lanceolate to elliptic-oval, 2 to 8 cm. long, acute or obtuse; flowers 2 cm. long, yellow; fruit 2 to 3.5 cm. long. "Chipilín cimarrón" (Tabasco); "tronador" (Sinaloa); "cohetillo" (El Sal-

vador); "chipilín" (Guatemala); "quiebra-plato," "uña del diablo" (Costa Rica).

Said to be of some importance as a forage plant in Brazil.

8. *Crotalaria maypurensis* H. B. K. Nov. Gen. & Sp. 6: 403. 1823.

Crotalaria acapulcensis Hook. & Arn. Bot. Beechey Voy. 414. 1841.

Jalisco to Veracruz and Chiapas. Central America and South America.

Slender shrub, 1 to 1.5 meters high; leaflets 2.5 to 6 cm. long, obtuse or acute; flowers yellow, 1.5 to 2 cm. long; fruit about 3 cm. long.

9. *Crotalaria anargyroides* H. B. K. Nov. Gen. & Sp. 6: 404. 1823.

Veracruz to Michoacán and Guerrero. Central America and northern South America.

Leaflets 1 to 5 cm. long, obtuse or rounded at apex; flowers yellow, 1.5 cm. long.

C. cajanifolia H. B. K.,¹ described from the Volcán de Jorullo, is perhaps the same species.

9. INDIGOFERA L. Sp. Pl. 751. 1753.

Unarmed shrubs or sometimes herbs, the pubescence of appressed hairs, these attached by the middle; leaves pinnate; flowers small, in axillary racemes; fruit terete or compressed, small.

Fruit strongly compressed, 3.5 to 5 mm. wide-----1. *I. platycarpa*.

Fruit terete or tetragonous, usually narrower.

Leaflets oblanceolate or obovate, broadest above the middle; leaves sessile or nearly so.

Leaflets conspicuously punctate-----2. *I. sabulicola*.

Leaflets not punctate.

Plants prostrate or procumbent; leaflets usually less than 1.5 cm. long.

-----3. *I. ornithopodioides*.

Plants erect; leaflets mostly 1.7 to 3 cm. long-----4. *I. lespedezioides*.

Leaflets lanceolate to oval, broadest at or below the middle; leaves petiolate.

Fruit 1 to 3-seeded, 5 to 9 mm. long.

Leaflets glabrous on the upper surface.

Fruit subglobose, 1-seeded-----5. *I. sphaerocarpa*.

Fruit oblong, usually 2 or 3-seeded-----6. *I. densiflora*.

Leaflets strigose on the upper surface.

Fruit truncate or subtruncate at apex-----7. *I. sphinctosperma*.

Fruit rounded to acute at apex.

Fruit 1-seeded, subglobose-----8. *I. jaliscensis*.

Fruit 2 or 3-seeded, oblong.

Leaflets usually 15 or more-----9. *I. montana*.

Leaflets 3 to 7-----10. *I. tumidula*.

Fruit with several seeds, usually much more than 1 cm. long.

Lobes of the calyx subulate, twice as long as the tube or longer; leaflets usually 3 or 5-----11. *I. mucronata*.

Lobes of the calyx deltoid or lanceolate, little if at all longer than the tube; leaflets 7 or more

Fruit conspicuously curved-----12. *I. suffruticosa*.

Fruit straight or nearly so.

Leaflets glabrous on the upper surface-----13. *I. salmoniflora*.

Leaflets strigose on the upper surface.

Corolla 5 to 6 mm. long.

¹ Nov. Gen. & Sp. 6: 405. 1823.

Leaflets mostly 2 to 4 cm. long, green, sparsely strigose.

14. *I. cuernavacana*.

Leaflets mostly less than 1.5 cm. long, densely gray-strigose.

15. *I. conzattii*.

Corolla 7 to 10 mm. long.

Racemes 4 cm. long or shorter, few-flowered----16. *I. palmeri*.

Racemes 5 to 20 cm. long, many-flowered.

Leaflets 3 to 5 pairs; fruit 2.5 to 4 cm. long--17. *I. fruticosa*.

Leaflets 6 to 10 pairs; fruit 1.5 to 2.5 cm. long.

18. *I. thibaudiana*.

1. *Indigofera platycarpa* Rose, Contr. U. S. Nat. Herb. 8: 47. pl. 7. 1903.

. Guerrero and Morelos; type from limestone mountains near Iguala, Guerrero.

Erect shrub, 1.5 to 4.5 meters high, with reddish brown branches; leaflets oval or oblong, 1 to 1.5 cm. long, obtuse; fruit 2 to 3 cm. long, 3 to 4 mm. wide.

2. *Indigofera sabulicola* Benth. in Mart. Fl. Bras. 15¹: 40. 1859.

Guerrero, Oaxaca, and Veracruz. Central America, West Indies, and South America; type from Brazil.

Plants prostrate, fruticose or almost wholly herbaceous, densely sericeous; leaflets about 5 mm. long; flowers 7 mm. long.

3. *Indigofera ornithopodioides* Schlecht. & Cham. Linnaea 5: 577. 1830.

Indigofera leptosepala Nutt.; Torr. & Gray, Fl. N. Amer. 1: 298. 1838.

Indigofera acutifolia Schlecht. Linnaea 12: 282. 1838.

Indigofera mexicana Benth. Pl. Hartw. 286. 1848.

Chihuahua to Tamaulipas and Oaxaca; type from Veracruz. Texas.

Plants prostrate or procumbent, chiefly herbaceous but sometimes shrubby; leaflets usually 5 or 7, rounded or retuse at apex; flowers 5 to 6 mm. long.

It is possible that the Mexican material includes more than one species, but there are no apparent lines of division. The description of *I. hippocreroides* Schlecht.¹ suggests this species, but that plant may belong to some other genus. The same is true of *I. coronilloides* Mart. & Gal.²

4. *Indigofera lespedezioides* H. B. K. Nov. Gen. & Sp. 6: 457. 1823.

Michoacán to Oaxaca; reported, probably erroneously, from Chihuahua; type from Volcán de Jorullo. Central America, Cuba and Jamaica, and South America.

Shrub or herb, a meter high or less; leaflets 3 or 5 or often only 1, rounded or retuse at apex; flowers red or purplish, 6 to 7 mm. long. "Añil cimarrón" (Cuba); "cachecahua," "escorzonera de jiquilite" (Guatemala, Honduras, Blake).

Said to be of some value as a forage plant in Cuba. Used in Guatemala as a remedy for stomach troubles.

5. *Indigofera sphaerocarpa* A. Gray, Pl. Wright. 2: 37. 1853.

Northern Chihuahua and Sonora; type from Santa Cruz, Sonora. Southern Arizona.

Slender erect shrub; leaflets about 17, 1 to 1.5 cm. long; flowers 3 mm. long; fruit 3 to 4 mm. long.

6. *Indigofera densiflora* Mart. & Gal. Bull. Acad. Brux. 10²: 44. 1843.

Mexico. Morelos, Puebla, and Oaxaca (type locality).

Slender shrub, about 2 meters high; leaflets about 19, oblong to oval, 1.5 to 2 cm. long; fruit about 8 mm. long.

¹ Linnaea 12: 283. 1838.

² Bull. Acad. Brux. 10²: 45. 1843.

A specimen from Durango is very closely related, differing only in having the leaflets thinly strigose on the upper surface.

7. *Indigofera sphinctosperma* Standl. Contr. U. S. Nat. Herb. 20: 216. 1919. Veracruz; type from Zacuapan.

Slender shrub; leaflets about 17, oval or rounded-oval, 8 to 14 mm. long; fruit 3 to 4 mm. long.

8. *Indigofera jaliscensis* Rose, Contr. U. S. Nat. Herb. 8: 310. 1905. Jalisco to Morelos; type from Río Blanco, Jalisco.

Shrub, a meter high or less; leaflets about 25, oblong or oval-oblong, 1 to 2.5 cm. long.

9. *Indigofera montana* Rose, Contr. U. S. Nat. Herb. 8: 311. 1905.

Durango, Zacatecas, and Jalisco; type collected between Mezquite and Monte Escobedo, Jalisco.

Slender shrub, about a meter high; leaflets oblong or narrowly oblong, 1 to 2.5 cm. long; flowers brown-sericeous.

Closely related to the preceding species, but usually with narrower leaflets.

10. *Indigofera tumidula* Rose, Contr. U. S. Nat. Herb. 12: 273. 1909.

Known only from the type locality, Iguala Canyon, Guerrero.

Shrub; leaflets oblong, 3 to 4 cm. long, rounded at apex; fruit 4 to 5 mm. long.

11. *Indigofera mucronata* Spreng.; DC. Prodr. 2: 227. 1825.

Galega frutescens Mill. Gard. Dict. ed. 8. *Galega* no. 3. 1768. Not *Indigofera frutescens* L. f. 1781.

Indigofera torulosa Hook. & Arn. Bot. Beechey Voy. 286. 1836-39.

Sinaloa to Veracruz and Chiapas. Widely distributed in tropical regions.

Plants herbaceous or suffrutescent and procumbent, or sometimes shrubby and 2 meters high, sparsely strigose; leaflets oblong to broadly oval, 1 to 3 cm. long, bright green; flowers pinkish or brick-red; fruit 2.5 to 4 cm. long, tetragonous, slender. "Añilillo" (Tabasco, *Rovirosa*).

12. *Indigofera suffruticosa* Mill. Gard. Dict. ed. 8. *Indigofera* no. 2. 1768. *Indigofera anil* L. Mant. Pl. 2: 272. 1771.

Indigofera lindheimeriana Scheele, Linnaea 21: 464. 1848.

Occurring nearly throughout Mexico. Widely dispersed in tropical America, and adventive in the Old World.

Shrub, 1 to 2.5 meters high; leaflets mostly 11 or 13, oblong or oval, 1 to 3 cm. long; flowers small, greenish or yellowish; fruit 1.2 to 1.5 cm. long, falcate. Known generally in Spanish America as "añil"; "choh" (Yucatán, Maya); "jiquelite" or "xiquelite" (Oaxaca, Chiapas, Central America; from the Nahuatl *xiu-quilitl*, "turquoise-herb"); "huiquilitl" (*Ramírez*); "añil colorado" (Tabasco, *Rovirosa*); "añil jiquelite," "añil montés" (Oaxaca); "jiquilete," "jiguite" (Guatemala); "azul," "azulejo" (Santo Domingo).

This species was formerly widely cultivated in the warmer parts of America for the extraction of indigo, although an Old World species, *I. tinctoria* L., was often used also. The latter is the chief source of the Old World indigo. In the southeastern United States indigo was an important crop in the early part of the nineteenth century. In 1794 about 1,500,000 pounds were exported to Europe. In southern Mexico, also, it was an important article of export, in Yucatán up to 1885 at least. The blue dye, for which indigo is chiefly valued, was finally largely replaced by coal-tar products, although much natural indigo is still used, having been found superior for some purposes to the artificial dyes. One of the chief reasons for the decline of indigo cultivation in America is the fact that the extraction and handling of the dye is very injurious to the health of those engaged in the work. The process of extraction of the coloring

matter is simple; the dried plants are soaked in water, and the infusion drawn off; the indigo soon settles to the bottom of the liquid and is rolled into balls and dried.

The use of this plant as a dye was known to the aboriginal inhabitants of Mexico. In Sonora the Indians use it for coloring palm leaves and other articles. In addition the plant has been much used in domestic medicine. The Aztecs used the seeds for urinary diseases and for ulcers, the leaves as a poultice applied to the head to reduce fever, and the plant as a remedy for syphilis. Febrifuge, vulnerary, purgative, antispasmodic, diuretic, and stomachic properties have been attributed to the plant, and it is a favorite local remedy for epilepsy. In Brazil it is one of the reputed remedies for snake bites, and in the United States indigo is often applied to the stings of bees and other insects. The powdered seeds or a decoction of the roots are said to be efficient in destroying vermin upon the human body.

13. *Indigofera salmoniflora* Rose, Contr. U. S. Nat. Herb. 5: 140. 1897.

Sinaloa; type from Imala.

Slender shrub, about a meter high; leaflets usually 7 or 9, oval, 1.5 to 4.5 cm. long; flowers pink; fruit 3 to 4 cm long.

14. *Indigofera cuernavacana* Rose, Contr. U. S. Nat. Herb. 5: 140. 1897.

Morelos to Michoacán and Oaxaca; type from Cuernavaca, Morelos.

Slender shrub, 2.5 meters high or less; leaflets about 9, oval, 2 to 4 cm. long.

15. *Indigofera konzattii* Rose, Contr. U. S. Nat. Herb. 8: 310. 1905.

Puebla and Oaxaca; type from Monte Albán, Oaxaca.

Low shrub; leaflets usually 7 or 9; fruit about 2 cm. long.

16. *Indigofera palmeri* S. Wats. Proc. Amer. Acad. 22: 404. 1887.

Durango and Jalisco; type from Tequila, Jalisco.

Slender shrub, 1.5 to 4.5 meters high; leaflets oblong or oval, 1 to 3 cm. long; fruit 1.5 to 3 cm. long.

17. *Indigofera fruticosa* Rose, Contr. U. S. Nat. Herb. 5: 140. 1897.

Baja California; type from San José del Cabo.

Shrub, 1 to 1.5 meters high.

18. *Indigofera thibaudiana* DC. Prodr. 2: 225. 1825.

Indigofera excelsa Mart. & Gal. Bull. Acad. Brux. 10³: 45. 1843.

San Luis Potosí and Veracruz to Oaxaca. Guatemala.

Shrub, 1 to 3 meters high; leaflets oblong to rounded-oval, 1.5 to 4 cm. long.

"Añil silvestre."

I. costaricensis Benth. has been treated as a synonym of this species, but it seems to differ in the glabrous upper surface of the leaflets.

DOUBTFUL SPECIES.

INDIGOFERA LOTOIDES Schlecht. Linnaea 12: 282. 1838. Type from Mineral del Monte. Apparently not of this genus.

INDIGOFERA PURPUSII T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 499. 1919. Type from Barranca de Tenampa, Veracruz.

10. *APOPLANESIA* Presl, Symb. Bot. 1: 63. pl. 41. 1831.

1. *Apoplanesia paniculata* Presl, Symb. Bot. 1: 63. pl. 41. 1831.

Microlobium glandulosum Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 104. 1854.

Eysenhardtia olivana Safford, Journ. Washington Acad. Sci 6: 133. f. 1. 1916.

Colima to Oaxaca. Guatemala.

Tree, sometimes 10 meters high; leaves odd-pinnate, the leaflets oval or oblong, 1 to 7 cm. long, rounded or emarginate at apex, black-dotted, puberulent when young but soon glabrate; flowers small, in slender racemes, the calyx accrescent in fruit. "Palo de arco" (Guerrero, Oaxaca); "ébano," "cacanaguasle" (Colima); "arco negro," "matagallina," "palo matagallina," "palo de arco negro," "palo de arco" (Oaxaca); "guie-biche" (Oaxaca, Zapotec, *Reko*); "cacanaguaste" (Colima).

The bark is said to yield a dye.

11. *AMORPHA* L. Sp. Pl. 713. 1753.

Erect unarmed shrubs; leaves pinnate, the leaflets numerous, gland-dotted; flowers small, violet, racemose, the corolla of a single petal; fruit short, 1 or 2-seeded, indehiscent.

Calyx lobes very short, obtuse; rachis of the leaf not aculeolate.

1. *A. fragrans*.

Calyx lobes elongate, acute; rachis of the leaf finely glandular-aculeolate.

2. *A. californica*.

1. *Amorpha fragrans* Sweet, Brit. Fl. Gard. *pl.* 241. 1828.

Amorpha occidentalis Abrams, Bull. N. Y. Bot. Gard. 6: 394. 1910.

Northern Chihuahua and Sonora. California to Texas, Illinois, and Montana.

Shrub, 1 to 3 meters high; leaflets 9 to 27, oblong to oval, 1.5 to 4 cm. long, minutely strigose; racemes 8 to 20 cm. long; calyx gland-dotted, 3 to 3.5 mm. long; banner 4.5 to 5 mm. long; fruit 5 mm. long.

From some of the related species, known in the United States as "false indigo," a kind of indigo was formerly extracted.

2. *Amorpha californica* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 306. 1838.

Mountains of Baja California. Southern Arizona and California (type from Santa Barbara).

Shrub 1 to 3 meters high; leaflets 11 to 25, oval or elliptic, 1 to 3 cm. long, soft-pilose, rounded at apex; racemes 5 to 20 cm. long; calyx 5 to 6 mm. long; banner 5 mm. long; fruit curved, 5 mm. long.

DOUBTFUL SPECIES.

AMORPHA RABIAE Lex.; Llave & Lex. Nov. Veg. Descr. 1: 22. 1824. Described from Pico de Quinceo, near Morelia, Michoacán. Probably not of this genus.

12. *EYSENHARDTIA* H. B. K. Nov. Gen. & Sp. 6: 489. 1824.

REFERENCE: Pennell, N. Amer. Fl. 24: 34-40. 1919.

Shrubs or small trees; leaves pinnate, the leaflets glandular-punctate; flowers in lax spikelike racemes; corolla nearly regular, white; stamens 10; fruit indehiscent, 1-seeded.

Calyx irregular, in fruit flaring from the base, the slit between the posterior lobes extending nearly to the base, the anterior lobes decidedly longer than the posterior ones.

Leaflets 35 to 45, 8 to 12 mm. long; bracts deciduous before anthesis; fruit 14 to 16 mm. long, glabrous-----1. *E. punctata*.

Leaflets 9 to 25, 3 to 6 mm. long; bracts persistent until after anthesis; fruit 5 to 7 mm. long, pubescent.

Leaflets 21 to 25, densely pubescent on the upper surface; racemes 6 to 9 cm. long-----2. *E. schizocalyx*.

Leaflets 9 to 17, nearly glabrous on the upper surface; racemes 1 to 5 cm. long.

Leaflets 9 or 11, 4 to 5 mm. long; style with a minute gland.

3. *E. peninsularis*.

Leaflets 13 to 17, 3 to 4 mm. long; style glandless-----4. *E. spinosa*.

Calyx only slightly irregular, in fruit tubular-campanulate, the slit between the posterior lobes short, the anterior lobes only slightly longer than the posterior ones.

Style pubescent, glandless; fruit 5 to 8 mm. long; leaflets 9 to 13, 2 to 2.5 mm. long-----5. *E. parvifolia*.

Style glabrous, gland-bearing; fruit 7 to 20 mm. long; leaflets 21 to 51, 3 to 25 mm. long.

Fruit reflexed in age, punctate with inconspicuous glands; standard conspicuously notched-----6. *E. polystachya*.

Fruit ascending, punctate with conspicuous glands; standard petal only slightly notched.

Fruit 12 to 13 mm. long, 3.5 to 4 mm. wide, straight or nearly so; leaflets 41 to 49, 12 to 15 mm. long-----7. *E. platycarpa*.

Fruit 7 to 10 mm. long, 2 to 2.5 mm. wide, curved; leaflets 15 to 31, 5 to 11 mm. long-----8. *E. texana*.

1. *Eysenhardtia punctata* Pennell, N. Amer. Fl. 24: 39. 1920.

Aguascalientes and Jalisco; type collected between Bolaños and Guadalajara, Jalisco.

Shrub or small tree, 3 to 5 meters high, with fragrant foliage; leaflets oval-oblong, glabrate; racemes 4 to 9 cm. long; calyx 3 to 4 mm. long; fruit 4.5 to 5 mm. wide, straight. "Palo dulce" (Aguascalientes).

2. *Eysenhardtia schizocalyx* Pennell, N. Amer. Fl. 24: 39. 1920.

Known only from the type locality, Mapimi, Durango.

Branchlets cinereous-canescient; leaflets oval or broadly oblong, 4 to 6 mm. long, appressed-pubescent; petals 4 to 4.5 mm. long; fruit 2.5 to 3 mm. wide.

3. *Eysenhardtia peninsularis* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 180. 1911.

Baja California.

Densely branched shrub, the branchlets cinereous-canescient; leaflets oblong, puberulent beneath; racemes 2 to 5 cm. long; petals 4 to 5 mm. long.

4. *Eysenhardtia spinosa* Engelm.; A. Gray, Bost. Journ. Nat. Hist. 6: 174. 1850.

Chihuahua; type from Lake Encinillas.

Densely branched shrub, the branchlets cinereous-canescient; leaflets oblong or oval, puberulent beneath; racemes 1 to 3 cm. long; petals 4 to 4.5 mm. long; fruit 2 mm. wide.

5. *Eysenhardtia parvifolia* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 180. 1911.

Known only from the type locality, Sierra de Parrás, Coahuila.

Densely branched shrub, the branchlets canescent; leaflets elliptic-oval, glabrate; racemes 5 to 10 mm. long; fruit 1.7 to 2 mm. wide, glabrous.

6. *Eysenhardtia polystachya* (Ortega) Sarg. Silv. N. Amer. 3: 29. 1892.

Viborquia polystacha Ortega, Hort. Matr. Dec. 66. 1798.

Eysenhardtia amorphoides H. B. K. Nov. Gen. & Sp. 6: 491. 1824.

Varennea polystachya DC. Prodr. 2: 522. 1825.

Eysenhardtia amorphoides orthocarpa A. Gray, Pl. Wright. 2: 37. 1853.

Eysenhardtia orthocarpa S. Wats. Proc. Amer. Acad. 17: 339. 1882.

? *Psoralea stipularis* Sessé & Moc. Fl. Mex. ed. 2. 169. 1894.

Eysenhardtia reticulata Pennell, N. Amer. Fl. 24: 36. 1919.

Eysenhardtia subcoriacea Pennell, N. Amer. Fl. **24**: 36. 1919.

Eysenhardtia cobriformis Pennell, N. Amer. Fl. **24**: 36. 1919.

Chihuahua and Sonora to Oaxaca and Tamaulipas. Southern Arizona.

Shrub or tree, 3 to 8 meters high, the branchlets canescent; bark thin, light gray; leaflets 21 to 51, oblong or oval, 3 to 20 mm. long, pubescent or sometimes glabrate; racemes 4 to 15 cm. long; petals 5 to 7 mm. long; fruit 10 to 15 mm. long, 3 to 5 mm. wide, glabrous; wood hard, dense, reddish brown, the specific gravity about 0.87. "Rosilla," "palo cuate" (Sinaloa); "palo dulce" (Mexico, Hidalgo, Puebla, Sonora, Jalisco, Oaxaca); "coatli," "coate," "cuate" (from the Nahuatl *coatli*, "snake-water"); "palo dulce blanco" (Mexico); "taray" (Nuevo León, Durango); "vara dulce," "varaduz" (Durango, *Patoni*); "leña nefrítica"; "urza" (Otomí).

This plant has long been known in Mexico because of the peculiar properties of the wood.¹ An infusion of the heartwood in water has at first a golden-yellow color which soon deepens to orange. When held in a glass vial against a black background it exhibits a beautiful peacock-blue fluorescence. The wood was well known in Europe as early as the 16th century, where it was called "lignum nephriticum," because of its supposed diuretic properties. It was first mentioned by Monardes (1565), and is mentioned by Hernández under the name "coatli" or "coatli." He also states that the name "tlapalezpatli,"² or "blood-red medicine," was used for the plant. Sahagún writes of the plant as follows: "There is a wild tree called *coatli* from which they get the branches for making the baskets which they call *uacales*. It is a flexible wood, and if put in water the latter becomes blue. It is a remedy for urinary diseases."

The foliage of the tree is aromatic and the flowers are fragrant. In Mexico drinking troughs made from the wood are used for watering fowls, or a piece of the wood is put in their drinking water to ward off diseases. Palmer reports that in Sonora a decoction of the wood is given as a refreshing drink to fever patients. The wood is much used in some localities for kidney and bladder affections. It also gives a yellowish brown dye.

7. *Eysenhardtia platycarpa* Pennell & Safford, N. Amer. Fl. **24: 37. 1919.**

Jalisco to Puebla and Guerrero; type from Barranca of Guadalajara, Jalisco.

Shrub or small tree, 3 to 5 meters high, the branchlets cinereous-puberulent; leaflets oblong, minutely puberulent; racemes 4 to 12 cm. long; petals 5 mm. long; fruit glabrous.

8. *Eysenhardtia texana* Scheele, Linnaea **21: 462. 1848.**

Coahuila and Tamaulipas. Texas; type from New Braunfels.

Shrub, 2 to 3.5 meters high; leaflets oblong, finely puberulent; racemes 3 to 10 cm. long; petals 4 to 5 mm. long; fruit glabrous. "Vara dulce" (Tamaulipas).

The shrub is said to be a good honey plant.

13. *PAROSELA* Cav. Descr. Pl. 185. 1802.

REFERENCE: Rydberg, N. Amer. Fl. **24**: 40-116. 1919-20.

Shrubs or rarely small trees, with gland-dotted branches, leaves, and calyx; leaves pinnate, rarely simple; flowers racemose or spicate; calyx 10-ribbed,

¹ See W. E. Safford, *Lignum nephriticum*—its history and an account of the remarkable fluorescence of its infusion, *Smiths. Rep.* **1915**: 271-298, *pl.* 1-7. 1916; also Safford, *Eysenhardtia polystachya*, the source of the true *Lignum nephriticum mexicanum*, *Journ. Washington Acad. Sci.* **5**: 503-517, *f.* 1, 2. 1915.

² Also written "tlalpalezpatli" and "tlapahoaxpatli."

5-lobed; stamens 10 or 9; fruit indehiscent, 1 or few-seeded, usually included in the calyx.

Many herbaceous species of the genus occur in Mexico. The shrubby forms are of scarcely any economic importance, and very few vernacular names are recorded for them. An infusion of the leaves of some species is said to be employed in Ecuador as a remedy for indigestion.

A. Flowers pediceled, reflexed.

Calyx lobes longer than the tube.

Leaves and stem glabrous.

Leaflets 17 to 37, less than 2 mm. long-----1. *P. filiciformis*.

Leaflets 5 or 7, 3 to 4 mm. long-----2. *P. berlandieri*.

Leaves and stem pubescent.

Calyx lobes filiform, plumose; flowers subtended by 1 to 3 prominent glands-----3. *P. sericocalyx*.

Calyx lobes lance-subulate, not plumose; flowers not subtended by glands.

Flowers 8 to 10 mm. long; leaflets 15 to 29-----4. *P. calycosa*.

Flowers about 6 mm. long; leaflets 9 to 17-----5. *P. orcuttii*.

Calyx lobes shorter than the tube or barely equaling it.

Leaves simple.

Leaves, at least the lower ones, obovate or spatulate, toothed; ovules 4 to 6; calyx with a single gland in each interval-----6. *P. spinosa*.

Leaves narrowly linear; ovules 2; glands 2 or more in each interval.

Branches glabrate, bright green; leaves sparsely pubescent.

7. *P. schottii*.

Branches densely gray-strigose, becoming yellowish; leaves densely strigose-----8. *P. puberula*.

Leaves pinnate.

Calyx hairy outside.

Leaves conspicuously hairy.

Pubescence of the stem and peduncles spreading-----9. *P. goldmani*.

Pubescence of the stem and peduncles appressed.

Calyx canescent throughout-----10. *P. parryi*.

Calyx glabrous below, canescent-hirsute above-----11. *P. maritima*.

Leaves glabrous or nearly so.

Stems decumbent, pilose-----12. *P. procumbens*.

Stems erect, glabrous or sparsely strigose.

Leaflets punctate above-----13. *P. hospes*.

Leaflets not punctate above.

Leaflets 2 mm. long, retuse; calyx 2.5 mm. long--13. *P. palmeri*.

Leaflets 7 to 10 mm. long, obtuse; calyx 3 to 3.5 mm. long.

14. *P. neglecta*.

Calyx glabrous outside.

Calyx hairy inside.

Calyx strongly angled, not conspicuously glandular.

Leaves pubescent.

Leaflets sparsely pilose; stem glabrous-----15. *P. anthonyi*.

Leaflets densely strigose; stem canescent-----11. *P. maritima*.

Leaves glabrous.

Leaflets linear-----16. *P. radicans*.

Leaflets oblong or oval.

Branches strigose-----22. *P. oculata*.

Branches glabrous.

Upper 4 calyx lobes acute-----17. *P. variegata*.

Upper 4 calyx lobes obtuse-----18. *P. divaricata*.

- Calyx not strongly angled, conspicuously glandular.
 Leaflets pubescent on the upper surface; racemes lax. Petals
 purplish-----19. *P. schaffneri*.
 Leaflets glabrous on both surfaces; racemes dense.
 Petals, except the banner, purplish-----20. *P. hegewischiana*.
 Petals all greenish yellow-----21. *P. viridiflora*.
 Calyx glabrous within.
 Calyx lobes equaling the tube.
 Branches strigose-----22. *P. oculata*.
 Branches glabrous.
 Racemes short, at the ends of short leafy branches.
 23. *P. crenulata*.
 Racemes 8 to 12 cm. long, on naked peduncles opposite the
 leaves-----24. *P. elongata*.
 Calyx lobes much shorter than the tube.
 Leaf rachis distinctly winged, constricted at the nodes.
 25. *P. nutans*.
 Leaf rachis not winged but slightly margined.
 Racemes headlike or subumbellate-----26. *P. gracillima*.
 Racemes elongate, not headlike.
 Racemes 2 to 5-flowered, lax-----27. *P. diffusa*.
 Racemes many-flowered, dense.
 Racemes 1 to 2 cm. long; plants decumbent.
 28. *P. dispansa*.
 Racemes 3 to 8 cm. long; plants erect--29. *P. submontana*.
 AA. Flowers sessile, ascending.
 B. Calyx lobes subulate-tipped, usually longer than the tube.
 Spikes subsessile at the ends of short axillary branches as well as at the
 ends of the main branches.
 Leaves and branches glabrous or nearly so, except when very young.
 Spikes short but not capitate, mostly short-pedunculate or at the ends
 of short leafy branches-----30. *P. scandens*.
 Spikes capitate, sessile in the leaf axils and at the ends of the branches.
 Leaflets 11 or 13, 3 to 4 mm. long-----31. *P. capitulata*.
 Leaflets 5 to 9, 4 to 11 mm. long-----32. *P. tehuacana*.
 Leaves and branches conspicuously villous.
 Calyx without conspicuous glands between the ribs----65. *P. sessilis*.
 Calyx with conspicuous glands between the ribs.
 Bracts ovate, acute, scarcely longer than the calyx tube.
 Spikes, at least in fruit, lax; leaf rachis evidently winged.
 33. *P. domingensis*.
 Spikes short and dense; rachis scarcely winged---34. *P. humilis*.
 Bracts lance-ovate, long-acuminate, much exceeding the calyx tube.
 35. *P. occidentalis*.
 Spikes terminating the stem and branches.
 C. Petals yellow, fading to rose or purplish.
 Calyx not conspicuously gland-dotted between the ribs; leaves glabrous.
 Calyx tube glabrous-----42. *P. argyrostachya*.
 Calyx tube pubescent.
 Leaflets 7 to 11, often emarginate, blackening in drying.
 36. *P. melantha*.
 Leaflets 11 to 35, not emarginate, not blackening.
 Leaflets 2 to 6 mm. long; corolla less than 1 cm. long.
 37. *P. zimapanica*.

Leaflets 7 to 9 mm. long; corolla more than 1 cm. long.

38. *P. diversicolor*.

Calyx with a row of conspicuous glands between the ribs; leaves usually more or less pubescent.

Calyx glabrous only at the base, more or less pilose between the ribs as well as on the margin.

Bracts caudate-acuminate, longer than the calyx—39. *P. caudata*.

Bracts acute or short-acuminate, shorter than the calyx.

Corolla 10 mm. long; bracts pubescent—40. *P. lutea*.

Corolla 7 mm. long; bracts glabrous on the back—41. *P. wardii*.

Calyx wholly glabrous except on the margins.

Leaves glabrous.

Stems glabrous—42. *P. argyrostachya*.

Stems puberulent—43. *P. botteri*.

Leaves pubescent.

Bracts acute or gradually short-acuminate.

Leaflets elliptic-obovate, pubescent on both sides.

44. *P. plumosa*.

Leaflets oblong, glabrous on the upper surface.

45. *P. painteri*.

Bracts abruptly caudate-acuminate.

Petals dark blue—46. *P. atrocyanea*.

Petals yellow.

Leaflets hairy on both sides; stem long-hairy.

47. *P. gigantea*.

Leaflets glabrate on the upper surface; stem short-hairy.

48. *P. macrostachya*.

CC. Petals purple or bluish to white, only the banner, if any of the petals, ochroleucous.

D. Leaves glabrous.

Leaflets 41 to 71.

Leaflets oblong, channeled. Calyx lobes longer than the tube.

49. *P. crassifolia*.

Leaflets oval, flat.

Bracts much longer than the calyx; calyx lobes equaling the tube—50. *P. roseiflora*.

Bracts not exceeding the calyx; calyx lobes shorter than the tube—51. *P. longifolia*.

Leaflets 7 to 31.

Spikes short and dense, subcapitate, subsessile.

Spikes many-flowered; calyx lobes about equaling the tube.

52. *P. saffordii*.

Spikes few-flowered; calyx lobes much longer than the tube.

Bracts glabrous; calyx lobes about 6 mm. long.

53. *P. formosa*.

Bracts silky-pilose; calyx lobes 3.5 to 4 mm. long.

54. *P. purpusi*.

Spikes elongate, distinctly pedunculate.

Calyx tube glabrous or nearly so—43. *P. botteri*.

Calyx tube densely pubescent.

Branches conspicuously gland-dotted—55. *P. brandegei*.

Branches not conspicuously gland-dotted.

Leaflets broadly oblong; calyx lobes shorter than the tube.

56. *P. smithii*.

Leaflets linear to narrowly oblong; calyx lobes equaling or exceeding the tube.

Calyx appressed-sericeous; leaves slightly pubescent when young-----57. *P. glabrescens*.

Calyx loosely pilose; leaves glabrous from the first.

Leaflets linear-oblong, slightly involute; petals rose-purple -----58. *P. lasiostachya*.

Leaflets linear, strongly involute; petals pink or whitish-----59. *P. involuta*.

DD. Leaves conspicuously pubescent.

Plants densely sericeous.

Leaves 3-foliolate-----60. *P. eriophylla*.

Leaves 5 to 11-foliolate-----61. *P. greggii*.

Plants not densely sericeous.

Petals (except sometimes the banner) dark purple.

Calyx lobes shorter than the tube-----62. *P. oaxacana*.

Calyx lobes equaling or longer than the tube.

Bracts deciduous-----83. *P. emoryi*.

Bracts persistent.

Leaflets narrowly oblong, 2 to 4 mm. long, pubescent on both sides -----63. *P. tsugoides*.

Leaflets broadly oblong, 4 to 7 mm. long, glabrous on the upper surface.

Corolla rose-purple; calyx not conspicuously glandular.

64. *P. versicolor*.

Corolla dark bluish purple; calyx with conspicuous glands between the ribs-----46. *P. atrocyanea*.

Petals rose-colored to white.

Spikes short, often subglobose, sessile at the ends of short leafy branches-----65. *P. sessilis*.

Spikes elongate, usually pedunculate at the ends of elongate branches.

Leaflets villous-sericeous; branches villous-canescens.

Branches glandular-tuberculate; petals usually without glands-----66. *P. megalostachys*.

Branches not conspicuously glandular; petals with a large gland near the apex-----67. *P. wislizeni*.

Leaflets and branches finely short-pubescent.

Leaflets obtuse, sparsely pilose or glabrate above; corolla rose-----68. *P. sanctae-crucis*.

Leaflets acute, finely short-pubescent above; corolla nearly white-----69. *P. leucantha*.

BB. Calyx lobes short, ovate or lanceolate, usually much shorter than the tube, rarely subulate-tipped.

Corolla yellow.

Fruit exserted from the calyx.

Stipular spines 3 to 9 mm. long; only the terminal leaflet retuse; banner about twice as broad as the other petals--70. *P. benthami*.

Stipular spines 1 to 2 mm. long; all leaflets retuse; banner 3 to 4 times as broad as the other petals-----71. *P. megacarpa*.

Fruit not exserted.

Spikes elongate; corolla fading to purple; bracts caducous.

72. *P. acutifolia*.

- Spikes subcapitate; corolla fading yellow; bracts persistent.
 Stems pubescent.....73. *P. capitata*.
 Stems glabrous.
 Bracts brown, not conspicuously glandular; pubescence of the
 calyx appressed.....74. *P. quinqueflora*.
 Bracts yellow, with green tip, conspicuously glandular; pubescence
 of the calyx not appressed.....75. *P. lloydii*.
 Corolla (except sometimes the banner) not yellow.
 Petals white.
 Calyx tube glabrous.....76. *P. mucronata*.
 Calyx tube pubescent.
 Leaflets 3 to 5 mm. long, linear; bracts persistent...77. *P. lumholtzii*.
 Leaflets more than 10 mm. long, oval or oblong; bracts caducous.
 Calyx lobes deltoid-acuminate, fully half as long as the tube;
 spikes paniculate, nodding.....78. *P. eysenhardtoides*.
 Calyx lobes triangular, acute, one-third as long as the tube; spikes
 mostly axillary, erect.....79. *P. leucostachys*.
 Petals wholly or partly purple, pink, or blue.
 Calyx glabrous or sparsely silky-strigose outside, the lobes ciliolate,
 broader than long.
 Calyx glabrous; flowers sessile.....80. *P. frutescens*.
 Calyx sericeous-strigose; flowers short-pedicellate...81. *P. hospes*.
 Calyx pubescent outside, at least on the lobes, these longer than broad.
 Leaflets large, 1 to 2 cm. long, acute; corolla yellow at first.
 72. *P. acutifolia*.
 Leaflets mostly small, sometimes large, nearly always obtuse; wing
 and keel petals always purple, pink, or blue.
 Petals dark blue.
 Leaflets 2 to 4 mm. long, elliptic or oval.....82. *P. pilosissima*.
 Leaflets 5 to 20 mm. long, or sometimes larger.
 Leaves simple.....84. *P. scoparia*.
 Leaves pinnate.
 Calyx lobes unequal, the lowest one distinctly longer; leaves
 glabrous85. *P. juncea*.
 Calyx lobes subequal; leaves sparsely or densely canescent.
 Leaflets entire or sinuate, oval to oblong...86. *P. tinctoria*.
 Leaflets distinctly dentate.
 Leaflets obovate to oblanceolate; stem and leaves de-
 cidedly canescent.....87. *P. dentata*.
 Leaflets linear-lanceolate; stem and leaves somewhat
 pubescent but green.....88. *P. arenaria*.
 Petals (except sometimes the banner) purple or pink.
 Banner, as well as the other petals, purple.
 Leaflets 13 to 31, oblong.....62. *P. oaxacana*.
 Leaflets 31 to 65, linear.
 Leaves glabrous.....89. *P. pectinata*.
 Leaves canescent.....90. *P. abietifolia*.
 Banner yellow or white.
 Branches not conspicuously glandular-tuberculate.
 Spikes solitary; leaflets glabrous, very numerous.
 51. *P. longifolia*.
 Spikes paniculate; leaflets few, canescent.
 Petals purple.....91. *P. tomentosa*.
 Petals pink, turning yellowish in age...92. *P. psoraleoides*.

Branches conspicuously glandular-tuberculate. Spikes single.
Stems and leaves glabrous. Spikes headlike.

Spikes long-pedunculate; bracts much shorter than the
calyx. Leaflets 2 to 3 mm. long---93. *P. hemsleyana*.

Spikes short-pedunculate; bracts equaling the calyx.

Bracts broadly obovate; leaflets 3 to 5 mm. long.

94. *P. trochilina*.

Bracts lanceolate; leaflets 1 to 2 mm. long.

95. *P. minutifolia*.

Stems and leaves more or less pubescent.

Calyx merely puberulent, brown; leaflets 11 to 21, 2 to 3
mm. long. Spikes oblong-----96. *P. naviculifolia*.

Calyx canescent; leaflets 3 to 7, if more numerous more
than 3 mm. long.

Spikes elongate and lax in fruit. Bracts soon deciduous.

Leaves long-sericeous on both sides---97. *P. argyrea*.

Leaves short-pubescent on the upper surface.

Calyx villous-canescant, the lobes equaling the tube.

Bracts ovate-acuminate, longer than the buds.

98. *P. seemanni*.

Calyx silky-canescant with appressed hairs, the
lobes shorter than the tube.

Bracts ovate or ovate-lanceolate, shorter than
the buds -----99. *P. tuberculata*.

Bracts lance-subulate, longer than the buds.

100. *P. canescens*.

Spikes dense and short, even in fruit.

Spikes (without the corollas) more than 1 cm. thick,
acute at first; corolla more than 1 cm. long;
leaflets 7 to 31.

Leaflets 7 to 13, sericeous-----97. *P. argyrea*.

Leaflets 13 to 31, short-pubescent with spreading
hairs-----101. *P. conzattii*.

Spikes 7 to 8 mm. thick, obtuse; corolla less than
1 cm. long; leaflets 5 to 9.

Leaves glabrous above, minutely puberulent be-
neath-----102. *P. tuberculina*.

Leaves canescent on both sides.

Spikes oblong, 2 to 3 cm. long, distinctly peduncu-
late-----103. *P. fulvosericca*.

Spikes globose or short-oblong, 1 to 1.5 cm. long,
sessile or very short-pedunculate.

Pubescence appressed; leaflets 3 to 8 mm. long.

104. *P. dorycnoides*.

Pubescence spreading; leaflets less than 3 mm.
long.

Leaves greenish, minutely canescent; calyx
silky-villous with brown hairs.

105. *P. polycephala*.

Leaves and calyx villous-canescant with long
whitish hairs-----106. *P. decora*.

1. *Parosela filiciformis* (Robins. & Greenm.) Rose, Contr. U. S. Nat. Herb. 8:
303. 1905.

Dalea filiciformis Robins. & Greenm. Proc. Amer. Acad. 29: 382. 1894.

In dry soil, San Luis Potosí and Aguascalientes to Oaxaca; type from Villar, San Luis Potosí.

Plants very slender, 20 to 60 cm. high, with a thick woody root; stems, glabrous; leaflets 17 to 37, oval or suborbicular, 1 to 2 mm. long, glabrous; racemes 5 to 10 cm. long, remotely flowered; calyx villous; petals yellowish below, purplish above.

2. *Parosela berlandieri* (A. Gray) Rose, Contr. U. S. Nat. Herb. 10: 106. 1906.

Dalea berlandieri A. Gray, Proc. Amer. Acad. 5: 177. 1861.

San Luis Potosí and Tamaulipas; type from San Carlos, Tamaulipas.

Slender shrub, 0.5 to 1 meter high; branches glabrous; leaflets 5 or 7, cuneate or obovate-oblong, 3 to 4 mm. long, glabrous; racemes lax, 2 to 4 cm. long; calyx densely pilose; petals at first yellowish, becoming reddish; fruit pilose.

3. *Parosela sericocalyx* Rydb. N. Amer. Fl. 24: 63. 1919.

Known only from the type collection, from the Sierra Madre of Durango or Sinaloa.

Slender shrub, 50 cm. high or more; stems silky-villous when young; leaflets 9 to 21, oval, sericeous on both sides, 10 to 15 mm. long; racemes 2 to 4 cm. long; calyx sericeous; petals reddish purple; fruit sericeous.

4. *Parosela calycosa* (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.

Dalea calycosa A. Gray, Pl. Wright. 2: 40. 1853.

Chihuahua, Sonora, and Nuevo León; type collected on the San Pedro, Sonora. New Mexico and Arizona.

Plants suffrutescent, 10 to 30 cm. high or more; stems slender, strigose-canescens; leaflets 15 to 29, oval or obovate, 3 to 5 mm. long, obtuse or retuse, glabrous above, strigose beneath; racemes 2 to 4 cm. long, dense; calyx densely pilose; petals white and purple; fruit pilose.

5. *Parosela orcuttii* (S. Wats.) Parish, Bot. Gaz. 55: 305. 1913.

Dalea orcuttii S. Wats. Proc. Amer. Acad. 20: 359. 1885.

Northern Baja California; type from Topo and Cantillas Canyon. Southern California.

Stems suffrutescent, ascending, 10 to 20 cm. long, strigose-canescens; leaflets 9 to 17, oblong-obovate, 2 to 4 mm. long, glabrous above, strigose beneath; racemes 1 to 2 cm. long, dense; calyx hirsute-pilose; petals purple and whitish.

6. *Parosela spinosa* (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900.

Dalea spinosa A. Gray, Mem. Amer. Acad. II. 5: 315. 1854.

Dalea spinescens Hemsl. Biol. Centr. Amer. Bot. 1: 247. 1880.

Psorodendron spinosum Rydb. N. Amer. Fl. 24: 45. 1919.

Sonora and Baja California. Arizona and southern California; type from the Gila River, Arizona.

Densely branched shrub or small tree, 4 to 7 meters high; leaves 2 to 5 cm. long, irregularly dentate, early deciduous; racemes 3 to 5 cm. long, the rachis spinose; calyx strigose; petals dark blue; fruit canescens; wood soft, coarse-grained, brown, its specific gravity about 0.55. "Mangle" (Sonora).

The English name is "indigo-bush" or "indigo-thorn." The plant is very showy when in flower.

7. *Parosela schottii* (Torr.) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.

Dalea schottii Torr. U. S. & Mex. Bound. Bot. 53. 1859.

Psorodendron schottii Rydb. N. Amer. Fl. 24: 44. 1919.

Northern Baja California. Southern Arizona and California; type from the Colorado River.

Densely branched shrub, 1 to 3 meters high, with spinose branches; leaves 0.5 to 3 cm. long; racemes 4 to 8 cm. long, 6 to 20-flowered; calyx sparsely short-hirsute or glabrate; petals blue.

8. *Parosela puberula* (Parish) Standl.

Parosela schottii puberula Parish, Bot. Gaz. **55**: 312. 1913.

Psorodendron puberulum Rydb. N. Amer. Fl. **24**: 45. 1919.

Northern Baja California. Southern California, the type from the Colorado Desert.

Densely branched shrub with spinose branches; leaves 1 to 2.5 cm. long; racemes 3 to 5 cm. long; calyx densely canescent; petals bluish purple, 1 cm. long; fruit puberulent.

Perhaps only a form of *P. schottii*.

9. *Parosela goldmani* Rose, Contr. U. S. Nat. Herb. **8: 305. 1905.**

Known only from the type locality, Sierra de Choix, Sinaloa.

Stems suffrutescent, 30 to 50 cm. high or more, short-hirsute, becoming glabrate, reddish; leaflets 15 to 35, oblong or elliptic, 3 to 4 mm. long, obtuse, white-hirsute; racemes 2 to 4 cm. long; calyx densely hirsute; petals bluish purple; fruit hirsutulous.

10. *Parosela parryi* (Torr. & Gray) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.

Dalea divaricata cinerea A. Gray, Proc. Amer. Acad. **7**: 336. 1868.

Dalea parryi Torr. & Gray; A. Gray, Proc. Amer. Acad. **7**: 397. 1868.

Sonora and Baja California. Southern Arizona and California; type from Fort Mohave, California.

Stems slender, suffruticose, 30 to 60 cm. high, gray-strigose; leaflets 15 to 33, obovate or suborbicular, 2 to 5 mm. long, emarginate, strigose; racemes 3 to 8 cm. long; calyx strigose-canescens; petals violet; fruit minutely puberulent.

11. *Parosela maritima* (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. **8: 304. 1905.**

Dalea maritima T. S. Brandeg. Proc. Calif. Acad. II. **3**: 125. 1891.

Southern Baja California; type from Todos Santos.

Stems suffruticose, decumbent, densely white-pubescent; leaflets 15 to 23, oblong-obovate, 3 to 4 mm. long, densely canescent; racemes 1 to 3 cm. long, dense; calyx glabrous below, hirsute above; petals purple; fruit glabrous.

12. *Parosela procumbens* (Moc. & Sessé) Rose, Contr. U. S. Nat. Herb. **8: 304. 1905.**

Dalea procumbens Moc. & Sessé; DC. Prodr. **2**: 246. 1825.

Dry hillsides, Jalisco to Chiapas (type locality).

Stems suffruticose, prostrate, 30 to 50 cm. long, reddish, pilose; leaflets 15 to 21, oval or obovate, 2 to 3 mm. long, glabrous, crenulate; racemes 1 to 2 cm. long, dense; calyx pilose on the ribs; petals bright purple; fruit puberulent.

13. *Parosela palmeri* Rose, Contr. U. S. Nat. Herb. **8: 304. 1905.**

Dry hillsides, Sonora and Sinaloa; type from Alamos, Sonora.

Slender shrub, 0.5 to 1 meter high, glabrous or nearly so; leaflets 11 to 21, elliptic or obovate, 2 mm. long, retuse, glabrous; racemes 4 to 6 cm. long, lax; calyx puberulent; petals ochroleucous, tipped and margined with purple.

14. *Parosela neglecta* (Robinson) Rose, Contr. U. S. Nat. Herb. **8: 304. 1905.**

Dalea neglecta Robinson, Proc. Amer. Acad. **29**: 329. 1894.

Known only from Guanajuato, the type locality.

Stems woody below, 30 to 50 cm. high, glabrous; leaflets 11 to 15, elliptic or oblanceolate, 7 to 10 mm. long, rounded at apex, glabrous, glaucous beneath; racemes lax, 2 to 4 cm. long; calyx puberulent; petals deep purple.

15. *Parosela anthonyi* (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. 12: 272. 1909.

Dalea anthonyi T. S. Brandeg. Erythea 7: 2. 1899.

Southern Baja California; type from San José del Cabo.

Shrub, about 1 meter high; branches glabrous or nearly so; leaflets 13 to 21, oblong, obtuse, 3 to 5 mm. long, sparsely pilose; racemes lax, 2 to 7 cm. long; calyx glabrous; petals bluish purple, variegated with yellow; fruit glabrous.

16. *Parosela radicans* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 8: 305. 1905.

Dalea radicans S. Wats. Proc. Amer. Acad. 17: 341. 1882.

Coahuila; type from the Sierra Madre, south of Saltillo.

Stems suffruticose, erect or procumbent, 10 to 40 cm. long, glabrous; leaflets 13 to 19, linear, 2 to 4 mm. long, glabrous; racemes 1 to 2 cm. long, lax; calyx glabrous; petals purple.

17. *Parosela variegata* Rydb. N. Amer. Fl. 24: 55. 1919.

Southern Baja California; type from San José del Cabo.

Slender shrub, 50 cm. high or more; branches purplish, glabrous; leaflets 19 to 25, elliptic, 3 to 4 mm. long, retuse, glabrous; racemes 3 to 6 cm. long; calyx glabrous; petals blue, white, and yellowish; fruit glabrous.

18. *Parosela divaricata* (Benth.) Rose, Contr. U. S. Nat. Herb. 8: 305. 1905.

Dalea divaricata Benth. Bot. Voy. Sulph. 12. 1844.

Baja California; type from Magdalena Bay.

Stems suffruticose, diffusely branched, brownish, glabrous; leaflets 15 to 21, oblong or obovate, 2 to 4 mm. long, obtuse or emarginate, glabrous; racemes 2 to 3 cm. long; calyx glabrous; petals purplish; fruit glabrous.

19. *Parosela schaffneri* (Hemsl.) Rose, Contr. U. S. Nat. Herb. 12: 273. 1909.

Dalea schaffneri Hemsl. Diag. Pl. Mex. 7. 1878.

Known only from the type locality, Chapultepec, Distrito Federal.

Stems suffruticose, glabrous; leaflets 15 to 41, oblong or elliptic, 4 mm. long, pilose above; racemes lax; calyx glabrous; petals purple and yellowish.

20. *Parosela hegewischiana* (Steud.) Rydb. N. Amer. Fl. 24: 57. 1919.

Dalea laxiflora Schlecht. Linnaea 12: 293. 1838. Not *D. laxiflora* Pursh, 1814.

Dalea hegewischiana Steud. Nom. Bot. ed. 2. 1: 480. 1840.

? *Trichopodium glandulosum* Presl, Bot. Bemerk. 52. 1844.

Dalea rosea D. Dietr. Syn. Pl. 4: 1017. 1847.

Parosela lasiostoma Rose, Contr. U. S. Nat. Herb. 8: 305. 1905.

Parosela campylostachya Rose, Contr. U. S. Nat. Herb. 12: 272. 1909.

Hidalgo to Oaxaca.

Stems slender, suffruticose, decumbent, glabrous; leaflets 13 to 35, oval or obovate, 2 to 5 mm. long, glabrous; racemes dense, 2 to 4 cm. long; calyx glabrous; petals rose-purple, the banner yellowish; fruit glabrous.

21. *Parosela viridiflora* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 8: 305. 1905.

Dalea viridiflora S. Wats. Proc. Amer. Acad. 21: 448. 1886.

Chihuahua to Hidalgo; type from Santa Eulalia Mountains, Chihuahua.

Stems slender, decumbent, suffrutescent, 20 to 30 cm. long, yellowish, glabrous; leaflets 9 to 17 oblong-obovate, 3 to 7 mm. long, obtuse or retuse, glabrous; racemes dense, 2 to 5 cm. long; petals greenish yellow; fruit glabrous.

22. *Parosela oculata* Rydb. N. Amer. Fl. 24: 60. 1919.

Known only from the type locality, Cerralvo, Baja California.

Low shrub; branches strigose; leaflets 25 to 37, oblong, 5 mm. long, glabrous; racemes 3 to 8 cm. long, dense; petals purplish blue, with a cream-colored spot on the banner.

23. *Parosela crenulata* (Hook. & Arn.) Rose, Contr. U. S. Nat. Herb. 8: 306. 1905.

Dalea crenulata Hook. & Arn. Bot. Beechey Voy. 285. 1836.

Sonora to Guerrero; type from Jalisco.

Slender shrub, sometimes 2 meters high; branches dark brown, glabrous; leaflets 7 to 13, elliptic, 2 to 4 mm. long, crenulate, glabrous; racemes dense, 1 to 3 cm. long; petals purple; fruit glabrous. "Malva prieta" (Sinaloa).

The slender branches are used for brooms.

24. *Parosela elongata* Rose, Contr. U. S. Nat. Herb. 8: 306. 1905.

Known only from the type locality, Jojutla, Morelos.

Stems 0.5 to 1 meter high, glabrous; leaflets 7 to 15, oblong, 7 to 12 mm. long, glabrous; calyx glabrous; petals purple; fruit glabrous.

25. *Parosela nutans* (Cav.) Rose, Contr. U. S. Nat. Herb. 8: 306. 1905.

Psoralea nutans Cav. Icon. Pl. 3: 1. pl. 201. 1794.

Dalea nutans Willd. Sp. Pl. 3: 1339. 1803.

Sonora to Yucatán and Chiapas. Central America.

Stems slender, suffruticose, sometimes 3 meters high, purplish, glabrous; leaflets 11 to 41, oblong, 5 to 10 mm. long, glabrous; racemes lax; calyx glabrous; petals purple; fruit glabrous. "Canchalagua" (Guatemala).

In Jalisco a yellow dye is obtained from the plant.

26. *Parosela gracillima* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 8: 305. 1905.

Dalea gracillima S. Wats. Proc. Amer. Acad. 22: 404. 1887.

Jalisco; type from Guadalajara.

Stems very slender, suffruticose, procumbent, reddish, glabrous, 30 to 50 cm. long; leaflets 13 to 21, oblanceolate, 1 to 4 mm. long, glabrous; racemes 2 to 6-flowered; calyx glabrous; petals purple, the banner yellowish; fruit glabrous.

27. *Parosela diffusa* (Moric.) Rose, Contr. U. S. Nat. Herb. 8: 305. 1905.

Dalea diffusa Moric. Mém. Soc. Genève 6: 536. 1833.

Dalea gracilis Hook. & Arn. Bot. Beechey Voy. 286. 1836. Not *D. gracilis* Kunth, 1824.

Dalea ramosissima Mart. & Gal. Bull. Acad. Brux. 10²: 41. 1843.

Chihuahua and Sonora to San Luis Potosí and Guerrero. Guatemala.

Slender shrub, often a meter high; branches glabrous, purplish; leaflets 3 to 23, oblong or obovate, 2 to 5 mm. long, glabrous; racemes lax, 2 to 5-flowered; calyx glabrous; petals purple, the banner usually yellowish; fruit glabrous. "Escoba larga" (Morelos, *Seler*); "ratón." "xolteco" (*Ramírez*).

As in the case of various other species, the branches are often tied together to form coarse brooms.

28. *Parosela dispansa* Rydb. N. Amer. Fl. 24: 59. 1919.

Known only from the type locality, mountains near Talpa, Jalisco.

Stems slender, suffruticose, glabrous, dark brown; leaflets 9 to 13, elliptic, 3 to 5 mm. long, retuse, glabrous; racemes 1 to 2 cm. long; calyx glabrous; petals violet or rose-purple; fruit glabrous.

29. *Parosela submontana* Rosé, Contr. U. S. Nat. Herb. 8: 306. 1905.

Chihuahua to Puebla and Oaxaca; type from Plateado, Zacatecas.

Stems slender, suffruticose, 0.5 to 1.2 meters high, glabrous, purplish; leaflets 31 to 41, oblong, 5 to 10 mm. long, glabrous; racemes 3 to 8 cm. long, rather dense; calyx glabrous; petals purple; fruit glabrous.

30. *Parosela scandens* (Mill.) Rydb. N. Amer. Fl. 24: 114. 1920.

Psoralea scandens Mill. Gard. Dict. ed. 8, *Psoralea* no. 4. 1768.

Veracruz.

Glabrous shrub with brown branches; leaflets 7 or 9, elliptic, 8 to 15 mm. long, glabrous; spikes short, globose or oblong; calyx tube nearly glabrous, the lobes plumose; petals yellow.

31. *Parosela capitulata* Rydb. N. Amer. Fl. 24: 113. 1920.

Known only from the type locality, in Oaxaca.

Glabrous shrub with purplish brown branches; leaflets 11 or 13, oblong, 3 to 4 mm. long, glabrous; spikes capitate; calyx tube sparsely hairy, the lobes plumose; petals brownish purple (when dry).

32. *Parosela tehuacana* Rydb. N. Amer. Fl. 24: 113. 1920.

Known only from the type locality, Tehuacán, Puebla.

Low shrub with brown glabrous branches; leaflets obovate, 3 to 7 mm. long, sparsely short-villous when young but soon glabrous; spikes globose; calyx tube pilose, the lobes plumose; petals yellow, turning dark purple; fruit villous above.

33. *Parosela domingensis* (DC.) Millsp. Field Mus. Bot. 1: 21. 1895.

Dalea domingensis DC. Prodr. 2: 246. 1825.

Yucatán. Cuba and Hispaniola (type locality).

Shrub, 1 to 4 meters high, the branches villous; leaflets 5 to 9, oval or obovate, 6 to 15 mm. long, villous on both sides; spikes becoming 2 to 4 cm. long; calyx pubescent, the lobes plumose; petals ochroleucous, turning pink or purple; fruit villous.

34. *Parosela humilis* (Mill.) Rydb. N. Amer. Fl. 24: 114. 1920.

Psoralea humilis Mill. Gard. Dict. ed. 8. *Psoralea* no. 7. 1768.

Dalea thyrsiflora A. Gray, Proc. Amer. Acad. 5: 177. 1861.

Parosela thyrsiflora Vail, Bull. Torrey Club 24: 14. 1897.

Chihuahua to Yucatán and Oaxaca; type from Veracruz. Texas; Guatemala.

Slender shrub with brownish villous branches; leaflets 3 to 9, oval or obovate, 6 to 18 mm. long, retuse, short-villous; spikes short and dense; calyx pubescent, the lobes plumose; petals yellow, turning brownish purple.

35. *Parosela occidentalis* Rydb. N. Amer. Fl. 24: 115. 1920.

Parosela platyphylla Rydb. N. Amer. Fl. 24: 115. 1920.

Sonora and Sinaloa; type from Culiacán(?), Sinaloa.

Shrub, 1 to 1.5 meters high, the branches villous; leaflets 5 to 15, oval or obovate, 5 to 15 mm. long, villous; spikes 1 to 3 cm. long, dense; calyx villous, the lobes plumose; petals yellow, turning brown or purplish; fruit villous.

36. *Parosela melantha* (Schauer) Rydb. N. Amer. Fl. 24: 108. 1920.

Dalea melantha Schauer, Linnaea 20: 746. 1847.

Parosela fuscescens Rydb. N. Amer. Fl. 24: 109. 1919.

Coahuila to Veracruz and Oaxaca (type locality).

Shrub with glabrous branches; leaflets 5 to 13, cuneate, 2 to 6 mm. long, retuse, glabrous; spikes 1 to 4 cm. long, 1 cm. thick; petals yellow; fruit pilose.

37. *Parosela zimapanica* (Schauer) Rydb. N. Amer. Fl. 24: 109. 1920.

Dalea zimapanica Schauer, Linnaea 20: 746. 1857.

Mexico, Hidalgo, Puebla, and Oaxaca; type from Zimapan, Hidalgo.

Shrub, 1 to 3 meters high, with glabrous branches; leaflets 11 to 19, elliptic or oblong, 2 to 6 mm. long, glabrous; spikes 1.5 to 3 cm. long, 1.2 to 1.5 cm. thick; calyx silky-villous; petals yellow, turning purplish brown or brownish pink; fruit villous.

This has been reported from Mexico as *Dalea microphylla* H. B. K.

38. *Parosela diversicolor* Rydb. N. Amer. Fl. 24: 109. 1920.

Known only from the type locality, Sierra de Clavellinas, Oaxaca.

Shrub, 1 meter high or more, with glabrous branches; leaflets 13 to 35, oblong, 7 to 9 mm. long, glabrous; spikes dense, 1 to 2 cm. long; calyx silky-villous, the lobes plumose; petals yellow, turning rose and purple; fruit silky-villous.

39. *Parosela caudata* Rydb. N. Amer. Fl. 24: 112. 1920.

Known only from the type locality, Álvarez, San Luis Potosí.

Shrub, 1 meter high or more, the branches densely villous; leaflets 13 to 17, oblong or elliptic, 5 to 6 mm. long, villous; spikes dense, 2 to 6 cm. long, 1 cm. thick; calyx silky-pilose, the lobes plumose; petals yellow, turning brownish; fruit villous.

40. *Parosela lutea* Cav. Descr. Pl. 186. 1802.

Psoralea lutea Cav. Icon. Pl. 4: 12. pl. 325. 1797.

Dalea ovalifolia Ortega, Hort. Matr. Dec. 30. 1797.

Dalea lutea Willd. Sp. Pl. 3: 1341. 1803.

Nuevo León to Puebla. Guatemala.

Shrub, 30 to 50 cm. high, the branches densely pubescent; leaflets 15 to 21, elliptic or oval, 4 to 6 mm. long, often retuse, pilose, sometimes glabrate on the upper surface; spikes dense, 5 to 8 cm. long, 1 cm. thick; calyx pilose, the lobes pilose-ciliate; petals yellow; fruit villous.

41. *Parosela wardii* Rydb. N. Amer. Fl. 24: 112. 1920.

Tamaulipas and San Luis Potosí; type collected at San Luis Potosí.

Shrub, 30 to 60 cm. high, the branches pubescent; leaflets 9 to 15, oblong, 3 to 8 mm. long, villous-canescient, obtuse; spikes dense, 2 to 3 cm. long; calyx silky-pilose, the lobes plumose; petals yellow, fading brownish; fruit densely pubescent.

This has been reported as *Dalea leucostoma* var. and as *D. cinerea* Moric.

42. *Parosela argyrostachya* (Hook. & Arn.) Rydb. N. Amer. Fl. 24: 110. 1920.

Dalea argyrostachya Hook. & Arn. Bot. Beechey Voy. 285. 1836.

Chihuahua to Guerrero and Chiapas; type from Jalisco.

Shrub 50 cm. high or more, with glabrous branches; leaflets 15 to 21, oblong or obovate, glabrous; spikes dense, 3 to 6 cm. long, acute; calyx glabrous, the lobes plumose; petals yellow, turning brownish; fruit pubescent above, glabrous below.

43. *Parosela botterii* Rydb. N. Amer. Fl. 24: 110. 1920.

Known only from the type locality, Orizaba, Veracruz.

Stems glabrous or when young brownish-villous; leaflets 17 to 21, elliptic, 2 to 4 mm. long, glabrous; spikes dense, 3 to 5 cm. long, acute; calyx sparsely hirsute, the lobes plumose; petals rose-purple.

44. *Parosela plumosa* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 10: 106. 1906.

Dalea plumosa S. Wats. Proc. Amer. Acad. 21: 448. 1886.

Chihuahua, the type collected near the city of Chihuahua.

Shrub 30 to 50 cm. high, the branches finely pubescent; leaflets 11 to 17, elliptic-obovate, 4 to 6 mm. long, minutely pilose; spikes dense, 2 to 4 cm. long, 1 cm. thick; calyx glabrous, the lobes long-pilose; petals yellow, turning brownish; fruit pubescent.

45. *Parosela painteri* Rose, Contr. U. S. Nat. Herb. 10: 105. 1906.

Querétaro; type from San Juan del Río.

Shrub 30 to 50 cm. high, the branches puberulent; leaflets 11 to 15, oblong, 5 mm. long, retuse, glabrous above, minutely pubescent beneath; spikes 2 to 3 cm. long; calyx glabrous, the lobes long-pilose; petals yellow, turning brownish purple; fruit densely pubescent.

46. *Parosela atrocyanea* Rydb. N. Amer. Fl. 24: 111. 1920.

Known only from the type locality, San Luis Tultitlanapa, Puebla.

Low shrub with strigose branches; leaflets 9 to 17, oblong or obovate, 4 to 7 mm. long, glabrous above, strigose beneath; spikes dense, 1.5 to 3.5 cm. long, 1 cm. thick; calyx tube nearly glabrous, the lobes ciliate; petals at first yellow (?), turning dark blue, the banner wholly or partly yellow; fruit pubescent above, glabrous below.

47. *Parosela gigantea* Rose; Rydb. N. Amer. Fl. 24: 110. 1920.

Michoacán and Puebla; type from Tarascón, Michoacán.

Shrub, 2 to 5 meters high, the branches villous; leaflets 11 to 17, oval or obovate, 6 to 10 mm. long, pilose; spikes 3 to 6 cm. long, 1 cm. thick, dense, acute; calyx tube glabrous, the lobes long-pilose; petals yellow, turning blackish; fruit sparsely pilose.

48. *Parosela macrostachya* (Moric.) Rose, Contr. U. S. Nat. Herb. 12: 273. 1909.

Dalea macrostachya Moric. Mém. Soc. Genève 6: 543. pl. 5. 1833.

Dalea leucostoma Schlecht. Linnaea 12: 294. 1838.

Hidalgo.

Shrub, 0.3 to 1 meter high, the branches at first pubescent, becoming glabrate; leaflets 17 to 25, oblong or elliptic, 5 to 7 mm. long, glabrous above, pilose beneath; spikes 2 to 4 cm. long; petals yellow; fruit sericeous.

49. *Parosela crassifolia* (Hemsl.) Rose, Contr. U. S. Nat. Herb. 12: 272. 1909.

Dalea crassifolia Hemsl. Biol. Centr. Amer. Bot. 1: 238. 1880.

Sinaloa and Jalisco; type from the Sierra Madre of Sinaloa or Durango.

Shrub, 50 cm. high or more, with long glabrous branches; leaflets oblong, 3 to 4 mm. long, fleshy, glabrous; spikes dense, 2 to 3 cm. long; calyx tube silky-pilose, the lobes plumose; petals pale pink or nearly white; fruit densely pilose above.

50. *Parosela roseiflora* Rydb. N. Amer. Fl. 24: 105. 1920.

Type from the Sierra Madre of Durango or Sinaloa.

Plants glabrous, 40 cm. high or more; leaflets 25 to 41, elliptic, 5 mm. long, obtuse; spikes dense, 2 cm. long; calyx tube sericeous, the lobes plumose; petals rose; fruit silky-villous.

51. *Parosela longifolia* Rose; Rydb. N. Amer. Fl. 24: 105. 1920.

Known only from the type locality, between Altenguilla and Jacala, Jalisco.

Stems glabrous, 1 meter high or more; leaflets 31 to 37, oval, 3 to 4 mm. long, glabrous; spikes dense, 2 to 3 cm. long, 1 cm. thick; calyx tube silky-pilose; banner yellowish, the other petals light rose; fruit sericeous.

52. *Parosela saffordii* Rose, Contr. U. S. Nat. Herb. 12: 273. 1909.

Coahuila (type locality) and Durango.

Low shrub with glabrous branches; leaflets 9 to 13, oblanceolate or obovate, 2 to 3 mm. long, glabrous; calyx tube pilose; petals rose-colored; pod pubescent.

53. *Parosela formosa* (Torr.) Vail, Trans. N. Y. Acad. Sci. 14: 34. 1894.

Dalea formosa Torr. Ann. Lyc. N. Y. 2: 177. 1827.

Chihuahua and Sonora. Colorado to Texas and Arizona; type from the Platte River, Colorado.

Crooked shrub, 0.3 to 1 meter high, with glabrous branches; leaflets 7 or 9, oblong-spatulate, 1.5 to 2 mm. long, glabrous; calyx tube pilose, the lobes plumose; petals purple-rose; fruit pilose.

A very handsome shrub when in flower.

54. *Parosela purpusi* (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. 10: 106. 1906.

Dalea purpusi T. S. Brandeg. Erythea 7: 2. 1899.

Baja California; type from Calmallí.

Densely branched shrub, 30 to 40 cm. high, the branches glabrous or strigillose; leaflets 3 or 5, obovate, 4 to 6 mm. long, strigose; spikes 1.5 cm. long; calyx tube sericeous, the lobes plumose; petals pink; fruit sericeous.

55. *Parosela brandegei* Rose, Contr. U. S. Nat. Herb. 10: 106. 1906.

Dalea ramosissima Benth. Bot. Voy. Sulph. 11. 1844. Not *D. ramosissima* Mart. & Gal. 1843.

Parosela ramosissima Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.

Baja California; type from Magdalena Bay.

Shrub with reddish glabrous branches; leaflets 11 or 13, obovate, 2 to 5 mm. long, obtuse or retuse, glabrous; spikes dense, 3 to 5 cm. long, 1 cm. thick; calyx densely pilose; petals rose-colored; fruit sparsely pilose.

56. *Parosela smithii* Rydb. N. Amer. Fl. 24: 106. 1920.

Oaxaca to Hidalgo; type from Sierra de San Felipe, Oaxaca.

Slender shrub about 1 meter high, the stems glabrous; leaflets 13 to 21, oblong, 5 to 8 mm. long, obtuse, glabrous; spikes dense, 1.5 to 4 cm. long, 1 cm. thick; calyx densely sericeous; petals rose-purple; fruit densely sericeous above.

57. *Parosela glabrescens* Rydb. N. Amer. Fl. 24: 106. 1920.

San Luis Potosí.

Slender shrub 50 cm. high or taller, the stems glabrous or slightly pubescent; leaflets 15 to 21, elliptic, acute or obtuse, sparsely pilose at first; spikes dense, 1.5 to 3 cm. long, 1 cm. thick; calyx silky-pilose; petals pale rose or nearly white.

58. *Parosela lasiostachya* (Benth.) Rose, Contr. U. S. Nat. Herb. 10: 107. 1906.

Dalea lasiostachya Benth. Pl. Hartw. 11. 1839.

Dry hillsides, Mexico and Puebla.

Slender shrub, 1 meter high, with reddish glabrous branches; leaflets 13 to 17, oblong or linear-oblong, 3 to 6 mm. long, glabrous; spikes 2 to 4 cm. long, 1.5 cm. thick; calyx silky-villous; petals rose or purple; fruit densely villous.

59. *Parosela involuta* Rydb. N. Amer. Fl. 24: 107. 1920.

Jalisco; type from Río Blanco.

Slender shrub, 1 meter high or more, with glabrous branches; leaflets 11 to 15, linear, 3 to 5 mm. long, glabrous; spikes dense, 2 to 4 cm. long, 1 cm. thick; calyx densely silky-pilose; petals pale rose or pink, or at first whitish; fruit densely pubescent.

60. *Parosela eriophylla* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 10: 106. 1906.

Dalea eriophylla S. Wats. Proc. Amer. Acad. 17: 340. 1822.

Coahuila; type from the Sierra Madre, 40 miles south of Saltillo.

Shrub, 10 to 20 cm. high, with tomentose branches; leaflets 3, oblong or obovate-oblong, 3 mm. long, densely white-villous; spikes sessile, headlike; calyx densely villous; petals rose-colored.

61. *Parosela greggii* (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.

Dalea greggii A. Gray, Mem. Amer. Acad. II. 5: 314. 1854.

Parosela leucosericea Rydb. N. Amer. Fl. 24: 104. 1920.

Sonora to San Luis Potosí, Puebla, and Oaxaca; type from Buena Vista, Coahuila. Arizona.

Low shrub with tomentose-sericeous branches; leaflets 5 to 11, obovate or oval, 3 to 10 mm. long, densely sericeous-tomentose; spikes dense, 1 to 3 cm.

long, 1 cm. thick; calyx silky-villous; petals rose-colored, or the banner yellowish; fruit densely villous above.

62. *Parosela oaxacana* Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Oaxaca; type from Sierra de San Felipe.

Shrub, 1 to 2 meters high, with finely soft-pubescent branches; leaflets 13 to 31, narrowly oblong, 6 to 9 mm. long, finely pubescent when young; spikes dense, 1 to 3 cm. long, 1 cm. thick; calyx silky-pubescent; petals rose-purple; fruit sparsely pubescent above.

63. *Parosela tsugoides* Rydb. N. Amer. Fl. 24: 102. 1920.

Oaxaca; type from the Valley of Oaxaca. Guatemala.

Shrub, 1 meter high, with finely villous reddish branches; leaflets 13 to 23, oblong, 2 to 3 mm. long, pubescent; spikes 2 to 3 cm. long, 1 cm. thick; calyx densely pilose; petals dark purple; fruit pubescent.

64. *Parosela versicolor* (Zucc.) Rydb. N. Amer. Fl. 24: 102. 1920.

Dalea versicolor Zucc. Flora 15²: Beibl. 1: 69. 1832.

Oaxaca and Chiapas.

Shrub, 1 meter high, with villous branches; leaflets 15 to 21, oblong, 4 to 7 mm. long, glabrous above, finely pubescent beneath; spikes 3 to 5 cm. long, 1.5 cm. thick; calyx pilose; banner white or ochroleucous, the other petals rose-purple; fruit densely pubescent.

65. *Parosela sessilis* (A. Gray) Rydb. N. Amer. Fl. 24: 104. 1920.

Dalea wislizeni sessilis A. Gray, Proc. Amer. Acad. 16: 105. 1880.

Sonora to Durango. New Mexico (type locality) and Arizona.

Shrub, 0.5 to 1 meter high, with finely puberulent branches; leaflets 13 to 21, oblong, 2 to 3 mm. long, densely pubescent beneath, sparsely pilose or glabrate above; spikes 1 to 2.5 cm. long; calyx densely pilose; banner white or yellowish, the other petals rose colored; fruit densely pubescent.

66. *Parosela megalostachys* Rose; Rydb. N. Amer. Fl. 24: 102. 1920.

Baja California; type from San Esteban.

Shrub, 1 meter high or more, with villous branches; leaflets 7 to 13, obovate, 8 to 10 mm. long, densely sericeous; spikes dense, 3 to 5 cm. long, 1.2 to 1.5 cm. thick; calyx densely silky-pilose; petals rose-colored; fruit villous.

67. *Parosela wislizeni* (A. Gray) Vail, Trans. N. Y. Acad. Sci. 14: 34. 1894.

Dalea wislizeni A. Gray, Mem. Amer. Acad. II. 4: 32. 1849.

Chihuahua to Durango and Guanajuato; type from the Sierra Madre west of Chihuahua.

Shrub, 0.5 to 1 meter high, with villous-canescenscent branches; leaflets 15 to 23, oblong, 3 to 6 mm. long, obtuse, densely villous-sericeous; spikes dense, 2 to 5 cm. long; calyx silky-villous; petals light rose or nearly white; fruit densely villous.

68. *Parosela sanctae-crucis* Rydb. N. Amer. Fl. 24: 103. 1920.

Sonora and Chihuahua; type from Santa Cruz, Sonora. Arizona.

Shrub, 0.5 to 1 meter high, with short-pubescent branches; leaflets 13 to 15, oblong, 3 to 5 mm. long, short-pubescent beneath, pilose or glabrate above; spikes dense, 1 to 2 cm. long; calyx densely pilose; petals rose colored; fruit pilose above.

69. *Parosela leucantha* Rydb. N. Amer. Fl. 24: 103. 1920.

Tepic and Jalisco; type collected in Tepic.

Shrub, 1 meter high, with finely short-pubescent branches; leaflets lance-oblong, 2 to 4 mm. long, acute, short-pubescent; spikes dense, 2 to 7 cm. long; calyx pilose; petals white; fruit densely pubescent above.

70. *Parosela benthami* (T. S. Brandeg.) Standl.*Dalea benthami* T. S. Brandeg. Proc. Calif. Acad. II. 2: 148. 1889.*Dalea megacarpa biuncifera* Greene; Vasey & Rose, Contr. U. S. Nat. Herb. 1: 15. 1890.*Psorobatus benthami* Rydb. N. Amer. Fl. 24: 40. 1919.

Islands of the west coast of Baja California; type from Santa Margarita Island.

Shrub, 1 meter high or less, with white-tomentose branches covered with orange or brown glands; leaflets 7 to 11, suborbicular, 4 to 8 mm. long, white-tomentose; spikes 2 to 6 cm. long; calyx tomentose; petals pale yellow; fruit tomentose.

71. *Parosela megacarpa* (S. Wats.) Standl.*Dalea megacarpa* S. Wats. Proc. Amer. Acad. 20: 359. 1885.*Psorobatus megacarpus* Rydb. N. Amer. Fl. 24: 41. 1919.

Sonora (type locality) and Baja California.

Shrub, 1 meter high or less, with white-tomentose branches; leaflets 9 to 13, suborbicular, 5 to 8 mm. long, white-tomentose; spikes 5 to 15 cm. long, nearly 1 cm. thick; calyx tomentose; petals yellow, turning brown; fruit tomentose, 1 cm. long.

72. *Parosela acutifolia* (DC.) Rose, Bot. Gaz. 40: 144. 1905.*Dalea acutifolia* DC. Prodr. 2: 245. 1825.

Morelos and Guerrero; type from Sierra Chilapa, Guerrero.

Shrub, 1 to 3 meters high, with glabrous branches; leaflets 7 to 11, elliptic or oval, 1 to 2.5 cm. long, cuspidate, glabrous; spikes rather lax, 5 to 15 cm. long; calyx silky-villous; petals at first greenish yellow, turning dark reddish purple; fruit silky-villous.

73. *Parosela capitata* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 12: 272. 1909.*Dalea capitata* S. Wats. Proc. Amer. Acad. 25: 146. 1890.

Chihuahua and Coahuila to San Luis Potosí; type from Carneros Pass, Coahuila.

Shrub, 30 to 50 cm. high, with finely puberulent branches; leaflets 5 to 9, obovate, 2 to 3 mm. long, emarginate; spikes dense, 1 to 3 cm. long; calyx sericeous; petals yellow; fruit finely pubescent.

74. *Parosela quinqueflora* (T. S. Brandeg.) Rydb. N. Amer. Fl. 24: 84. 1920.*Dalea quinqueflora* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 180. 1911.

San Luis Potosí; type from Buena Vista.

Low shrub with glabrous branches; leaflets 5 or 7, cuneate-oblong, 3 mm. long; spikes headlike, 3 to 7-flowered; calyx sericeous; petals yellow.

75. *Parosela lloydii* Rydb. N. Amer. Fl. 24: 84. 1920.

Known only from the type locality, Cedros, Zacatecas.

Low shrub with glabrous branches; leaflets 7 or 9, cuneate-oblong, 3 mm. long, glabrous; spikes 2 to 7-flowered; petals yellow.

76. *Parosela mucronata* (DC.) Rose, Contr. U. S. Nat. Herb. 10: 103. 1906.*Dalea mucronata* DC. Prodr. 2: 246. 1825.

Jalisco and elsewhere in central Mexico.

Stems suffruticose, 0.5 to 1 meter high, glabrous; leaflets 7 to 27, elliptic, glabrous, cuspidate; spikes dense, 1 to 2.5 cm. long, 1 cm. thick; calyx glabrous; petals white; fruit glabrous.

77. *Parosela lumholtzii* (Robins. & Fern.) Vail, Bull. Torrey Club 26: 117. 1899.*Dalea lumholtzii* Robins. & Fern. Proc. Amer. Acad. 30: 115. 1894.*Parosela arizonica* Vail, Bull. Torrey Club 24: 14. 1897.

Sonora; type from Los Pinitos. Arizona.

Stems suffruticose, puberulent; leaflets 17 to 27, linear, 4 to 6 mm. long, obtuse, glabrous or sparsely sericeous when young; spikes dense, 1 cm. long or less; calyx sparsely sericeous; petals white; fruit densely pubescent above.

78. *Parosela eysenhardtoides* (Hemsl.) Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Dalea eysenhardtoides Hemsl. Diag. Pl. Mex. 6. 1878.

Michoacán to Oaxaca; type from Oaxaca.

Shrub, 2 to 4 meters high, with finely puberulent branches; leaflets 7 to 13, oblong-obovate or oblong-oblancheolate, 1 to 2 cm. long, mucronate; spikes dense, 1 to 3 cm. long, 6 to 7 mm. thick; petals white; fruit puberulent.

79. *Parosela leucostachys* (A. Gray) Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Dalea leucostachys A. Gray, Mem. Amer. Acad. II. 4: 32. 1849.

Chihuahua, Durango, and Jalisco; type from Cosihuiriachic, Chihuahua.

Shrub, 0.5 to 1 meter high, with puberulent or short-villous branches; leaflets 5 to 9, oblanceolate or obovate, obtuse or retuse; spikes 1 to 3 cm. long; calyx puberulent; petals white; fruit pubescent.

80. *Parosela frutescens* (A. Gray) Vail; Rose, Contr. U. S. Nat. Herb. 8: 303. 1905.

Dalea frutescens A. Gray, Bost. Journ. Nat. Hist. 6: 175. 1850.

Chihuahua, Coahuila, and Nuevo León. Texas (type from Guadalupe River) and New Mexico.

Slender shrub, 1 meter high or less, with glabrous branches; leaflets 13 to 17, obovate, 3 to 8 mm. long, retuse, glabrous; spikes dense, about 1 cm. long; calyx tube glabrous; petals purple; fruit glabrous.

81. *Parosela hospes* Rose, Contr. U. S. Nat. Herb. 12: 272. 1909.

Coahuila and Nuevo León; type collected near Monterrey, Nuevo León.

Slender shrub, 2 to 3 meters high, glabrous throughout, the branches purplish; leaflets 5 or 7, oblong or cuneate, 6 to 10 mm. long; spikes lax, 2 to 4 cm. long, 5 to 12-flowered; petals creamy white to pale purple; fruit sericeous.

82. *Parosela pilosissima* Rydb. N. Amer. Fl. 24: 91. 1920.

Known only from the type locality, near the city of Durango.

Shrub, 20 to 40 cm. high, the branches purplish, puberulent when young; leaflets 9 to 15, elliptic or oval, 2 to 4 mm. long, glabrous above, pilose beneath; spikes dense, 1 to 3 cm. long; calyx pubescent; petals blue; fruit slightly pubescent.

83. *Parosela emoryi* (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 6. 1900.

Dalea emoryi A. Gray, Mem. Amer. Acad. II. 5: 315. 1854.

Psoralea emoryi Rydb. N. Amer. Fl. 24: 47. 1919.

Sonora and Baja California. Arizona (type from the Gila River) and southern California.

Shrub, 1 to 2 meters high, with white-velvety branches dotted with red or orange glands; leaflets 1 to 13, linear-oblong to obovate, 5 to 20 mm. long, white-velutinous; spikes dense, 1.2 to 1.5 cm. thick, 10 to 20-flowered; petals dark blue; fruit villous above.

This and related species were used by the Indians to dye baskets, giving a yellow or yellowish brown color.

84. *Parosela scoparia* (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 7. 1900.

Dalea scoparia A. Gray, Mem. Amer. Acad. II. 4: 32. 1849.

Psoralea scoparius Rydb. N. Amer. Fl. 24: 48. 1919.

On sandhills, Chihuahua and Coahuila. New Mexico; type from the Jornada del Muerto.

Shrub, 0.5 to 1 meter high, with erect canescent branches; leaves 1 cm. long or less, linear or oblanceolate, canescent; spikes 1.2 to 1.5 cm. thick; calyx white-villous; petals dark blue; fruit pubescent.

85. *Parosela juncea* (Rydb.) Standl.

Psorothamnus junceus Rydb. N. Amer. Fl. **24**: 48. 1919.

Known only from the type locality, Esperanza Canyon, San Pedro Mártir Mountains, Baja California.

Shrub with glabrous branches; leaflets 1 to 5, oblong or narrowly oblanceolate, 1 to 1.5 cm. long, glabrous; spikes subglobose, 1 cm. thick; petals dark blue.

86. *Parosela tinctoria* (T. S. Brandeg.) Standl.

Dalea tinctoria T. S. Brandeg. Proc. Calif. Acad. II. **2**: 147. 1889.

Psorothamnus tinctorius Rydb. N. Amer. Fl. **24**: 47. 1919.

Baja California; type from San Gregorio.

Shrub, 1 to 2 meters high, with gray branches; leaflets 3 or 5, 4 to 10 mm. long; spikes subglobose, 1 cm. thick; calyx villous; petals dark blue.

87. *Parosela dentata* (Rydb.) Standl.

Psorothamnus dentatus Rydb. N. Amer. Fl. **24**: 47. 1919.

Known only from the type locality, Santo Domingo, Baja California.

Shrub with velutinous-canescenscent branches; leaflets 9 to 17, 1 to 2 cm. long, canescent; spikes subglobose, 1 cm. thick; petals dark blue.

88. *Parosela arenaria* (T. S. Brandeg.) Standl.

Dalea tinctoria arenaria T. S. Brandeg. Proc. Calif. Acad. II. **2**: 147. 1889.

Psorothamnus arenarius Rydb. N. Amer. Fl. **24**: 47. 1919.

Southern Baja California; type from Boca de Soledad.

Shrub, the branches glabrous or nearly so; leaflets 5 to 9, 1 to 3.5 cm. long, sparsely canescent; spikes short, 1 cm. thick; calyx silky-villous; petals blue; fruit pubescent.

89. *Parosela pectinata* (Kunth) Rose, Contr. U. S. Nat. Herb. **10: 104. 1906.**

Dalea pectinata Kunth, Mimos. Pl. Légum. 169. *pl.* 49. 1819.

Durango, Jalisco, and San Luis Potosí; type from Villapando.

Stems suffruticose, 0.5 to 1 meter high, glabrous; leaflets 41 to 65, linear, 2 to 4 mm. long, glabrous; spikes dense, 2 to 3 cm. long, 1 cm. thick; calyx silky-villous; petals blue or bluish purple; fruit short-villous.

90. *Parosela abietifolia* Rose; Rydb. N. Amer. Fl. **24: 92. 1920.**

Known only from the type locality, mountains above Etzatlán, Jalisco.

Stems suffruticose, 30 to 40 cm. high, villous-tomentose; leaflets 31 to 35, 5 to 8 mm. long, short-villous; spikes 1 to 3 cm. long; calyx densely silky-villous; petals rose-purple; fruit densely villous.

91. *Parosela tomentosa* (Cav.) Rose, Contr. U. S. Nat. Herb. **12: 273. 1909.**

Psoralea tomentosa Cav. Icon. Pl. **3**: 21. *pl.* 240. 1794.

Dalea tomentosa Willd. Sp. Pl. **3**: 1341. 1803.

Dalea verbenacea Schlecht. & Cham. Linnaea **5**: 579. 1830.

Dalea argentea Don, Hist. Diehl. Pl. **2**: 225. 1832.

Tepic and Jalisco to Veracruz and Guerrero.

Shrub, 1 meter high, with villous branches; leaflets 3 to 7, obovate, 8 to 12 mm. long, acute or mucronate, silky-villous; spikes dense, 1 to 3 cm. long, acute; calyx villous; petals purple or pink; fruit pubescent above.

92. *Parosela psoraleoides* (Moric.) Rose, Contr. U. S. Nat. Herb. **10: 104. 1906.**

Dalea verbenacea sericea Schlecht. Linnaea **5**: 579. 1830.

Dalea psoraleoides Moric. Mém. Soc. Genève 6: 533. pl. 4. 1833.

Jalisco to Veracruz and Guerrero; type from Cuernavaca, Morelos. Guatemala.

Shrub, 0.5 to 1.2 meters high, with villous branches; leaflets 5 to 9, oblong-ovate or elliptic, 5 to 10 mm. long, cuspidate, white-sericeous; spikes dense, 1 to 4 cm. long, 8 mm. thick; calyx villous; banner yellowish, the other petals pink, turning yellowish; fruit hairy at the summit.

93. *Parosela hemsleyana* Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Dalea ramosissima Hemsl. Biol. Centr. Amer. Bot. 1: 245. 1880. Not *D. ramosissima* Mart. & Gal. 1843.

San Luis Potosí.

Shrub with glabrous branches; leaflets 9 to 15, oblong, 2 to 3 mm. long, obtuse, glabrous; spikes subcapitate; calyx sericeous; banner ochroleucous, the other petals purple; fruit densely pubescent.

94. *Parosela trochilina* (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Dalea trochilina T. S. Brandeg. Proc. Calif. Acad. II. 3: 200. 1892.

Southern Baja California; type from La Chuparosa.

Shrub, 1 to 1.5 meters high, the branches glabrous; leaflets 7 to 15, obovate, 3 to 5 mm. long, glabrous; spikes dense, 1 to 2 cm. long; calyx sericeous; banner ochroleucous, the other petals purple; fruit pubescent.

95. *Parosela minutifolia* Rydb. N. Amer. Fl. 24: 87. 1920.

Zacatecas to Oaxaca and Veracruz; type from Pachuca, Hidalgo.

Shrub, 50 cm. high, with glabrous branches; leaflets 7 or 9, 1 to 2 mm. long, glabrous; spikes 1 to 1.5 cm. long; calyx densely silky-pilose; banner ochroleucous, the other petals purple; fruit silky-villous.

96. *Parosela naviculifolia* (Hemsl.) Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Dalea naviculifolia Hemsl. Diag. Pl. Mex. 7. 1878.

Oaxaca.

Shrub, 30 to 50 cm. high, with puberulent branches; leaflets 11 to 21, oblong, 2 to 3 mm. long, obtuse, puberulent above; spikes dense, 1 to 3 cm. long, 8 mm. thick; calyx puberulent; banner white or ochroleucous, the other petals purple; fruit puberulent above.

97. *Parosela argyrea* (A. Gray) Heller, Cat. N. Amer. Pl. ed. 2. 5. 1900.

Dalea argyrea A. Gray, Pl. Wright. 1: 47. 1852.

Chihuahua and Nuevo León. Texas (type from San Pedro River) and New Mexico.

Shrub, 0.3 to 1 meter high, with tomentose branches; leaflets 7 to 13, obovate, 5 to 8 mm. long, sericeous; spikes dense, 1 to 2.5 cm. long; calyx silky-villous; banner yellowish, fading purplish, the other petals purple; fruit silky-villous.

98. *Parosela seemanni* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 10: 106. 1906.

? *Dalea ehrenbergii* Schlecht. Linnaea 12: 290. 1838.

Dalea seemanni S. Wats. Proc. Amer. Acad. 22: 470. 1887.

Baja California to Zacatecas, Mexico, and Hidalgo; type from the Sierra Madre (Durango?).

Shrub, 50 cm. high or more, the branches finely pubescent; leaflets 7 to 11, obovate or cuneate-oblong, sericeous; spikes rather dense, 2 to 5 cm. long; calyx long-villous; banner yellowish, the other petals purple.

99. *Parosela tuberculata* (Lag.) Rose, Contr. U. S. Nat. Herb. 10: 104. 1906.

Dalea tuberculata Lag. Gen. & Sp. Nov. 23. 1816.

Dalea thymoides Schlecht. *Linnaea* 5: 580. 1830.

Dalea verrucosa Don, *Hist. Dichl. Pl.* 2: 225. 1832.

? *Dalea comosa* Schlecht. *Linnaea* 12: 289. 1838.

Chihuahua and Coahuila to Mexico and Puebla.

Shrub, 50 cm. high or more, the branches densely short-pubescent; leaflets 5 to 11, oblong or obovate, 4 to 8 mm. long, short-pubescent, sometimes glabrate above; spikes 2 to 15 cm. long; calyx short-pubescent; banner yellowish, the other petals purple; fruit pubescent. "Engorda-cabras" (Durango, *Patoni*).

100. *Parosela canescens* (Mart. & Gal.) Rose, *Contr. U. S. Nat. Herb.* 10: 105. 1906.

Dalea canescens Mart. & Gal. *Bull. Acad. Brux.* 10²: 43. 1843.

Hidalgo, Puebla, and Oaxaca; type from Tehuacán, Puebla.

Shrub, 1 to 2 meters high, with finely canescent branches; leaflets 3 to 7, obovate, 4 to 10 mm. long, canescent, sometimes glabrate on the upper surface; spikes 2 to 10 cm. long; calyx short-pubescent; banner ochroleucous, the other petals purple; fruit pubescent.

101. *Parosela conzattii* Rydb. *N. Amer. Fl.* 24: 89. 1920.

Known only from the type locality, Cerro San Antonio, Oaxaca.

Low shrub with puberulent branches; leaflets 17 to 31, linear-oblong, 4 to 5 mm. long, glabrous above, puberulent beneath; spikes 2 cm. long; calyx pubescent; petals rose-purple.

102. *Parosela tuberculina* Rydb. *N. Amer. Fl.* 24: 89. 1920.

Known only from the type locality, San Luis Tultitlanapa, Puebla.

Low shrub with puberulent branches; leaflets 7 to 11, obovate, 4 to 5 mm. long, retuse, glabrous above, puberulent beneath; spikes dense, 1.5 to 3 cm. long; calyx short-pilose; banner yellowish, the other petals rose-purple; fruit densely pubescent.

103. *Parosela fulvosericca* Rydb. *N. Amer. Fl.* 24: 89. 1920.

Vicinity of San Luis Potosí.

Shrub, 50 cm. high, with villous branches; leaflets 7 or 9, obovate, 4 to 10 mm. long, retuse, sericeous; spikes dense, 2 to 3 cm. long; calyx sericeous; banner yellowish, the other petals rose-purple; fruit densely pubescent.

104. *Parosela dorycnoides* (DC.) Rydb. *N. Amer. Fl.* 24: 90. 1920.

Dalea dorycnoides DC. *Prodr.* 2: 245. 1825.

Dalea pulchella Moric. *Mém. Soc. Genève* 7: 249. *pl.* 7. 1836. Not *D. pulchella* Don, 1832.

? *Dalea argentea* Mart. *Del. Sem. Hort. Monac.* 1846. Not *D. argentea* Don, 1832.

Parosela pulchella Heller, *Cat. N. Amer. Pl.* ed. 2. 6. 1900.

San Luis Potosí and Hidalgo.

Shrub, 50 cm. high or more, with tomentose branches; leaflets 5 or 7, obovate, 3 to 8 mm. long, retuse, silky-canescens; spikes headlike, 1 to 2 cm. long; calyx villous; banner ochroleucous, the other petals purple; fruit pubescent.

105. *Parosela polycephala* (Benth.) Rydb. *N. Amer. Fl.* 24: 90. 1920.

Dalea polycephala Benth.; *Hemsl. Biol. Centr. Amer. Bot.* 1: 244, hyponym. 1880.

San Luis Potosí.

Low shrub with puberulent branches; leaflets 5 to 9, obovate, 2 mm. long or less, puberulent; spikes subglobose; calyx villous; banner yellowish, the other petals rose-purple; fruit pubescent.

106. *Parosela decora* (Schauer) Rydb. N. Amer. Fl. 24: 90. 1920.*Dalea decora* Schauer, *Linnaea* 20: 743. 1847.

Oaxaca.

Shrub, 0.3 to 1 meter high, with tomentose branches; leaflets 3 to 7, oblong or obovate, 2 to 5 mm. long, obtuse or retuse, villous-tomentose; spikes dense, headlike, 1 to 1.5 cm. long; calyx villous; banner white or ochroleucous, the other petals purple; fruit pubescent.

For a list of doubtful species of the genus see Rydberg, N. Amer. Fl. 24: 116. 1920.

14. *HARPALYCE* DC. Prodr. 2: 523. 1825.

Shrubs or small trees; leaves odd-pinnate, the leaflets rather large, with numerous yellowish or reddish glands on the lower surface; flowers large, racemose; fruit short and broad, bivalvate.

The writer is skeptical concerning the validity of the species listed below. They are separated usually by characters which would be considered of little value in other genera of the family and are represented by very few specimens.

The name "balché-ceh" is said by Seler to be applied to some species of the genus in Yucatán.

Leaflets glabrous on the upper surface, even when young-----1. *H. goldmani*.

Leaflets sericeous or puberulent on the upper surface, at least when young.

Venation of the lower surface of the leaflets prominent and reticulate.

Leaflets acutish or obtuse; valves of the fruit very thick and hard.

2. *H. mexicana*.

Leaflets rounded and shallowly retuse at apex; valves of the fruit thin.

3. *H. pringlei*.

Venation of the leaflets neither prominent nor reticulate.

Leaflets oval or rounded-oval, finally glabrate beneath, retuse at apex.

4. *H. arborescens*.

Leaflets oblong, copiously sericeous beneath, scarcely or not at all retuse at apex.

Leaflets 7 or 9-----5. *H. loeseneriana*.

Leaflets 13 to 23-----6. *H. macrobotrya*.

1. *Harpalyce goldmani* Rose, Contr. U. S. Nat. Herb. 8: 313. 1905.

Known only from the type locality, Canjob, Chiapas.

Leaflets 17 to 21, oblong or oblong-ovate, obtuse; racemes mostly longer than the leaves, the flowers large.

2. *Harpalyce mexicana* Rose, Contr. U. S. Nat. Herb. 8: 42. 1903.

Known only from the type locality, near Bolaños, Jalisco.

Small tree; leaflets 11 or 13, 4 to 7.5 cm. long; fruit 5.5 cm. long, 2.5 cm. wide, glabrous; seeds 10 to 14 mm. long, brown, lustrous.

3. *Harpalyce pringlei* Rose, Contr. U. S. Nat. Herb. 8: 42. 1903.

Known only from the vicinity of the type locality, Cuernavaca, Morelos.

Shrub, 0.3 to 1.8 meters high; leaflets about 11, 1.8 to 4 cm. long; fruit about 8 cm. long and 2.5 cm. wide.

4. *Harpalyce arborescens* A. Gray, Proc. Amer. Acad. 5: 178. 1862.

Brongniartia retusa Benth.; Hemsl. Diag. Pl. Mex. 8. 1878.

Brongniartia hidalgensis Taub. Bull. Herb. Boiss. 3: 613. 1895.

Harpalyce retusa Rose, Contr. U. S. Nat. Herb. 8: 43. 1903.

San Luis Potosí, Veracruz, and Hidalgo; type collected near Tantoyuca, Veracruz.

Shrub or small tree; leaflets 7 to 11, 2 to 5 cm. long.

5. *Harpalyce loeseneriana* Taub. Bull. Herb. Boiss. 3: 612. 1895.*Harpalyce ferruginea* T. S. Brandeg. Zoe 5: 234. 1906.

Puebla and Oaxaca; type from Mitla, Oaxaca.

Leaflets 2 to 4.5 cm. long; flowers 2.5 cm. long; fruit 8.5 cm. long, 3 cm. wide.

6. *Harpalyce macrobotrya* Harms, Verh. Bot. Ver. Brand. 51: 22. 1909.

Known only from the type locality, Distrito de Comitán, Chiapas.

Leaflets 2 cm. long or shorter; flowers 2 cm. long, red.

DOUBTFUL SPECIES.

HARPALYCE FORMOSA DC. Prodr. 2: 523. 1825. This, the type of the genus, was based upon one of Mociño and Sessé's drawings, but the tracing of the drawing seen by the writer is so imperfect that it is impossible to tell what species is represented. It may be the same as *H. pringlei* Rose.

15. *BRONGNIARTIA* H. B. K. Nov. Gen. & Sp. 6: 465. 1823.

Unarmed shrubs, usually small, with odd-pinnate leaves; flowers usually large, axillary, and long-pedunculate.

The plants vary greatly in pubescence at different stages of growth. Leaves that are densely sericeous at first may be almost glabrous when fully developed.

Stipules semireniform or semisagittate, much produced below the point of insertion.

Leaflets 3 or 5; bracts longer than peduncles.....1. *B. inconstans*.

Leaflets more than 5; bracts usually shorter than the peduncles.

Young branches pilose with soft spreading hairs.

Corolla about 2.5 cm. long.....2. *B. lunata*.

Corolla about 1.5 cm. long.....3. *B. nudiflora*.

Young branches glabrous or with appressed hairs.

Leaflets mostly 2.5 to 5 cm. long.....4. *B. podalyrioides*.

Leaflets mostly 1 to 2.5 cm. long.....5. *B. mollicula*.

Stipules oval to linear, not produced below the point of insertion.

Leaflets linear, less than 1 mm wide.....6. *B. minutifolia*.

Leaflets oblong or broader, much wider.

Young branches glabrous or practically so.

Flowers about 2 cm. long; leaflets 1 to 2 cm. long.....7. *B. diffusa*.

Flowers about 3 cm. long; leaflets 2 to 4 cm. long.....8. *B. glabrata*.

Young branches copiously pubescent.

Leaflets 3 or 5.

Leaflets 5, rounded or obtuse at apex, thin.....9. *B. suberea*.

Leaflets usually 3, emarginate, subcoriaceous.....10. *B. trifoliata*.

Leaflets 7 or more in all or most of the leaves.

Bractlets subtending the flowers glabrous.

Leaflets glabrous; bractlets cordate at base.....11. *B. foliolosa*.

Leaflets sericeous beneath when young; bractlets not cordate at base.....12. *B. magnibracteata*.

Bractlets pilose or sericeous.

Fruit densely pilose.....13. *B. lasiocarpa*.

Fruit glabrous.

Bracts at anthesis as long as the calyx.....14. *B. lupinoides*.

Bracts at anthesis much shorter than the calyx.

Calyx glabrous.

Leaflets acute, 2.5 to 5 mm. wide.....15. *B. parvifolia*.

Leaflets rounded or obtuse at apex, 5 to 17 mm. wide.

Leaflets reticulate-veined, subcordate at base.

16. *B. discolor*.

Leaflets not reticulate-veined, rounded or obtuse at base.

Leaflets 14 to 17 mm. wide, broadly rounded or retuse at apex-----17. *B. luisana*.

Leaflets 5 to 8 mm. wide, obtuse at apex.

18. *B. peninsularis*.

Calyx copiously pilose or sericeous.

Venation of the lower surface of the leaflets very prominent and closely reticulate-----19. *B. parryi*.

Venation of the leaflets neither very prominent nor closely reticulate.

Pubescence of the peduncles retrorse-----20. *B. goldmanii*.

Pubescence of the peduncles spreading, ascending, or appressed.

Corolla 2.7 to 3 cm. long-----21. *B. benthamiana*.

Corolla less than 2.5 cm. long.

Leaflets 6 to 11 mm. long-----22. *B. vicloides*.

Leaflets 14 to 50 mm. long-----23. *B. intermedia*.

1. *Brongniartia inconstans* S. Wats. Proc. Amer. Acad. 22: 404. 1887.

Jalisco and Michoacán; type from Tequila, Jalisco.

Glabrous shrub about a meter high; stipules very large, resembling the leaflets, these 1.2 to 5.5 cm. long, coriaceous, reticulate-veined, glaucescent beneath; flowers 3 cm. long, yellowish brown, turning purple.

2. *Brongniartia lunata* Rose, Contr. U. S. Nat. Herb. 5: 194. 1899.

Known only from the type locality, east of Huasemote, Durango.

Leaflets 7 to 11, oval, 4 to 6 cm. long.

3. *Brongniartia nudiflora* S. Wats. Proc. Amer. Acad. 25: 146. 1890.

Brongniartia palmeri Rose, Contr. U. S. Nat. Herb. 1: 97. 1891.

Sonora to Jalisco; type from hills near Guadalajara.

Shrub, 45 to 90 cm. high; leaflets 7 to 15, 2.5 to 6 cm. long, copiously pilose, reticulate-veined; flowers purplish. "Haba de barranca" (Jalisco).

4. *Brongniartia podalyrioides* H. B. K. Nov. Gen. & Sp. 6: 468. pl. 588. 1823.

? *Brongniartia bilabiata* Michell. Mém. Soc. Phys. Hist. Nat. Genève 34: 248. pl. 1. 1903.

Sonora to Guerrero and Morelos; type collected near La Punta de Ixtla, between Tasco and Cuernavaca, Morelos, altitude 900 meters.

Shrub, 1 meter high or less; leaflets about 11, elliptic or oval, glabrate in age; flowers 2.5 cm. long; fruit 2.5 cm. wide or narrower, glabrous, glaucescent.

B. galegoides Presl,¹ probably a Mexican plant, is closely related to this species.

5. *Brongniartia mollicula* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 380. 1909.

Oaxaca and Puebla; type from San Luis Tultitlanapa, Puebla.

Leaflets 7 or 9, oval or suborbicular, bright green; flowers 2 to 2.5 cm. long.

6. *Brongniartia minutifolia* S. Wats. Proc. Amer. Acad. 20: 360. 1885.

Brongniartia minutifolia canescens S. Wats. Proc. Amer. Acad. 23: 271. 1888.

Chihuahua. Western Texas; type from Chisos Mountains.

Shrub, 0.3 to 1 meter high; leaflets numerous, linear, 2 to 4 mm. long; flowers 1 cm. long; fruit 1.5 cm. long, 1 cm. wide.

The Chihuahua plant is *B. minutifolia canescens*.

¹ Symb. Bot. 2: 21. pl. 67. 1833.

7. *Brongniartia diffusa* Rose, Contr. U. S. Nat. Herb. 5: 194. 1899.

Known only from the type locality, between Pedro Paulo and San Blasito, Tepic.

Slender shrub, about a meter high; leaflets 7 to 19, oval or rounded-oval, bright green; flowers purplish, 2 cm. long; fruit glabrous.

8. *Brongniartia glabrata* Hook. & Arn. Bot. Beechey Voy. 238. 1836.

Brongniartia bracteolata Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 249. pl. 2. 1903.

Sinaloa to Guerrero.

Slender shrub, 2 meters high or less, with green branches; leaflets 5 to 11, elliptic to suborbicular, bright green, glabrate; flowers 2.5 cm. long or larger; fruit 7 to 8 cm. long, 1.5 cm. wide. "Hierba de vibora" (Sinaloa).

Bark and leaves used in Sinaloa as a remedy for rattlesnake bites.

It is possible that *B. bracteolata* is a distinct species, but the material at hand does not show any important differences.

9. *Brongniartia suberea* Rose, Contr. U. S. Nat. Herb. 5: 134. pl. 13. 1897.

Known only from Acapulco, Guerrero, the type locality.

Shrub, 2.5 to 3.5 meters high, the young branches often with thick corky ridges; flowers brownish or purplish.

B. mollis H. B. K.,¹ the type from Quebrada de Zopilote, between Zumpango and Tasco, is closely related and may be the same species. The only difference is found in the larger number of leaflets (9 to 11) in the species earlier described.

10. *Brongniartia trifoliata* T. S. Brandeg. Zoe 5: 105. 1901.

Southern Baja California.

Spreading shrub, 2 to 4 meters high; leaflets 2.5 to 5.5 cm. long and nearly as wide, pale; fruit about 3.5 cm. long and 2 cm. wide.

11. *Brongniartia foliolosa* Benth.; Hemsl. Diag. Pl. Mex. 7. 1878.

Hidalgo and Puebla; type from Zimapán, Hidalgo.

Slender shrub, 1.5 to 2.5 meters high; leaflets about 25, oval, 4 to 10 mm. long, bright green, thick; fruit glabrous.

12. *Brongniartia magnibracteata* Schlecht. Linnaea 12: 338. 1838.

Veracruz and probably elsewhere; type from San Bartolo.

Slender shrub, 1 to 2 meters high; leaflets about 33, oblong or oval, 1 to 2 cm. long, bright green; flowers purplish, nearly 2 cm. long; fruit glabrous, 4 cm. long, 1.8 cm. wide.

Judging from the description, *B. stipitata* Hemsl.² is closely related to this species, if not synonymous with it.

13. *Brongniartia lasiocarpa* Rose, Contr. U. S. Nat. Herb. 12: 268. 1909.

Puebla; type from Tehuacán.

Shrub, 30 to 40 cm. high or larger; leaflets 15 to 19, broadly oval, 4 to 7 mm. long, thick, bright green, pilose, reticulate-veined flowers 1.5 cm. long.

14. *Brongniartia lupinoides* (H. B. K.) Standl.

Peraltea lupinoides H. B. K. Nov. Gen. & Sp. 6: 471. pl. 589. 1823.

Peraltea oxyphylla DC. Mém. Légum. 463. 1825.

Brongniartia thermoides Spreng.; Steud. Nom. Bot. 1: 230. 1840.

Brongniartia oxyphylla Hemsl. Biol. Centr. Amer. Bot. 1: 254. 1880.

Guanajuato to Guerrero and Oaxaca; type collected between Chilpancingo and Zumpango, Guerrero.

¹ Nov. Gen. & Sp. 6: 467. pl. 587. 1823.

² Diag. Pl. Mex. 8. 1878.

Shrub, 1 to 2.5 meters high; leaflets about 17, oblong or oval, 2 to 4 cm. long, densely sericeous, at least when young; flowers purple, 2.5 cm. long, very showy; fruit 5 to 7 cm. long, 2 to 3 cm. wide. "Janacahuate" (Jalisco, *Urbina*); "jaboncillo" (Guanajuato).

The fruit is nearly sessile in this species. A specimen from Guerrero differs in having stipitate fruit, but it is doubtful whether this is a specific character.

15. *Brongniartia parvifolia* Rose, Contr. U. S. Nat. Herb. 12: 268. 1909.

Known only from the type locality, between San Gerónimo and La Venta, Oaxaca.

Low shrub, about 30 cm. high; leaflets about 35, oblong or elliptic, 5 to 10 mm. long, pilose; flowers small, dark red; fruit 3.5 cm. long, nearly 1.5 cm. wide.

16. *Brongniartia discolor* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 272. 1912.

San Luis Potosí and Veracruz to Puebla; type from Bagre, San Luis Potosí. Leaflets 11 to 27, 1 to 1.7 cm. long; flowers 1.5 cm. long.

17. *Brongniartia luisana* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 381. 1909.

Known only from the type locality, San Luis Tultitlanapa, Puebla.

Slender shrub; leaflets oval, 2 to 3 cm. long, thin, bright green, sericeous beneath.

18. *Brongniartia peninsularis* Rose, Contr. U. S. Nat. Herb. 12: 268. 1909.

Known only from the type locality, southwest of El Potrero, Baja California, altitude 450 meters.

Shrub, 2 to 3 meters high, with pale crooked branches; leaflets 11 to 15, ovate to oval, 1.5 to 2.2 cm. long; flowers 1.7 cm. long.

19. *Brongniartia parryi* Hemsl. Biol. Centr. Amer. Bot. 1: 254. 1880.

San Luis Potosí (type locality), Guanajuato, and Querétaro.

Shrub; leaflets about 15, oblong or ovate-oblong, 1.5 to 4.5 cm. long, pale green, pubescent; fruit 3.5 to 7 cm. long, 2 to 3 cm. wide. "Garbancillo" (Querétaro).

20. *Brongniartia goldmanii* Rose, Contr. U. S. Nat. Herb. 12: 269. 1909.

Known only from the type locality, between Las Flechas and La Rastra, Sinaloa.

Shrub, 2 to 3 meters high; leaflets about 7, oval, 1 to 2.5 cm. long, bright green; flowers 2 to 2.5 cm. long.

21. *Brongniartia benthamiana* Hemsl. Biol. Centr. Amer. Bot. 1: 252. 1880.

Guanajuato, Hidalgo, and Mexico; type from León, Guanajuato.

Shrub a meter high or less; leaflets about 19, oval or oblong, 1.5 to 2.5 cm. long; fruit 4 to 6 cm. long, 1.7 to 2.5 cm. wide.

22. *Brongniartia vicioides* Mart. & Gal. Bull. Acad. Brux. 10²: 49. 1843.

Puebla and Oaxaca; type from Misteca Alta and Cerro de San Felipe, Oaxaca.

Low shrub; leaflets 13 to 21, oval or broadly oblong, bright green on the upper surface, densely sericeous beneath.

23. *Brongniartia intermedia* Moric. Mém. Soc. Phys. Hist. Nat. Genève 7: 253. pl. 10. 1836.

Brongniartia sericea Schlecht. Linnaea 12: 337. 1838.

Brongniartia revoluta Rose, Contr. U. S. Nat. Herb. 12: 269. 1909.

San Luis Potosí to Jalisco and Oaxaca.

Shrub 1 meter high or less; leaflets 11 to 37, oblong or oval, densely sericeous when young; fruit 4 to 6 cm. long, 1.5 to 2.2 cm. wide, often glaucescent.

DOUBTFUL SPECIES.

BRONGNIARTIA GRACILIS Hemsl. Biol. Centr. Amer. Bot. 1: 253. 1880. Described from Mexico, the exact locality not known.

BRONGNIARTIA OLIGOSPERMOIDES Baill. Adansonia 9: 240. 1868-70. Type from Xochialco.

16. *BARBIERIA* DC. Mém. Légum. 241. 1825.1. *Barbieria pinnata* (Pers.) Baill. Hist. Pl. 2: 263. 1870.

Galactia pinnata Pers. Syn. Pl. 2: 302. 1807.

Clitoria polyphylla Poir. in Lam. Encycl. Suppl. 2: 300. 1811.

Barbieria polyphylla DC. Mém. Légum. 242. 1825.

Southern Mexico, the exact localities not known, but probably in Veracruz or Oaxaca or both. Greater Antilles, Central America, and South America.

Shrub, 0.5 to 4 meters high, erect or scandent; leaves odd-pinnate, with numerous oblong leaflets; flowers red, about 5.5 cm. long, racemose; fruit linear, hirsute. "Enredadera" (Porto Rico).

17. *CRACCA* L. Sp. Pl. 752. 1753.

Low unarmed shrubs; leaves pinnate, the leaflets usually numerous but sometimes only 1 or 3, commonly with numerous close parallel lateral nerves; flowers small or large, racemose; fruit linear, flat, bivalvate.

Many of the Mexican plants of this genus are probably to be classed as herbs rather than shrubs, although most of them are inclined to be suffrutescent, at least at the base. All the Mexican species except one which, so far as known, is always a herbaceous annual, are included in the present treatment. Most of the species have very tough stems, which are broken with difficulty. *Cracca virginiana* L., of the United States, a herbaceous species, was used by the Indians of the Southeastern States to poison fish. It is said also to have diaphoretic and powerful anthelmintic properties.

Leaflets densely tomentose beneath, very obtuse at apex, large, 1 to 5 or rarely 7.

Leaflets 5 or 7-----1. *C. lanata*.

Leaflets usually 1 or 3, the lateral ones, when present, often much reduced.

Calyx long-pilose; leaflet one, oval or broadly oblong----2. *C. platyphylla*.

Calyx short-pilose; leaflets usually 3, oblong.

Calyx about 2 cm. long-----3. *C. diversifolia*.

Calyx about 1 cm. long-----4. *C. micheliana*.

Leaflets sericeous or glabrate beneath, or rarely short-pilose but then acute.

Leaflets nearly or quite as broad as long-----5. *C. potosina*.

Leaflets much longer than broad.

A. Leaflets rounded or very obtuse at base.

Leaflets 1 to 7, glabrous or densely white-sericeous beneath.

Leaflets densely white-sericeous beneath-----6. *C. watsoniana*.

Leaflets glabrous beneath-----7. *C. madrensis*.

Leaflets more than 7 in all or most of the leaves, or if fewer neither glabrous nor densely white-sericeous beneath.

Pubescence of the stems closely appressed.

Fruit pubescent.

Pubescence of the stems closely appressed; leaflets 3 to 4 cm. long.

8. *C. rhodantha*.

Pubescence of the stems often partly spreading; leaflets 1.5 to 2.6 cm. long-----17. *C. leucantha*.

Fruit glabrous, at least on the sides.

Fruit glabrous on the edges; leaflets 2.5 to 4 cm. long.

9. *C. leiocarpa*.

Fruit strigillose on the edges; leaflets 1.5 to 2.5 cm. long.

10. *C. cuernavacana*.

Pubescence of the stems spreading or reflexed.

Leaflets 5 to 9 or rarely 11, 1.4 to 2.5 cm. wide.

Leaflets obtuse, glabrate beneath-----11. *C. tepicana*.

Leaflets acute, densely pilose beneath-----12. *C. langlassei*.

Leaflets more than 9 in all or most of the leaves, usually much more numerous, commonly less than 1.4 cm. wide.

Keel of the corolla about 1 cm. long. Leaflets 0.8 to 1.5 cm. long, glabrous on the upper surface-----13. *C. seemanni*.

Keel of the corolla much more than 1 cm. long.

Leaflets 0.6 to 1.2 cm. long-----22. *C. pringlei*.

Leaflets 1.5 to 4 cm. long or longer.

Pubescence of the stems brown; leaflets acute, 3.5 cm. long.

14. *C. submontana*.

Pubescence of the stems white to yellow; leaflets obtuse, or if acute less than 3.5 cm. long.

Fruit 6 to 7 mm. wide, thick, densely long-pilose.

15. *C. talpa*.

Fruit 3 to 5 mm. wide, flat, short-pilose or sericeous.

Corolla 2.5 to 3 cm. long-----16. *C. macrantha*.

Corolla 2 cm. long or shorter.

Leaflets small, 1.5 to 2.6 cm. long-----17. *C. leucantha*.

Leaflets large, most of them 3 to 5 cm. long or longer.

Calyx lobes subulate-attenuate-----18. *C. toxicaria*.

Calyx lobes triangular or oblong, acute or subobtuse.

19. *C. schiedeana*.

AA. Leaflets acute or cuneate at base.

Pubescence of the stems spreading or ascending, never closely appressed.

Leaflets broadest near the apex.

Flowers about 2 cm. long; leaflets 3 to 8 cm. long, glabrous on the upper surface-----20. *C. nitens*.

Flowers 8 to 12 mm. long; leaflets 6 to 20 mm. long, usually sericeous on the upper surface-----21. *C. cinerea*.

Leaflets broadest at or near the middle.

Flowers 2 cm. long-----22. *C. pringlei*.

Flowers less than 1 cm. long.

Leaflets appressed-pilose on the upper surface--23. *C. brandegei*.

Leaflets glabrous on the upper surface-----24. *C. vicioides*.

Pubescence of the stems closely appressed.

Fruit glabrous-----9. *C. leiocarpa*.

Fruit sericeous or strigillose.

Leaflets oblanceolate or obovate, broadest near the apex.

21. *C. cinerea*.

Leaflets linear to linear-oblong, broadest at the middle.

Flowers 5 to 7 mm. long-----25. *C. purpurea*.

Flowers 11 to 18 mm. long-----26. *C. palmeri*.

1. *Cracca lanata* (Mart. & Gal.) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia lanata Mart. & Gal. Bull. Acad. Brux. 10²: 48. 1843.

Tephrosia crassifolia Benth. Bot. Voy. Sulph. 80. 1844.

Cracca crassifolia Kuntze, Rev. Gen. Pl. 1: 174. 1891.

Veracruz to Tepic and Guerrero; type from Zacuapan, Veracruz.

Low shrub; leaflets oblong or oval, 4 to 8 cm. long, coriaceous; flowers 2 to 2.5 cm. long, purplish; fruit tomentose.

2. *Cracca platyphylla* Rose, Contr. U. S. Nat. Herb. 12: 270. f. 25. 1909.

Known only from the type locality, pine woods between Mascota and San Sebastián, Jalisco.

Low shrub; leaflet one, oval-oblong to broadly oval, 5 to 7 cm. wide, broadly rounded at apex, coriaceous, white-tomentose beneath; flowers large, rose-red.

3. *Cracca diversifolia* Rose, Contr. U. S. Nat. Herb. 12: 270. 1909.

Michoacán; type from Uruapam.

Shrub 0.5 to 1 meter high; leaflets 3, green on the upper surface, densely white-tomentose beneath, the lateral ones smaller than the terminal one; flowers violet, 2.5 cm. long; fruit very densely pilose.

4. *Cracca micheliana* Standl.

Tephrosia major Micheli. Mém. Soc. Phys. Hist. Nat. Genève 34: 251. pl. 4. 1903.

Cracca major Rose, Contr. U. S. Nat. Herb. 12: 270. 1909. Not *C. major* Alef. 1861.

Known only from the type locality, El Ocote, Michoacán or Guerrero.

Shrub about a meter high; leaflets sometimes 16 cm. long and 6 cm. wide; flowers white tinged with violet; fruit densely tomentose.

5. *Cracca potosina* (T. S. Brandeg.) Standl.

Tephrosia potosina T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 272. 1912.

Nuevo León and San Luis Potosí; type from Rascón, San Luis Potosí.

Plants chiefly herbaceous, decumbent; leaflets usually 5, suborbicular, 2 to 4 cm. long, sericeous beneath; fruit densely pilose.

This plant has been reported from Mexico as *Tephrosia lindheimeri* A. Gray, but it seems quite distinct from that species.

6. *Cracca watsoniana* Standl.

Clitoria sericea S. Wats. Proc. Amer. Acad. 22: 407. 1887.

Cracca sericea Rose, Contr. U. S. Nat. Herb. 12: 271. 1909. Not *C. sericea* A. Gray, 1883.

Tepic to Guerrero; type from Río Blanco, Jalisco.

Plants 45 cm. high or less, woody at base; leaflets 1 or sometimes 5 or 7, linear-oblong to oval, 3 to 8 cm. long, densely white-sericeous beneath; flowers purple, 2 to 2.5 cm. long.

7. *Cracca madrensis* (Seem.) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia madrensis Seem. Bot. Voy. Herald 280. pl. 61. 1856.

Known only from the type locality, somewhere in the Sierra Madre.

Leaves unifoliate.

8. *Cracca rhodantha* (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. 12: 270. 1909.

Tephrosia rhodantha T. S. Brandeg. Zoe 5: 201. 1905.

Sinaloa; type from Cofradía.

Slender shrub, 0.4 to 1.8 meters high, or often herbaceous nearly throughout; leaflets numerous, narrowly oblong; flowers brick-red or purplish white.

9. *Cracca leiocarpa* (A. Gray) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia leiocarpa A. Gray, Pl. Wright. 2: 36. 1853.

Tephrosia affinis S. Wats. Proc. Amer. Acad. 21: 424. 1886.

Tephrosia viridis Jones, Contr. West. Bot. 12: 7. 1908.

Cracca affinis Rose, Contr. U. S. Nat. Herb. 12: 269. 1909.

Chihuahua and Sonora to Jalisco; type collected along the Sonoita, in Sonora.

Slender shrub, 0.6 to 2 meters high; leaflets about 17, narrowly oblong; flowers pinkish.

10. *Cracca cuernavacana* Rose, Contr. U. S. Nat. Herb. 12: 269. 1909.

Known only from the type locality, wooded slopes of barranca above Cuernavaca, Morelos, altitude 1,800 meters.

Slender suffrutescent plant, 0.6 to 1 meter high; leaflets oblong, obtuse, bright green; flowers 1.5 cm. long.

11. *Cracca tepicana* Standl. Contr. U. S. Nat. Herb. 20: 217. 1919.

Known only from Tepic, the type locality.

Leaflets oblong or oval-oblong, obtuse, green; flowers 1.5 cm. long.

12. *Cracca langlassei* (Micheli) Rose, Contr. U. S. Nat. Herb. 12: 270. 1909.

Tephrosia langlassei Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 250. pl. 3. 1903.

Jalisco to Oaxaca; type from the Sierra Madre of Michoacán or Guerrero.

Plants copiously pubescent; leaflets oblong-ovate, 3 to 6 cm. long; flowers 1.5 cm. long.

The specimens from Jalisco are slightly different from the more southern plant, and may represent a different species.

13. *Cracca seemanni* Britten & Baker, Journ. Bot. Brit. & For. 38: 17. 1900.

Sinaloa and perhaps elsewhere; type from somewhere in the Sierra Madre.

Plants suffrutescent, with purplish flowers. "Gallitos" (Sinaloa).

This has been reported from Mexico as *Tephrosia virginiana* (L.) Pers.

14. *Cracca submontana* Rose, Contr. U. S. Nat. Herb. 8: 46. 1903.

Sinaloa and Tepic; type collected between Pedro Paulo and San Blasito, Tepic.

Leaflets coriaceous, bright green on the upper surface and scaberulous; flowers about 2.5 cm. long.

15. *Cracca talpa* (S. Wats.) Rose, Bot. Gaz. 40: 143. 1905.

Tephrosia talpa S. Wats. Proc. Amer. Acad. 22: 405. 1887.

Sinaloa and Durango to Veracruz and Oaxaca; type from Río Blanco, Jalisco.

Plants herbaceous or suffrutescent; leaflets oblong or oval, 2 to 6 cm. long, densely sericeous; flowers pink, 1.5 to 2 cm. long.

This species is closely related to *C. toxicaria*, but has much broader, thicker fruit, and the leaflets are usually proportionally broader.

16. *Cracca macrantha* (Robins. & Greenm.) Rose, Bot. Gaz. 40: 143. 1905.

Tephrosia macrantha Robins. & Greenm. Proc. Amer. Acad. 29: 383. 1894.

Jalisco to Guerrero; type from Tequila, Jalisco.

Slender shrub, 2.5 to 3.5 meters high; leaflets oblong, 2 to 4 cm. long; flowers large, white or pink, in long racemes.

17. *Cracca leucantha* (H. B. K.) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia leucantha H. B. K. Nov. Gen. & Sp. 6: 460. pl. 577. 1823.

Tephrosia leucantha acuta Jones, Contr. West. Bot. 12: 7. 1908.

Chihuahua and Sonora to Guanajuato; type collected near Guanajuato.

Plants suffrutescent; leaflets numerous, oblong or narrowly oblong; flowers greenish white or pinkish; fruit 3 to 5.5 cm. long, 4 to 5 mm. wide.

18. *Cracca toxicaria* (Pers.) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia toxicaria Pers. Syn. Pl. 2: 328. 1807.

Tephrosia multifolia Rose, Contr. U. S. Nat. Herb. 1: 320. 1895.

Cracca multifolia Rose, Contr. U. S. Nat. Herb. 12: 270. 1909.

Sinaloa to Zacatecas and Oaxaca. Central America, West Indies, and South America.

Shrub, 1 to 2 meters high, or often herbaceous; leaflets numerous, oblong or narrowly oblong; flowers white and pink, 1.5 to 2 cm. long. "Barbasco" (Jalisco, Oaxaca, Colombia); "chilapate" (El Salvador).

The roots have a disagreeable odor; in the West Indies they have been used in the treatment of cutaneous diseases. The plant is said also to have purgative properties and to affect the heart like digitalis. It is often crushed and thrown in water to poison fish. It is reported to furnish a fine blue dye.

19. *Cracca schiedeana* (Schlecht.) Standl.

Tephrosia schiedeana Schlecht. *Linnaea* 12: 299. 1838.

Jalisco to Oaxaca and Veracruz; type from Barranca de Tioselo, Veracruz. Guatemala.

Low shrub or herb; leaflets oblong or narrowly oblong, sericeous; flowers greenish white or pinkish; fruit 3 to 5.5 cm. long, 4 to 5 mm. wide.

It is not certain that the specific name applies to the present plant, which seems distinct from *C. toxicaria*. It may be that *C. schiedeana* should be referred to the synonymy of that species.

20. *Cracca nitens* (Benth.) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia nitens Benth.; Seem. Bot. Voy. Herald 107. pl. 19. 1853.

Michoacán to Chiapas. Central and South America; type from Panama.

Erect shrub 1 to 5 meters high; leaflets few, coriaceous, bright green above, densely sericeous beneath with lustrous hairs; flowers violet-red.

21. *Cracca cinerea* (L.) Morong, Ann. N. Y. Acad. 7: 79. 1892.

Galega cinerea L. Syst. Nat. ed. 10. 1172. 1759.

Tephrosia cinerea Pers. Syn. Pl. 2: 328. 1807.

Tephrosia decumbens Benth. Nat. For. Kjöbenhavn Vid. Medd. 1853: 7. 1854.

Tephrosia scopulorum T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 181. 1915.

Guerrero to Veracruz, Yucatán, and Oaxaca. Widely distributed in tropical America.

Plants decumbent, herbaceous or suffrutescent; flowers small, purplish or pink. "Barbasco" (Colombia); "añil," "añil cenizo" (Porto Rico).

The plant is said to have narcotic properties, and has been used in Guiana to stupefy fish. In the West Indies it is reputed to have medicinal properties, and has been used in the treatment of fevers and in nervous, cutaneous, and venereal diseases.

22. *Cracca pringlei* Rose, Bot. Gaz. 40: 143. 1905.

Oaxaca; type from Las Sedas.

Plants decumbent, suffrutescent; leaflets about 1 cm. long; flowers few, purple, 2 cm. long.

23. *Cracca brandegei* Standl. Contr. U. S. Nat. Herb. 20: 217. 1919.

Sinaloa and Durango; type from Altata, Sinaloa.

Leaflets linear or oblong-linear, 1 to 4.5 cm. long.

24. *Cracca vicioides* (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 175. 1891.

Tephrosia vicioides Schlecht. *Linnaea* 12: 297. 1838.

Veracruz to Michoacán and Guerrero; type from Hacienda de la Laguna, Veracruz.

Plants herbaceous or suffrutescent, green and nearly glabrous; leaflets 2 to 3 cm. long; flowers small, wine-red, in very slender racemes.

25. *Cracca purpurea* L. Sp. Pl. 752. 1753.

Tephrosia purpurea Pers. Syn. Pl. 2: 329. 1807.

Tephrosia tenella A. Gray, Pl. Wright. 2: 36. 1853.

Cracca tenella Rose, Contr. U. S. Nat. Herb. 12: 271. 1909.

Baja California to Chihuahua, Veracruz, and Oaxaca. Widely distributed in the tropics of both hemispheres.

Plants usually herbaceous but sometimes frutescent; flowers small, purple or purplish. "Añil" (Porto Rico).

Specimens of this species have been reported from Mexico as *Tephrosia leptostachya* DC. Maiden reports that the plant is harmful and even poisonous to stock. The plant is used in different countries for stupefying fish. Various medicinal properties are ascribed to it in India. An ointment made from the roots is applied for elephantiasis; the juice is applied to eruptions upon the skin, and a decoction of the roots is used for indigestion, coughs, liver and kidney affections, etc.

26. *Cracca palmeri* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 12: 270. 1909.

Tephrosia palmeri S. Wats. Proc. Amer. Acad. 24: 46. 1889.

Tephrosia purisimae T. S. Brandeg. Proc. Calif. Acad. II. 2: 149. 1889.

Tephrosia cana T. S. Brandeg. Proc. Calif. Acad. II. 3: 126. 1891.

Baja California and Sonora; type from Guaymas, Sonora.

Plants slender, erect or decumbent, herbaceous or frutescent; leaflets 1.5 to 5.5 cm. long; flowers pink or purplish.

DOUBTFUL OR EXCLUDED SPECIES.

CRACCA OROBOIDES (H. B. K.) Kuntze, Rev. Gen. Pl. 1: 175. 1891. *Tephrosia oroboides* H. B. K. Nov. Gen. Sp. 6: 462. pl. 579. 1823. Apparently a species of *Lotus*.

CRACCA VENOSA (Mart. & Gal.) Kuntze, Rev. Gen. Pl. 1: 175. 1891. *Tephrosia venosa* Mart. & Gal. Bull. Acad. Brux. 10³: 47. 1843. Type from Oaxaca. The description suggests *C. pringlei* Rose, but the fruit is described as glabrous.

TEPHROSIA CHRYSOPHYLLA Mart. & Gal. Bull. Acad. Brux. 10³: 40. 1843. Not *T. chrysophylla* Pursh, 1814. Type from Veracruz.

18. ROBINIA L. Sp. 722. 1753.

Trees or shrubs, usually armed with spines; leaves deciduous, pinnate; flowers in axillary racemes; fruit flat, bivalvate, narrowly winged along the upper suture.

Robinia pseudacacia L., the black locust, a native of the eastern United States, with white flowers, is cultivated as a shade tree in some localities. It is known usually as "acacia," and the name "loco" is said to be applied in Chihuahua.

Inflorescence glandular-hispid.....1. *R. neomexicana*.

Inflorescence puberulent or pilose, without glands.....2. *R. pringlei*.

1. *Robinia neomexicana* A. Gray, Mem. Amer. Acad. n. ser. 5: 314. 1854.

Mountains of northern Sonora. Western Texas to Arizona and southern Colorado; type from the Mimbres River, New Mexico.

Very spiny tree or shrub, sometimes 7.5 meters high, with a trunk 35 cm. in diameter; bark thin, light brown, nearly smooth; leaflets 13 to 21, oval, about 4 cm. long; flowers large, showy, pale pink; fruit flat, densely hispid with gland-tipped hairs; wood very hard, strong, close-grained, yellow with brownish markings, the specific gravity about 0.80. "Uña de gato" (New Mexico).

2. *Robinia pringlei* Rose, Contr. U. S. Nat. Herb. 12: 274. 1909.

Known only from the type locality, near Tula, Hidalgo, altitude 2,040 meters.

Medium-sized tree; leaflets 13 or 15, oval, 3.5 to 5 cm. long, thin, nearly glabrous; flowers large, in lax axillary racemes; fruit flat, 6 cm. long, 1 cm. wide, smooth, with 2 narrow wings along one edge.

DOUBTFUL SPECIES.

ROBINIA EHRENBERGII Schlecht. *Linnaea* 12: 303. 1838. Type from Aguascalientes, near Granada. Probably a species of *Lonchocarpus*.

ROBINIA MELANOCARPA Schlecht. *Linnaea* 12: 305. 1838. Type from Papantla, Veracruz. Probably a *Lonchocarpus*.

19. DAUBENTONIA DC. *Mém. Légum.* 285. 1825.1. *Daubentonia cavanillesii* (S. Wats.) Standl.

? *Aeschynomene longifolia* Cav. *Icon. Pl.* 4: 8. *pl.* 316. 1797.

Sesban cavanillesii S. Wats. *Proc. Amer. Acad.* 17: 342. 1882.

San Luis Potosí. Southern United States.

Shrub 1 to 2 meters high; leaves odd-pinnate, the leaflets numerous, pale, narrowly oblong, 1 to 2.5 cm. long, obtuse; flowers yellow, 1.5 to 2 cm. long, racemose; fruit with 4 longitudinal wings.

The seeds are said to have been used in the southern United States as a substitute for coffee.

20. SESBAN Adans. *Fam. Pl.* 2: 327. 1763.

Unarmed shrubs or small trees or often herbs; leaves pinnate, the leaflets numerous, small; flowers racemose, large and showy; fruit linear, compressed, 4-angled, or subterete, often very long.

Corolla 6 to 7 cm. long. Leaflets oblong or oval-----1. *S. grandiflora*.

Corolla 2.5 cm. long or shorter.

Leaflets lanceolate to elliptic, acute; fruit stipitate, 8 mm. wide.

2. *S. mexicana*.

Leaflets oblong or oval, rounded at the apex; fruit sessile, 3 to 4 mm. wide.

3. *S. macrocarpa*.

1. *Sesban grandiflora* (L.) Pers. *Syn. Pl.* 2: 316. 1807.

Aeschynomene grandiflora L. *Sp. Pl.* ed. 2. 1060. 1763.

Agati grandiflora Desv. *Journ. de Bot. Desv.* 1: 120. 1813.

Adventive in Yucatán and sometimes cultivated for ornament. Native probably of the East Indies; adventive in tropical America.

Nearly glabrous shrub or small tree, sometimes 4.5 meters high; leaflets about 3 cm. long; flowers very large, white or pink, pendulous; fruit 30 to 35 cm. long. "Pico de flamingo" (Yucatán); "cobreque" (Nicaragua); "gallo," "báculo," or "cresta de gallo" (Porto Rico).

The wood is soft, weak, and light. From incisions in the stem there runs a pinkish white juice, which dries into vitreous tears of a violet tint. From these is obtained a gum from which two coloring principles have been separated—a red one, agathine, and a yellow one, xanthoagathine. The bitter bark is said to have tonic and febrifuge properties; in India it has been employed as a remedy for smallpox. Diuretic and laxative properties are ascribed to the leaves. In southern Asia the flowers and green pods are eaten as a salad or pot herb, and the leaves and young shoots are gathered and fed to cattle. For an illustration of the plant see *Contr. U. S. Nat. Herb.* 9: *pl.* 6.

2. *Sesban mexicana* Pollard, *Bull. Torrey Club* 24: 154. 1897.

Aeschynomene longifolia Ortega, *Hort. Matr. Dec.* 9: 70. 1800. Not *A. longifolia* Cav. 1797.

Sesban longifolia DC. *Prodr.* 2: 265. 1826.

Jalisco.

Low shrub; leaflets 1.5 to 3.5 cm. long, bright green; fruit 6.5 to 12.5 cm. long, conspicuously torulose.

It is not at all certain that the name *Aeschynomene longifolia* Cav. does not apply to this plant. That species was based upon flowering specimens, and the leaves illustrated resemble those of *S. mexicana* quite as much as those of *Daubentonia cavanillesii*.

3. *Sesban macrocarpa* Muhl.; Ell. Bot. S. C. & Ga. 2: 221. 1788.

Aeschynomene picta Cav. Icon. Pl. 4: 7. pl. 314. 1797.

Sesban picta Pers. Syn. Pl. 2: 316. 1807.

Usually along streams or in wet soil, Baja California and Sonora to Guerrero and Veracruz. Southern United States; Central America.

Shrub, 1 to 4.5 meters high; leaflets numerous, 1 to 3.5 cm. long, pale green; flowers large, yellow, racemose; fruit slender, 10 to 30 cm. long. "Zacate de agua" (Jalisco); "bequilla" (Sonora, *Palmer*).

21. BENTHAMANTHA Alef. Bonplandia 1862: 264. 1862.

Unarmed herbs or low shrubs; leaves odd-pinnate, with 3 to many thin, rather small leaflets; flowers small, racemose; fruit linear, compressed, bivalent.

Pedicels and rachis of the inflorescence glandular-pilose.

Leaflets sericeous on the upper surface.....1. *B. glandulifera*.

Leaflets glabrous on the upper surface.....2. *B. greenmanii*.

Pedicels and rachis without gland-tipped hairs.

Leaflets glabrous on the upper surface.....3. *B. glabrescens*.

Leaflets pilose or sericeous on the upper surface.....4. *B. mollis*.

1. *Benthamantha glandulifera* (Benth.) Alef. Bonplandia 1862: 264. 1862.

Tephrosia glandulifera Benth. Pl. Hartw. 115. 1843.

Cracca glandulifera Benth. Nat. For. Kjöbenhavn Vid. Medd. 1853: 8. 1853.

Benthamantha glandulosa Rose, Contr. U. S. Nat. Herb. 10: 99. 1906.

Chiapas. Central America and northwestern South America; type from Guayaquil, Ecuador.

Shrub, 60 cm. high, or sometimes herbaceous; leaflets about 13, oval, 1 to 2 cm. long, sericeous beneath; flowers purplish yellow, 1 cm. long.

2. *Benthamantha greenmanii* (Millsp.) Britt. & Baker; Millsp. Field Mus. Bot. 2: 50. 1900.

Cracca greenmanii Millsp. Field Mus. Bot. 1: 299. pl. 13. 1896.

Yucatán and Campeche; type from Chichen Itzá, Yucatán.

Plants low, suffrutescent or herbaceous.

The roots bear numerous tubers as in *B. glabrescens*. Probably these tubers are borne by all the members of the genus.

3. *Benthamantha glabrescens* (Benth.) Alef. Bonplandia 1862: 264. 1862.

Tephrosia glabrescens Benth. Bot. Voy. Sulph. 81. 1844.

Cracca glabrescens Benth. Nat. For. Kjöbenhavn Vid. Medd. 1853: 9. 1853.

Benthamantha pumila Rose, Contr. U. S. Nat. Herb. 10: 99. pl. 30. 1906.

Benthamantha tuberosa T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 376. 1913.

Chihuahua to Puebla and Veracruz; reported from Nuevo León. Type from Colombia.

Plants decumbent, herbaceous or suffrutescent, bright green and glabrate; leaflets oval or rounded-oval, 0.5 to 2 cm. long.

The roots bear numerous tubers 1 to 10 cm. long, resembling small sweet potatoes.

4. *Benthamantha mollis* (H. B. K.) Alef. Bonplandia 1862: 264. 1862.

Tephrosia mollis H. B. K. Nov. Gen. & Sp. 5: 463. 1821.

Cracca mollis Benth. Nat. For. Kjöbenhavn Vid. Medd. 1853: 4. 1853.

Cracca edwardsii A. Gray, Pl. Wright. 2: 35. 1853.

Cracca edwardsii sericea A. Gray, Proc. Amer. Acad. 17: 201. 1882.

Cracca sericea A. Gray, Proc. Amer. Acad. 19: 74. 1883.

Brittonamra sericea Kearney, Trans. N. Y. Acad. Sci. 14: 32. 1894.

Benthamantha sericea Britt. & Baker, Journ. Bot. Brit. & For. 38: 19. 1900.

Benthamantha fruticosa Rose, Contr. U. S. Nat. Herb. 8: 99. 1906.

Baja California to Chihuahua, Yucatán, and Chiapas. Southern Arizona; Central America and northern South America; type from Venezuela.

Slender shrub, 0.6 to 1.5 meters high, or often herbaceous; leaflets mostly oval, 1 to 3.5 cm. long; flowers small, yellow striped with brown or purple; fruit about 6 cm. long and 3.5 mm. wide.

A very variable species, with a wide range. It may be possible to divide it into two or more species, but no constant lines of separation are apparent. The pubescence of the stems is either appressed or spreading, in varying degrees. The earlier or larger leaves are often trifoliolate, while the upper leaves on the same plant are usually multifoliolate. The leaflets are often mottled with bronze and green. Specimens of this species have been reported from Yucatán as *Tephrosia cinerea* Pers. and as *Cracca cinerea* (Pers.) Morong.

The writer has seen no specimens of *B. caribaea* (Jacq.) Kuntze from Mexico, although it might be expected in Yucatán. It resembles *B. mollis*, but has much larger flowers.

22. DIPHYSA Jacq. Enum. Pl. Carib. 7. 1760.

Unarmed shrubs or small trees; leaves pinnate, the leaflets few, thin; flowers rather large, yellow, racemose; fruit inflated but compressed.

Some of the species—probably all of them—yield a yellow dye. The vernacular names "macano" and "cacique" are said to be applied in Panama to *D. carthaginensis* Jacq.

Inflorescence densely viscid-pubescent or covered with long, stout, spinelike hairs.

Inflorescence viscid-pubescent, without spinelike hairs.

Fruit 3 to 5 cm. long-----1. *D. racemosa*.

Fruit 6 to 11 cm. long-----2. *D. macrocarpa*.

Inflorescence scarcely or not at all viscid, covered with long spinelike hairs.

3. *D. thurberi*.

Inflorescence neither viscid-pubescent nor with spinelike hairs.

Racemes usually 1 or 2-flowered; leaflets 5 mm. long or shorter; branches puberulent.-----4. *D. minutifolia*.

Racemes with few or numerous flowers; leaflets usually much more than 5 mm. long, or if small the branches glabrous.

Stipe of the fruit much longer than the calyx-----5. *D. sennoides*.

Stipe equaling or shorter than the calyx.

Pedicels with at least a few short hairs in anthesis; leaflets mostly 1.5 to 3 cm. long, bright green on the upper surface-----6. *D. robinoides*.

Pedicels wholly glabrous; leaflets mostly less than 1.5 cm. long, commonly grayish green.

Fruit less than 1.5 cm. wide-----7. *D. suberosa*.

Fruit 2 to 3 cm. wide-----8. *D. occidentalis*.

1. *Diphysa racemosa* Rose, Contr. U. S. Nat. Herb. 1: 97. pl. 3. 1891.

Sonora to Guerrero and Morelos; type from Alamos, Sonora.

Shrub, 1.5 to 3 meters high, very viscid; leaflets usually 9 to 17, oval or oblong, 0.5 to 2.5 cm. long, pale beneath; racemes long, numerous, the flowers about 2 cm. long; fruit about 4 cm. long and 1.5 cm. wide.

The plant has a disagreeable odor. The wood is hard and yellow.

2. *Diphysa macrocarpa* Standl., sp. nov.

Type from Tecozantla, Hidalgo, collected by F. Salazar, May 22, 1914 (U. S. Nat. Herb. no. 1,039,091).

Branches, petioles, and inflorescence densely viscid-pubescent; leaflets 11 to 29, oval, 8 to 15 mm. long, glabrous, pale beneath; racemes lax, few-flowered; calyx glabrous, the lobes glandular-ciliate; fruit 6 to 11 cm. long, 1.2 to 1.5 cm. wide, obtuse or acute, short-rostrate, covered with sessile glands, the stipe about twice as long as the calyx, viscid-setulose. "Retama de cerro."

3. *Diphysa thurberi* (A. Gray) Rydb.

Daubentonia thurberi A. Gray, Mem. Amer. Acad. n. ser. 5: 313. 1855.

Diphysa echinata Rose, Contr. U. S. Nat. Herb. 12: 271. 1909.

Sonora and Sinaloa; type from Mabibi, Sonora. Southern Arizona.

Shrub; leaflets about 11, or more, oval or rounded-oval, 1 to 1.5 cm. long.

4. *Diphysa minutifolia* Rose, Contr. U. S. Nat. Herb. 12: 271. 1909.

Tamaulipas to Yucatán and Chiapas; type from Cuernavaca, Morelos.

Shrub, 1 to 2 meters high, rigidly branched, the branches gray or red; leaflets about 13, oval or oblong, bright green; flowers 1.5 cm. long. "Xsusuc" (Yucatán, Maya); "retama" (Tamaulipas).

5. *Diphysa sennoides* Benth. Nat. For. Kjöbenhavn Vid. Medd. 1853: 12. 1854.

Veracruz (type locality) and Hidalgo to Guerrero and Oaxaca. Reported from Guatemala and Venezuela.

Shrub 2 to 4 meters high; leaflets about 13; fruit very large, about 10 cm. long. "Cascabelillo" (Guerrero).

6. *Diphysa robinoides* Benth. Nat. For. Kjöbenhavn Vid. Medd. 1853: 11. 1854.

Diphysa floribunda Peyr. Linnaea 30: 78. 1859.

Veracruz to Yucatán, Chiapas, and Oaxaca. Central America; type from Nicaragua.

Shrub or small tree, sometimes 7.5 meters high; leaflets mostly 11 to 21, oval or oblong; flowers numerous, 1.5 cm. long; fruit about 6 cm. long and 1.5 to 2 cm. wide. "Cuachepil" (from the Nahuatl *cuau-chepilli*); "palo amarillo" (Guatemala); "guachipilín," "guachipeli," "huachipilín" (El Salvador, Costa Rica).

The wood is hard and durable; it yields a yellow dye. It is doubtful whether this species is distinct from *D. carthaginensis* Jacq., which was described from Cartagena, Colombia.

7. *Diphysa suberosa* S. Wats. Proc. Amer. Acad. 22: 405. 1887.

Sonora to Morelos and Oaxaca; type from Guadalajara.

Shrub 1 to 3 meters high; bark of the older branches forming thick, corky ridges; leaflets numerous, 5 to 15 mm. long. "Palo santo" (Jalisco).

The powdered bark is used in Jalisco as a remedy for catarrh. The flowers of this and the next species are smaller than in *D. robinoides*.

8. *Diphysa occidentalis* Rose, Contr. U. S. Nat. Herb. 12: 271. 1909.

Sonora to Guerrero; type from Guaymas, Sonora.

Shrub or tree, 1.5 to 8 meters high, the trunk sometimes 30 cm. in diameter.

DOUBTFUL SPECIES.

COLUTEA AMERICANA Mill. Gard. Dict. ed. 8. *Colutea* no. 5. 1768. Type from Veracruz.

23. *LENNEA* Klotzsch; Link, Klotzsch & Otto, Icon. Pl. Rar. 2: 65. 1842.

Unarmed shrubs or small trees; leaves pinnate, the leaflets large; flowers rather small, racemose; fruit flat, bivalvate, few-seeded.

Inflorescence glabrous; standard about 7 mm. long; fruit glabrous.

1. *L. robinioides*.

Inflorescence densely brown-pilose with short appressed hairs; fruit densely pubescent-----2. *L. brunnescens*.

1. *Lennea robinioides* Klotzsch; Link, Klotzsch & Otto, Icon. Pl. Rar. 2: 65. pl. 26. 1842.

Veracruz; described from cultivated plants.

Slender glabrous shrub; leaflets usually 9 or 11, oval, 2.5 to 4 cm. long, thin, bright green; flowers purplish, in very slender axillary racemes; fruit linear.

2. *Lennea brunnescens* Standl., sp. nov.

Veracruz; type from Carrizal (*Goldman* 701; U. S. Nat. Herb. no. 397071).

Tree, 6 to 7.5 meters high, the branches grayish or brownish, when young densely pilose with short brownish ascending hairs; stipules subulate, 2 to 3 mm. long; leaf rachis 6 to 11 cm. long, the petiolules 1 to 2 mm. long; leaflets 13 or 15, oval, oval-oblong, or oval-obovate, 2 to 5.5 cm. long, 1 to 2.5 cm. wide, acutish to rounded at base, rounded or subretuse at apex, bright green and glabrous on the upper surface, with prominulous reticulate venation, beneath slightly paler, thinly sericeous with whitish or brownish hairs; racemes rather dense, 4 to 5 cm. long, the rachis and slender pedicels pilose with short brown hairs; calyx 3 mm. long, densely brown-pilose, the lower lobes triangular, acuminate; petals glabrous, the standard 8 to 9 mm. long; fruit flat, 5.5 to 7 cm. long, 1.2 to 1.4 cm. wide, obtuse at apex, gradually tapering to the base, densely pilose with minute appressed brown hairs.

Also collected at Baños del Carrizal, Veracruz, August, 1914, by C. A. Purpus (no. 6083). The Purpus collection is in fruit only and was distributed as "*Acacia?*" The only other Mexican species of the genus, *L. robinioides*, is represented in the National Herbarium by a single collection (*Purpus* 5891), from Misantla, Veracruz, which agrees well with the original description and plate. *L. robinioides* differs from the present plant, in its lack of pubescence, less numerous leaflets, and smaller flowers. The flowers of *L. brunnescens* appear to have been greenish yellow, although of course their color may have changed in drying; those of *L. robinioides* are purplish.

24. *COURSETIA* DC. Ann. Sci. Nat. 4: 92. 1825.

Erect shrubs or trees, spiny or unarmed, pubescent; leaves pinnate, the leaflets small or large; flowers in axillary racemes; fruit linear, compressed, bivalvate.

In *C. glandulosa* as well as in other species the branches are often covered with a transparent, yellowish or brown gum or lac produced by insects. Palmer reports that in Sonora this is dissolved in water with sugar and used as a drink in colds and fevers, and that it is believed also to be a remedy for tuberculosis. It is sold in the drug shops as "goma Sonora" at about a peso per pound.

Inflorescence without glands or gland-tipped hairs.

Leaflets 1.5 to 4 cm. long-----1. *C. polyphylla*.

Leaflets less than 1 cm. long-----2. *C. axillaris*.

Inflorescence with numerous subsessile glands or gland-tipped hairs.

Petioles flat and winged-----3. *C. planipetiolata*.

Petioles subterete, not winged.

Rachis of the leaves pilose with long soft spreading hairs----4. *C. mollis*.

Rachis of the leaves with short appressed hairs.

Corolla about 1 cm. long-----5. *C. glandulosa*.

Corolla about 2 cm. long-----6. *C. madrensis*.

1. *Coursetia polyphylla* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 376. 1913.

Known only from the type locality, Baños del Carrizal, Veracruz.

Slender shrub, apparently unarmed; leaflets about 11, oval-oblong or oval-obovate; fruit 6 cm. long, 5 mm. wide, constricted between the seeds.

2. *Coursetia axillaris* Coult. & Rose, Bot. Gaz. 16: 180. 1891.

Tamaulipas. Southwestern Texas, the type from San Diego.

Densely branched shrub or small tree, unarmed; flowers white, 1 cm. long, solitary or in few-flowered racemes; fruit linear, 2 to 3.5 cm. long, slightly constricted between the seeds.

3. *Coursetia planipetiolata* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 253. pl. 5. 1903.

Guerrero and Oaxaca; type from Río San Luis.

Shrub, about 2 meters high; leaflets oval or ovate, 3 to 5.5 cm. long; flowers pinkish white; fruit 5 to 7 cm. long, 6 mm. wide, brown.

4. *Coursetia mollis* Robins. & Greenm. Proc. Amer. Acad. 29: 384. 1894.

Sinaloa to Guerrero; type from the Barranca of Beltrán, Jalisco.

Densely pubescent shrub, 1 to 4 meters high, armed with very stout short spines; leaflets often as many as 31, oblong or oval, 1 to 2 cm. long; flowers in short long-pedunculate racemes, the standard purplish, the other petals pale yellow; fruit 7 cm. long and 7 mm. wide, scarcely at all constricted. "Garbancillo de la costa," "cucablanca" (Sinaloa).

5. *Coursetia glandulosa* A. Gray, Proc. Amer. Acad. 5: 156. 1862.

Coursetia microphylla A. Gray, Proc. Amer. Acad. 17: 201. 1882.

Baja California and Sonora to Guerrero; type from the vicinity of Cape San Lucas, Baja California.

Shrub or small tree, 1.5 to 6 meters high, unarmed; leaflets mostly oval, 1 cm. long or shorter; flowers pink, with yellow center, or white and yellow; fruit constricted between the seeds. "Samo prieto" (Sonora).

6. *Coursetia madreensis* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 253. pl. 6. 1903.

Known only from the type locality, in the Sierra Madre of Michoacán or Guerrero.

Spiny shrub; leaflets oval, 1.5 cm. long, sericeous beneath; flowers blood-red with orange-yellow center.

DOUBTFUL SPECIES.

COURSETIA VIRGATA (Cav.) DC. Prodr. 2: 264. 1825. *Aeschynomene virgata* Cav. Icon. Pl. 3: 47. pl. 293, 1794. Type from New Spain. Scarcely of this genus.

25. *OLNEYA* A. Gray, Mem. Amer. Acad. n. ser. 5: 328. 1855.

1. *Olneya tesota* A. Gray, Mem. Amer. Acad. n. ser. 5: 328. 1855.

Dry plains and hillsides, Sonora and Baja California. Southern Arizona (type locality) and California.

Shrub or small tree, often only a meter high but sometimes attaining a height of 9 meters, with a trunk diameter of 45 cm.; branches armed with stiff sharp spines; bark thin, scaly, peeling off in long reddish brown strips; leaves sharp spines; bark thin, scaly, peeling off in long reddish brown strips; leaves odd-pinnate, the leaflets 11 to 15, 8 to 20 mm. long, grayish; flowers purplish white, showy, in short racemes; fruit glandular-hairy, with 1 to 5 or more seeds. "Palo fierro," "palo de hierro," "árbol de hierro," "tésota," "uña de gato."

The English name is "ironwood." Wood hard, strong but brittle, dark brown, the specific gravity about 1.15; difficult to work, but sometimes used, and valued for firewood. The Indians of Arizona and northwestern Sonora grind the

roasted beans and use them for making "pinole." The tree is mentioned by Clavigero (*Historia de la California*, 1789) as "palo hierro."

26. GLIRICIDIA H. B. K. *Nov. Gen. & Sp.* 6: 393. 1823.

Trees with pinnate leaves; leaflets estipellate, usually blotched beneath; flowers in axillary racemes, pink or purplish; fruit stipitate, broadly linear, exalate, bivalvate.

Leaflets rounded at apex, densely sericeous beneath when young with long hairs; flowers about 1.5 cm. long-----1. *G. guatemalensis*.

Leaflets mostly acute, glabrate beneath or sparsely strigose with very short hairs; flowers about 2.5 cm. long-----2. *G. sepium*.

1. *Gliricidia guatemalensis* Micheli, *Bull. Herb. Boiss.* 2: 442. *pl.* 10. 1894.

Oaxaca. Guatemala; type from Sacabajá.

Leaflets 11 to 17, oval, 1.5 to 3.5 cm. long, blotched beneath with bronze or purple; flowers long-pediceled, in lax racemes.

2. *Gliricidia sepium* (Jacq.) Steud. *Nom. Bot.* ed. 2. 1: 688. 1841.

Robinia sepium Jacq. *Enum. Pl. Carib.* 28. 1760.

Gliricidia maculata H. B. K. *Nov. Gen. & Sp.* 6: 393. 1823.

Robinia maculata H. B. K. *Nov. Gen. & Sp.* 6: 393. 1823.

Lonchocarpus maculatus DC. *Prodr.* 2: 260. 1825.

Robinia variegata Schlecht. *Linnaea* 12: 301. 1838.

Gliricidia lambii Fernald, *Bot. Gaz.* 20: 533. 1895.

Sinaloa to Veracruz, Yucatán, and Chiapas. Central America and northern South America; naturalized in the West Indies and Philippines; type from Cartagena, Colombia.

Tree, 3 to 9 meters high or larger, the trunk usually short and crooked; bark grayish, smooth or shallowly fissured; leaflets ovate or elliptic, 3.5 to 6.5 cm. long, acute, green above, pale beneath and usually blotched with bronze; flowers 2.5 cm. long, in clustered racemes, bright pink; fruit long, flat, 1.5 cm. wide; sapwood yellowish, turning reddish brown on exposure, the heartwood darker, tinged with red, hard and heavy, very tough, close-grained, taking a good polish. "Cacahuananche" (Michoacán, Guerrero, Sinaloa, Tepic); "cacahuanano" (Oaxaca; from the Nahuatl "cacahua-nantl," "cacao-mother"); "lengua de perico" (Veracruz); "madre de cacao" (Jalisco, Chiapas, Guatemala, Nicaragua, El Salvador, Panama, Philippines); "xak-yaab," "sacyab" (Yucatán, Maya); "iaiti" (Chiapas); "cansim" (Guatemala); "madera negra" (Costa Rica, Panama, Nicaragua); "sangre de drago" (Costa Rica); "bala" (Costa Rica, Panama); "madriado" (Nicaragua); "mataratón" (Panama, Colombia); "bien vestida," "piñón florido," "piñón amoroso" (Cuba); "cacaute" (Philippines).

Often planted for hedges, and a favorite shade tree for cacao and coffee plantations; grown from seeds or cuttings. The leaves are eaten by cattle but, like other parts of the plant, they are poisonous to rats, mice, and other rodents. The seeds or powdered bark mixed with rice, etc., are used in tropical America for poisoning rats and mice. The tree is said to have been introduced into the Philippines from Mexico at an early date.

This tree was first described by Oviedo (*Lib. VIII, Cap. XXX*), who says that in order to protect the cacao "they plant between the trees other trees which the Indians call *yaguaguyt* and the Christians *madera negra*, which grow almost twice as large as the cacao trees and protect them from the sun, and they prune the branches to make them grow straight. These trees are of such a nature that they live much longer than the cacao trees and never decay; it is one of the strongest woods known. The *madera negra* has very beautiful flowers, pink and white, in bunches, and they have a good odor; the fruit consists of pods

which contain lentils, somewhat smaller than lupine seeds and very hard; they never shed their leaves and are trees that the Indians value for making hedges about their lands, and for wood for their houses or huts, for they say that it never decays. I tore down a sacrificial building in Nicaragua a quarter of a league or less outside the city of León, in the square of the Cacique Mahomotompo, who served me; for to separate the people from the rites and sacrifices and diabolic ceremonies we took from them the temples which, in the language of Charotega, to which that town belongs, they call *teyopa*; that is to say, houses of prayer. And I had taken to León the wooden posts, all of which were *madera negra*, and made a stable for my horses. When I asked the cacique and the old men who had made that temple, they said it was built many years before; so far as I could understand, it was a hundred years or more; the wood that had been two yards deep in the ground was still as green and fresh as if just cut, and the axes rebounded and were nicked in cutting it. I am often reminded by this wood of the Ark of the Covenant of the Old Testament, made of shittim wood, which was incorruptible, and of the same wood was made the altar of the Lord. I do not know whether this *madera negra* of Nicaragua is shittim wood; but I do know that the Indians hold it for a fact that it is imperishable, unless burnt, and so they affirm." Oviedo treats the tree in another chapter (Lib. VIII, Cap. XXXVIII) under the name "yagaguyt."

27. WILLARDIA Rose, Contr. U. S. Nat. Herb. 1: 97. 1891.

Unarmed shrubs or trees; leaves pinnate, the leaflets numerous, small or large; flowers showy, in axillary racemes; fruit flat, dehiscent.

Flowers 6 to 8 mm. long; leaflets 0.8 to 1.5 cm. long; fruit glabrous.

1. *W. parviflora*.

Flowers 15 to 25 mm. long; leaflets 1.5 to 5 cm. long; fruit pubescent.

Flowers about 1.5 cm. long, the standard glabrous.....2. *W. mexicana*.

Flowers 2 to 2.5 cm. long, the standard sericeous.....3. *W. eriophylla*.

1. *Willardia parviflora* Rose, Contr. U. S. Nat. Herb. 8: 313. 1905.

Known only from the vicinity of the type locality, Yautepec, Morelos.

Shrub, 3 to 4 meters high, much branched; leaflets 11 to 21, subcordate, with revolute margins; fruit 4.5 to 7 cm. long, 1.2 cm. wide, acute at each end.

2. *Willardia mexicana* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 1: 98. 1891.

Coursetia mexicana S. Wats. Proc. Amer. Acad. 21: 424. 1886.

Chihuahua, Sonora, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Shrub or tree, 3 to 12 meters high, the trunk sometimes 35 cm. or more in diameter; bark smooth; leaflets 9 to 15; flowers lilac; fruit flat, 5 to 12.5 cm. long. "Nesco," "palo plojo" (Chihuahua, Sinaloa, Sonora); "taliste" (Sinaloa).

Wood used for mining props, fuel, and for other purposes. A decoction of the bark is employed in Sinaloa to destroy parasites on cows and horses.

3. *Willardia eriophylla* (Benth.) Standl.

Lonchocarpus eriophyllus Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 94. 1860.

Michoacán, Guerrero, and Puebla; perhaps also in Morelos; type from Chilá, Puebla.

Tree, 4 to 5 meters high; leaflets about 13, oblong, obovate, or oval, densely pubescent; flowers reddish violet.

Specimens from Morelos have fruit 9 to 13 cm. long and 1.2 to 1.5 cm. wide. It is not certain that they are conspecific with the flowering specimens. The generic position of *Willardia eriophylla* can not be established with certainty until more material is collected.

28. HESPEROTHAMNUS T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 499. 1919.

Erect shrubs or trees; leaflets pinnately 5-foliolate; flowers purple or purplish, large, in terminal racemes; fruit broadly linear, bivalvate.

Fruit about 17 mm. wide-----1. *H. littoralis*.

Fruit 7 to 10 mm. wide-----2. *H. grandis*.

1. *Hesperothamnus littoralis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 499. 1919.

Lonchocarpus littoralis T. S. Brandeg. Zoe 5: 157. 1903.

Southern Baja California.

Shrub or small tree; leaflets 3 to 6 cm. long, acute, densely pubescent; fruit about 8 cm. long.

2. *Hesperothamnus grandis* Standl., sp. nov.

Puebla and Oaxaca; type from Tehuacán, Puebla (*Rose & Hay* 5869; U. S. Nat. Herb. no. 395657).

Shrub or small tree, sometimes 7.5 meters high, the branchlets brownish, when young densely pilose with short, fulvous, spreading or reflexed hairs; leaf rachis 4 to 10.5 cm. long, the petiolules 3 to 5 mm. long, the stipels filiform; leaflets elliptic-oblong, ovate-oval, elliptic, oval, or rounded-oval, the terminal one sometimes rounded-obovate, 3.5 to 7 cm. long, 1.5 to 5.3 cm. wide, rounded, obtuse, or subcordate at base, rounded to acute at apex, often abruptly short-acuminate, thick, pale green, densely velvety-puberulent on the upper surface when young, beneath densely velvety-pilose with very short pale hairs, or in age glabrate; flowers fasciculate-racemose, short-pedicellate, the racemes dense or interrupted, 4.5 to 11 cm. long, usually long-pedunculate and equaling or longer than the leaves, the rachis densely short-pilose; calyx 5 to 7 mm. long, densely sericeous or short-pilose, the 4 lobes triangular or lanceolate, usually subulate-acuminate, equaling or longer than the tube; petals purplish, the standard thinly pilose outside with short, appressed or somewhat spreading hairs, the blade about 1 cm. long and broad, the claw 3 mm. long, the wing and keel petals of about the same length; style glabrous; fruit sessile, 5 to 6 cm. long, 6 to 10 mm. wide, compressed, bivalvate, strigose-sericeous, the margins slightly thickened.

The following additional collections belong here:

PUEBLA: Near Tehuacán, 1905, *Rose, Painter & Rose* 9923; in 1906, *Rose & Rose* 11281; *Pringle* 6748.

OAXACA: Canyon above Domingullo, *Pringle* 5649. Six miles above Domingullo, altitude 1,350 to 1,650 meters, *Nelson* 1826a.

29. MEIBOMIA Heist.; Fabr. Pl. Hort. Helmst. 168. 1759.

Herbs or shrubs, sometimes scandent; leaves pinnate, the leaflets usually 3 but sometimes only 1; flowers commonly racemose, small, purple to white; fruit of 1 to several joints, often covered with hooked hairs, the joints thus readily adhering to clothing.

One of the largest genera of Mexican plants, but most of the species are herbaceous. Besides the species listed here there are doubtless others which sometimes become shrubs. The plants are often browsed by stock, and some species of the genus have been cultivated as fodder crops.

Joints of the fruit notched on the upper side; plants usually scandent.

Leaflets suborbicular-----1. *M. painteri*.

Leaflets ovate or nearly so.

Joints of the fruit less than 1 cm. wide, much longer than broad.

2. *M. angustata*.

Joints of the fruit about 2 cm. wide, nearly as broad as long.

3. *M. purpusii*.

Joints of the fruit not notched.

Leaves unifoliolate.

Fruit glabrous.....4. *M. pallida*.

Fruit puberulent.....5. *M. psilophylla*.

Leaves 3-foliolate.

Joints of the fruit closely folded together.

Leaflets oblong or ovate-oblong.....6. *M. plicata*.

Leaflets oval or suborbicular.....7. *M. plectocarpa*.

Joints of the fruit not folded together.

Joints twice as long as wide or longer.....8. *M. foliosa*.

Joints much less than twice as long as wide.

Pubescence of the stems of numerous closely appressed hairs.

Leaflets broadly rounded at apex; fruit sericeous.....9. *M. robinsonii*.

Leaflets acute or acutish; fruit glabrous or puberulent.

Bracts cuspidate-acuminate.....10. *M. konzattii*.

Bracts obtuse or acutish.....11. *M. jaliscana*.

Pubescence of the stems of spreading or recurved hairs, or wanting.

Fruit glabrous or nearly so.

Leaflets suborbicular or obovate-orbicular.

Joints of the fruit 4 mm. long; leaflets mostly obovate-orbicular.

12. *M. rubricaulis*.

Joints of the fruit 5 to 6 mm. long; leaflets suborbicular.

13. *M. orbicularis*.

Leaflets oval to narrowly oblong.

Joints of the fruit longer than broad.

14. *M. chartacea*.

Joints of the fruit suborbicular.....15. *M. nitida*.

Fruit copiously puberulent or pilose.

Leaflets mostly oval or suborbicular, rounded at apex.

16. *M. cinerea*.

Leaflets ovate to narrowly oblong or lanceolate, acute or acutish,
or at least narrowed to the apex.

Leaflets 5 cm. long or shorter; bracts small.

17. *M. ghiesbreghtii*.

Leaflets 6 to 17 cm. long; bracts large and conspicuous.

Leaflets linear-lanceolate, glabrate beneath.

18. *M. macrostachya*.

Leaflets ovate, sericeous beneath.....19. *M. amplifolia*.

1. *Meibomia painteri* Rose & Standl. Contr. U. S. Nat. Herb. 16: 214. 1913.

Known only from the type locality, Iguala Canyon, Guerrero.

Plants scandent, suffrutescent; leaflets orbicular. 3 to 8 cm. long; joints of the fruit about 1 cm. long and broad.

2. *Meibomia angustata* Rose & Standl. Contr. U. S. Nat. Herb. 16: 215. 1913.

Known only from the type locality, between San Sebastián and Las Palmas, Jalisco.

Leaflets ovate-lanceolate, 2.5 to 8 cm. long.

3. *Meibomia purpusii* (T. S. Brandeg.) Blake, Contr. U. S. Nat. Herb. 24: 6. 1921.

Desmodium lunatum T. S. Brandeg. Zoe 5: 246. 1908. Not *D. lunatum* Huber, 1906.

Desmodium purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 53. 1914.

Veracruz; type from Zacuapan.

Scandent shrub; leaflets 5.5 to 9.5 cm. long, acute.

4. *Meibomia pallida* Rose & Painter, Bot. Gaz. 40: 145. pl. 5. 1905.

Known only from the type locality, Huilotepec, Oaxaca.

Low shrub; leaflets oblong to orbicular, 1 to 2.5 cm. long, obtuse or acute, pale.

5. *Meibomia psilophylla* (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.

Desmodium psilophyllum Schlecht. Linnaea 12: 310. 1838.

San Luis Potosí and Veracruz to Chiapas and Puebla; type from Chiconquiaco. Guatemala.

Slender glabrous shrub, a meter high or less; leaflets oblong to narrowly lance-oblong, 2 to 8 cm. long, obtuse.

6. *Meibomia plicata* (Schlecht. & Cham.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.

Desmodium plicatum Schlecht. & Cham. Linnaea 5: 585. 1830.

Sonora to Veracruz and Chiapas; type collected between Misantla and Colipa, Veracruz.

Shrub, 1 to 3.5 meters high; leaflets 2 to 7 cm. long, densely tomentose beneath; flowers purple. "Escobilla" (Michoacán, Guerrero).

7. *Meibomia plectocarpa* (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.

Desmodium plectocarpum Hemsl. Diag. Pl. Mex. 46. 1880.

San Luis Potosí and Veracruz; type from Orizaba.

Leaflets 2.5 to 6.5 cm. long, densely pubescent; flowers violet, in long dense racemes.

8. *Meibomia foliosa* (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.

Desmodium foliosum Hemsl. Biol. Centr. Amer. Bot. 1: 278. 1880.

Veracruz and Oaxaca; type from Sierra San Pedro Nolasco.

Slender glabrous shrub; leaflets ovate or lanceolate, 2.5 to 7 cm. long, usually attenuate, thin, bright green.

9. *Meibomia robinsonii* Standl.

Desmodium jaliscanum obtusum Robinson, Proc. Amer. Acad. 26: 164. 1891.

San Luis Potosí and Jalisco; type from Tamasopo Canyon, San Luis Potosí, Guatemala.

Shrub, 1 to 3 meters high; leaflets oval, 3.5 to 7 cm. long, densely pubescent.

10. *Meibomia konzattii* (Greenm.) Standl.

Desmodium konzattii Greenm. Field Mus. Bot. 2: 331. 1912.

Guerrero to Veracruz and Oaxaca; type from San Bernardino, Oaxaca.

Shrub, 1 to 4.5 meters high; leaflets ovate or oblong, 3 to 8 cm. long; flowers purplish, rather large.

11. *Meibomia jaliscana* (S. Wats.) Standl.

Desmodium jaliscanum S. Wats. Proc. Amer. Acad. 22: 406. 1887.

Jalisco and Guanajuato; type from Río Blanco, Jalisco.

Shrub, 1 to 2.5 meters high; leaflets lance-oblong or ovate-oblong, 3 to 9 cm. long.

12. *Meibomia rubricaulis* Rose & Painter, Bot. Gaz. 40: 145. 1905.

Sinaloa and Durango to Guerrero; type from Etzatlán, Jalisco.

Slender shrub, 1 to 2 meters high, with purple flowers; leaflets 1 to 2 cm. long, glabrate.

13. *Meibomia orbicularis* (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.

Desmodium orbiculare Schlecht. Linnaea 12: 311. 1838.

San Luis Potosí and Veracruz to Chiapas and Oaxaca; type from Regla, Hidalgo. Guatemala.

Slender shrub or herb; leaflets 1 to 2.5 cm. long, pale beneath, glabrate; flowers purplish. "Engorda-cabra" (Guanajuato).

14. Meibomia chartacea (T. S. Brandeg.) Standl.*Desmodium chartaceum* T. S. Brandeg. Zoe 5: 202. 1905.

Known only from the type locality, near Culiacán, Sinaloa.

Leaflets narrowly lance-oblong, 3.5 to 7.5 cm. long, pale.

15. Meibomia nitida (Mart. & Gal.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.*Desmodium nitidum* Mart. & Gal. Bull. Acad. Brux. 10²: 186. 1843.

Veracruz, Oaxaca (type locality), and Guerrero.

Slender shrub, 1 to 4 meters high, with purple flowers; leaflets mostly ovate, 3 to 6 cm. long, bright green.

16. Meibomia cinerea (H. B. K.) Standl.*Hedysarum cinereum* H. B. K. Nov. Gen. & Sp. 6: 526. pl. 599. 1823.*Desmodium cinereum* DC. Prodr. 2: 330. 1825.*Desmodium chiapense* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 53. 1914.

Tepic to Chiapas; type collected near Mexcala and Chilpancingo, Guerrero. Central America.

Shrub, 1 to 2.5 meters high; leaflets 3 to 7 cm. long, densely pubescent or tomentose.

17. Meibomia ghiesbreghtii (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.*Desmodium ghiesbreghtii* Hemsl. Biol. Centr. Amer. Bot. 1: 279. 1880.

Mexico and Oaxaca (type locality).

Shrub, 1 to 2.5 meters high.

18. Meibomia macrostachya (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 198. 1891.*Desmodium macrostachyum* Hemsl. Diag. Pl. Mex. 44. 1880.

Jalisco to Morelos and Oaxaca (type locality).

Plants 1.5 to 2.5 meters high; leaflets 5.5 to 17 cm. long; flowers in very long, mostly simple racemes.

19. Meibomia amplifolia (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 197. 1891.*Desmodium amplifolium* Hemsl. Biol. Centr. Amer. Bot. 1: 274. 1880.

Oaxaca (type locality) and Chiapas. Guatemala.

Leaflets 5 to 12 cm. long, sericeous beneath.

30. NISSOLIA Jacq. Enum. Pl. Carib. 7. 1760.

REFERENCE: Rose, Contr. U. S. Nat. Herb. 5: 157-163. 1899.

Plants usually scandent, fruticose or herbaceous; leaves odd-pinnate, the leaflets usually 5; flowers small, yellow, racemose or verticillate in the leaf axils; fruit indehiscent, of few short broad joints, the terminal joint with a large thick terminal wing.

The species are very closely related, and it is doubtful whether all those listed here are really distinct.

Calyx or fruit or both with few or numerous yellow bristle-like hairs.

Fruit setose-hispid.

Leaflets densely pilose beneath; fruit rounded at the apex____1. *N. dodgei*.Leaflets glabrous beneath; fruit acute_____2. *N. setosa*.

Fruit not setose-hispid.

Plants scandent; fruit not constricted_____3. *N. schottii*.

Plants prostrate; fruit conspicuously constricted into joints.

_____4. *N. wislizeni*.

Calyx and fruit without yellow bristle-like hairs.

Flowers all or chiefly in naked racemes.

Calyx lobes long, filiform-subulate_____5. *N. guatemalensis*.Calyx lobes very short, deltoid_____6. *N. nelsoni*.

Flowers verticillate in the axils of the leaves.

Calyx tube about 5 mm. long-----7. *N. platycalyx*.

Calyx tube 1.5 to 3.5 mm. long.

Leaflets densely and persistently pilose beneath-----8. *N. hirsuta*.

Leaflets glabrous beneath or nearly so.

Leaflets large, most of them 2.5 to 4 cm. long, all much longer than broad.

9. *N. laxior*.

Leaflets small, most of them 1 to 2 cm. long, those of the lower leaves usually orbicular or nearly so-----10. *N. pringlei*.

1. *Nissolia dodgei* Rose, Contr. U. S. Nat. Herb. 5: 161. f. 23. 1899.

Coahuila and Neuvo León; type from Monterrey, Nuevo León.

Leaflets 1 to 2 cm. long; fruit 2 cm. long, 2 or 3-seeded.

2. *Nissolia setosa* T. S. Brandeg. Proc. Calif. Acad. II, 3: 127. 1891.

Southern Baja California; type from Triunfo.

Vine, 3 to 4 meters long; leaflets 5, orbicular, 1 to 2 cm. long; flowers 4 mm. long, dark yellow.

3. *Nissolia schottii* (Torr.) A. Gray, Journ. Linn. Soc. 5: 26. 1861.

Chaetocalyx schottii Torr. U. S. & Mex. Bound. Bot. 56. pl. 18. 1859.

Chihuahua, Sonora, and Sinaloa; type from Sierra Verde, Sonora. Southern Arizona.

Leaflets 5, oval or orbicular, 1 to 3.5 cm. long; flowers nearly 1 cm. long; fruit 2.5 to 3 cm. long.

4. *Nissolia wislizeni* A. Gray, Journ. Linn. Soc. 5: 25. 1861.

Chaetocalyx wislizeni A. Gray, Pl. Wright. 1: 51. 1852.

Chihuahua and Sonora to Zacatecas and Hidalgo; type collected near the city of Chihuahua. Southern Arizona.

Leaflets orbicular or nearly so, 8 to 15 mm. long; flowers 1 cm. long or slightly larger.

This species differs from the others in being prostrate rather than scandent. The plants are nearly or quite herbaceous.

5. *Nissolia guatemalensis* Rose, Contr. U. S. Nat. Herb. 5: 162. 1890.

Sinaloa. Guatemala (type locality).

Leaflets oval, 3 to 7 cm. long, obtuse or acutish; flowers 6 mm. long, very numerous, in long racemes.

Although known in Mexico from a single locality far distant from Guatemala, the specimens can not be distinguished from those from the latter region.

6. *Nissolia nelsoni* Rose, Contr. U. S. Nat. Herb. 5: 162. f. 26. 1899.

Sinaloa and Jalisco to Veracruz and Chiapas; type from the Valley of Oaxaca.

Plants climbing to a height of 3 to 4.5 meters; leaflets elliptic to orbicular, 2 to 5.5 cm. long, acutish to broadly rounded at apex. "Riatilla" (Sinaloa).

It is doubtful whether this is distinct from *N. fruticosa* Jacq., of Columbia.

7. *Nissolia platycalyx* S. Wats. Proc. Amer. Acad. 17: 344. 1882.

Known only from the type locality, in the mountains east of Saltillo, Coahuila.

8. *Nissolia hirsuta* DC. Prodr. 2: 257. 1825.

Nissolia confertiflora S. Wats. Proc. Amer. Acad. 21: 424. 1886.

Chihuahua to Sinaloa, Oaxaca, and Morelos; type from Guanajuato.

Leaflets 1 to 5.5 cm. long, thin, bright green; wing of the fruit 1 cm. wide or narrower.

9. *Nissolia laxior* (Robinson) Rose, Contr. U. S. Nat. Herb. 5: 162. 1899.

Nissolia confertiflora laxior Robinson, Proc. Amer. Acad. 29: 315. 1894.

Nissolia montana Rose, Contr. U. S. Nat. Herb. 8: 48. 1903.

Jalisco and Guanajuato to Morelos and Puebla; type from Beltram, Jalisco.
Leaflets elliptic or oval, thin, bright green; flowers 1 cm. long.

10. *Nissolia pringlei* Rose, Contr. U. S. Nat. Herb. 5: 159. f. 20. 1899.

Nissolia diversifolia Rose, Contr. U. S. Nat. Herb. 5: 160. f. 21. 1899.

Nissolia multiflora Rose, Contr. U. S. Nat. Herb. 5: 161. f. 24. 1899.

Chihuahua to Morelos and Oaxaca; type from Santa Eulalia Mountains, Chihuahua.

Flowers about 7 mm. long; fruit 3 cm. long, the wing about 7 mm. wide.

DOUBTFUL SPECIES.

NISSOLIA PLATYCARPA Benth. in Mart, Fl. Bras. 15¹: 77. 1859. Type from Zimapán, Hidalgo. This species has never been properly described, and it is impossible to place it definitely.

31. *AMICIA* H. B. K. Nov. Gen. & Sp. 6: 511. 1823.

1. *Amicia zygomeris* DC. Prodr. 2: 315. 1825.

Chihuahua to Tepic, Oaxaca, and Veracruz.

Slender unarmed shrub, or sometimes herbaceous, glabrous or pilose, leaflets 4 or 6, 2 to 6 cm. long and nearly as wide, truncate or emarginate at apex, conspicuously gland-dotted; flowers 3 to 3.5 cm. long, yellow, racemose, subtended by large, orbicular or reniform bracts.

32. *PICTETIA* DC. Ann. Sci. Nat. 9: 93. 1825.

1. *Pictetia microphylla* Benth.; Hemsl. Diag. Pl. Mex. 8. 1878.

Type collected in Sonora; plant known to the writer only from the description.

Glandular-pubescent shrub; leaves pinnate, the leaflets 4 or 5 pairs, lanceolate, 3 mm. long, pungent; flowers 1.8 cm. long, racemose; fruit stipitate, 3 or 4-seeded, constricted between the seeds.

33. *AESCHYNOMENE* L. Sp. Pl. 713. 1753.

Small shrubs or herbaceous plants; leaves odd-pinnate; flowers small, in axillary racemes or clusters; fruit flat, of 2 to several joints.

Several other species besides those enumerated here occur in Mexico, but they are all herbaceous forms.

Stipules conspicuously produced below the point of insertion.

Leaflets acute or acutish, the costa near the margin.....1. *A. americana*.

Leaflets very obtuse, the costa central.

Stems glabrous or nearly so.....2. *A. sensitiva*.

Stems hispid.

Fruit 5 to 6 mm. wide.....3. *A. hispida*.

Fruit 3 to 4 mm. wide.....4. *A. hispidula*.

Stipules not produced below the point of insertion.

Costa of the leaflets excentric, usually near the margin; leaflets 3.5 mm. wide or narrower, often acute.

Leaflets densely white-sericeous.....5. *A. nivea*.

Leaflets green, thinly sericeous or strigose or glabrate.

Leaflets obtuse, the costa not very close to the margin.

Corolla 10 to 12 mm. long; leaflets 2.5 to 3.5 mm. wide.

6. *A. fascicularis*.

Corolla 6 to 7 mm. long; leaflets 1 to 1.5 mm. wide...7. *A. oligantha*.

Leaflets acute, the costa very close to the margin.

Leaflets 6 to 10 pairs.....8. *A. purpusii*.

Leaflets mostly more than 10 pairs.....9. *A. compacta*.

Costa of the leaflets central; leaflets often more than 3.5 mm. wide, obtuse or rounded at apex.

Standard petal glabrous.

Leaflets numerous, 1.2 to 3 mm. wide-----10. *A. amorphoides*.

Leaflets 15 or fewer, 4 to 16 mm. wide-----11. *A. palmeri*.

Standard petal variously pubescent.

Venation of the leaflets reticulate.

Calyx glabrous; branches of the inflorescence glabrous or nearly so.
12. *A. simulans*.

Calyx pubescent; branches of the inflorescence densely pilose and often hispid-----13. *A. petraea*.

Venation of the leaflets not reticulate.

Leaflets 7 to 11.

Leaflets glabrous or nearly so-----14. *A. fruticosa*.

Leaflets densely sericeous or pilose-----15. *A. vigil*.

Leaflets 15 or more.

Leaflets 3.5 to 6 mm. wide-----16. *A. pringlei*.

Leaflets 2 mm. wide or narrower-----17. *A. paniculata*.

1. *Aeschynomene americana* L. Sp. Pl. 713. 1753.

Aeschynomene glandulosa Poir. in Lam. Encycl. Suppl. 4: 76. 1816.

Aeschynomene floribunda Mart. & Gal. Bull. Acad. Brux. 10³: 180. 1843.

Aeschynomene americana depila Millsp. Field Mus. Bot. 1: 363. 1898.

Chihuahua to Sinaloa, Chiapas, Yucatán, and Veracruz. Widely distributed in tropical America; type from Jamaica.

Plants suffrutescent and sometimes a meter high, or often herbaceous; leaflets numerous, oblong-linear, about 1 cm. long; flowers small, pale yellow to brownish yellow, sometimes striped with purple. "Huevo de rana" (Nicaragua); "hierba rosario" (Porto Rico); "pegapega" (Cuba).

Of some importance as a forage plant.

2. *Aeschynomene sensitiva* Swartz, Prodr. Veg. Ind. Occ. 107. 1788.

Sinaloa to Veracruz. Widely distributed in tropical America; also in Africa.

Plants suffrutescent or herbaceous, sometimes 4 meters high; leaflets oblong, 6 to 15 mm. long; flowers pale yellow with red veins, about 1 cm. long; fruit 4 to 8 cm. long, 3 to 6 mm. wide. "Hierba de ciénaga," "hierba rosario" (Porto Rico).

3. *Aeschynomene hispida* Willd. Sp. Pl. 3: 1163. 1800.

Sinaloa and Durango to Veracruz and Oaxaca. Widely distributed in tropical America.

Herbaceous or suffrutescent; flowers yellow, striped with red, 10 to 14 mm. long.

4. *Aeschynomene hispidula* H. B. K. Nov. Gen. & Sp. 6: 531. 1823.

Michoacán to Veracruz and Oaxaca. Central America and South America; type from Colombia.

Herbaceous or suffrutescent, sometimes 3.5 meters high; flowers scarcely 1 cm. long.

5. *Aeschynomene nivea* T. S. Brandeg. Proc. Calif. Acad. II. 2: 150. 1889.

Baja California; type from Purísima.

Silvery-sericeous shrub, 0.6 to 1 meter high; leaflets numerous, oblong-linear, 4 to 10 mm. long; flowers ochroleucous or sulphur-yellow, 1 cm. long; fruit usually of only 2 joints.

6. *Aeschynomene fascicularis* Schlecht. & Cham. *Linnaea* 5: 584. 1830.

Chihuahua and Sonora to Jalisco and Yucatán; type collected between Laguna Verde and Actopan (Veracruz?). Central America.

Shrub, 1 to 2.5 meters high, with yellow flowers.

7. *Aeschynomene oligantha* Micheli, *Mém. Soc. Phys. Hist. Nat. Genève* 34: 526. 1903.

Known only from the type locality, "Mata de Dios," Michoacán or Guerrero. Doubtfully distinct from *A. fascicularis*.

8. *Aeschynomene purpusii* T. S. Brandeg. *Zoe* 5: 247. 1908.

Known only from the type locality, Zacuapan, Veracruz.

9. *Aeschynomene compacta* Rose, *Contr. U. S. Nat. Herb.* 5: 191. 1899.

Aeschynomene oaxacana T. S. Brandeg. *Univ. Calif. Publ. Bot.* 6: 181. 1915.

Puebla and Oaxaca; type from Tomellín Cañón, Oaxaca.

Shrub, 1 to 1.5 meters high; leaflets 3 to 10 mm. long.

10. *Aeschynomene amorphoides* (S. Wats.) Rose; Robinson, *Proc. Amer. Acad.* 29: 315. 1894.

Brya amorphoides S. Wats. *Proc. Amer. Acad.* 22: 406. 1887.

Sinaloa to Colima; type from Tequila, Jalisco.

Shrub, about a meter high; flowers purplish, 6 mm. long; joints of the fruit 1 or 2.

11. *Aeschynomene palmeri* Rose, *Contr. U. S. Nat. Herb.* 5: 192. 1899.

Aeschynomene paucifoliolata Micheli, *Mém. Soc. Phys. Hist. Nat. Genève* 34: 256. *pl.* 9. 1903.

Guerrero; type from Acapulco.

Shrub, 1 to 3 meters high, with purplish flowers.

12. *Aeschynomene simulans* Rose, *Contr. U. S. Nat. Herb.* 5: 192. 1899.

Sinaloa and Tepic; type collected between Rosario and Colomas, Sinaloa.

Plants suffrutescent; flowers yellow, tinged with purple.

13. *Aeschynomene petraea* Robinson, *Proc. Amer. Acad.* 27: 166. 1892.

Aeschynomene madreensis Micheli, *Mém. Soc. Phys. Hist. Nat. Genève* 34: 255. *pl.* 8. 1903.

Durango to Guerrero; type from Guadalajara.

Plants suffrutescent, 1 to 1.5 meters high; flowers large, yellow, striped with brown or purple.

14. *Aeschynomene fruticosa* Rose, *Contr. U. S. Nat. Herb.* 5: 192. 1899.

Known only from the type locality, Topolobampo, Sinaloa.

Shrub, 1 to 1.5 meters high, with small yellow flowers.

15. *Aeschynomene vigil* T. S. Brandeg. *Proc. Calif. Acad.* II. 3: 128. 1891.

Southern Baja California; type from San José del Cabo.

Shrub, about a meter high, with white stems; flowers purple.

16. *Aeschynomene pringlei* Rose, *Contr. U. S. Nat. Herb.* 8: 312. 1905.

Known only from the type locality, limestone hills near Jojutla, Morelos.

Shrub, 3 to 4.5 meters high.

17. *Aeschynomene paniculata* Willd.; Vog. *Linnaea* 12: 95. 1838.

Guerrero to Veracruz. South America; type from Brazil.

34. *CLIMACORACHIS* Hemsl. & Rose, *Contr. U. S. Nat. Herb.* 8: 43. 1903.

Low erect shrubs or herbs; leaves pinnate, the leaflets small, numerous; flowers yellow, racemose, the racemes geniculate; fruit flat, 2 to 4-seeded.

Stems glabrous-----1. *C. mexicana*.

Stems glandular-pilose-----2. *C. fruticosa*.

1. *Climacorachis mexicana* Hemsl. & Rose, Contr. U. S. Nat. Herb. 8: 43. 1903.
Known only from the type locality, in the Sierra Madre west of Bolaños, Jalisco.

Leaflets 9 to 12 pairs, linear, 4 to 5 mm. long; fruit 5 to 10 mm. long.

2. *Climacorachis fruticosa* Hemsl. & Rose, Contr. U. S. Nat. Herb. 8: 44. 1903.
Known only from the type locality, mountains near Talpa, Jalisco, altitude 1,320 to 1,500 meters.

Leaflets sometimes 20 pairs, 7 mm. long.

35. **ABRUS** Adans. Fam. Pl. 2: 327. 1763.

1. *Abrus precatorius* L. Syst. Nat. ed. 12. 2: 472. 1767.

Glycine abrus L. Sp. Pl. 753. 1753.

Veracruz; reported from Yucatán. West Indies, South America, Asia, and Africa.

Scandent shrub with pinnate leaves; leaflets numerous, oblong, 1 to 1.5 cm. long, bright green, very obtuse; flowers racemose, pink or purplish; fruit short, broad; seeds 4 to 6, scarlet, black about the hilum. "Xocoac," "xoxoag" (Yucatán, Maya); "peonía" (Cuba); "peronía," "peronilas" (Porto Rico); "brujitos," "chochitos de Indio," "pionías," "peronilla" (Colombia).

The English names are "bead-vine," "wild licorice," and "crab's-eyes." Stems strong and used as cordage. The leaves and root have the flavor of licorice, and the latter is sometimes employed as a substitute for that article. The root is said to contain glycyrrhizin, the principle found in true licorice (*Glycyrrhiza glabra* L.). The leaves are sensitive to changes in light intensity; they droop vertically during the night and rise to a horizontal position in the morning. Lunan states that the dried leaves were used in India as a substitute for tea.

The plant is reported to have poisoned cattle in India, and the seeds are certainly poisonous. They have been used in that country for criminal poisoning, but are said to be inert if swallowed whole. It is said that the poisonous properties are destroyed by heat and that the seeds have been used for food in some countries, but this is perhaps erroneous. They contain abric acid and two proteid poisons, to one of which the name abrine has been given. They are known in commerce as "jequirity seeds," and have been employed by European physicians in treating diseases of the eye and skin. The seeds are very handsome and are strung into bracelets and necklaces. Because of their uniformity in size they were formerly used as weights by jewel merchants. The leaves are applied externally to swellings in India and are chewed with sugar for coughs.

36. **RAMIREZELLA** Rose, Contr. U. S. Nat. Herb. 8: 44. 1903.

Scandent plants, fruticose, at least at the base; leaves pinnately trifoliate, the leaflets large; flowers racemose, at first covered with large striate bracts; fruit linear, compressed, bivalvate.

The species are very closely related, and more material is necessary to determine their validity.

Fruit densely pilose; calyx short-pilose.....1. *R. pubescens*.

Fruit and calyx glabrous or nearly so.

Peduncles and rachis glabrous or nearly so.....2. *R. buseri*.

Peduncles and rachis of the inflorescence copiously pilose.

Lower calyx lobes acute.....3. *R. pringlei*.

Lower calyx lobes rounded or obtuse.....4. *R. strobilophora*.

1. *Ramirezella pubescens* Rose, Contr. U. S. Nat. Herb. 8: 45. 1903.

Known only from the type locality, between Tlapa and Tlaliscatilla, Guerrero, altitude 1,170 to 1,350 meters.

Leaflets broadly ovate, about 8 cm. long, acuminate, densely pubescent beneath; fruit long-beaked.

2. *Ramirezella buseri* (Micheli) Rose, Contr. U. S. Nat. Herb. 12: 274. 1909.
Phaseolus buseri Michell, Mém. Soc. Phys. Hist. Nat. Genève 34: 263. pl. 13. 1903.

Ramirezella occidentalis Rose, Contr. U. S. Nat. Herb. 8: 45. 1903.

Ramirezella glabrata Rose, Contr. U. S. Nat. Herb. 8: 45. 1903.

Jalisco to Guerrero; type from La Botella, altitude 350 meters.

Leaflets ovate or broadly ovate, 4 to 10 cm. long, acuminate, glabrate; flowers purplish white, large and showy.

With more ample material, it may be possible to recognize more than a single species here.

3. *Ramirezella pringlei* Rose, Contr. U. S. Nat. Herb. 12: 274. 1909.

Known only from the type locality, Iguala Canyon, Guerrero, altitude 900 meters.

Leaflets 6 to 10 cm. long, glabrate; corolla violet, 2 cm. long.

4. *Ramirezella strobilophora* (Robinson) Rose, Contr. U. S. Nat. Herb. 5: 44. 1903.

Vigna strobilophora Robinson, Proc. Amer. Acad. 27: 167. 1892.

Chihuahua to Jalisco; type collected near Guadalajara.

Scandent shrub, the stems sometimes 2.5 cm. thick; leaflets 6 to 8 cm. long, acuminate; flowers purple and white, in dense racemes; fruit 9 to 12 cm. long, about 1.5 cm. wide.

37. CLITORIA L. Sp. Pl. 753. 1753.

Shrubby or herbaceous plants, often scandent; leaves pinnate, with usually 3 leaflets; flowers large, showy, solitary or clustered in the axils of the leaves or short-racemose.

Besides the species listed here, *C. ternatea* L., a herbaceous vine, with 5 leaflets, also occurs in Mexico.

Leaves sessile or very short-petiolate.....1. *C. subsessilis*.

Leaves long-petiolate.

Flowers about 7 cm. long.....2. *C. javitensis*.

Flowers 2 to 4 cm. long.

Plants scandent. Leaflets acute or acuminate, pale beneath.

3. *C. mexicana*.

Plants erect.

Pubescence of the stems appressed.....4. *C. multiflora*.

Pubescence of the stems spreading.

Flowers about 2.5 cm. long.....5. *C. triflora*.

Flowers about 4 cm. long.....6. *C. humilis*.

1. *Clitoria subsessilis* Rose, Contr. U. S. Nat. Herb. 5: 169. 1899.

Oaxaca; type collected between Guichocovi and Lagunas.

Plants low, erect, herbaceous or suffrutescent; leaflets linear-oblong, obtuse; flowers 4.5 to 5.5 cm. long.

2. *Clitoria javitensis* (H. B. K.) Benth. Journ. Linn. Soc. 2: 42. 1858.

Neurocarpum javitense H. B. K. Nov. Gen. & Sp. 6: 409. 1823.

Reported from Veracruz and Mexico. Panama and northern South America; type from Javita.

Scandent or repent shrub; leaflets oval or elliptic, acuminate, 8 to 15 cm. long, pubescent beneath.

3. *Clitoria mexicana* Link, Enum. Pl. 2: 235. 1822.

Veracruz, Puebla, and Oaxaca. Guatemala.

Stems slender, scandent, herbaceous or suffruticose; leaflets ovate, 4 to 6 cm. long; flowers blue; fruit 3.5 to 5.5 cm. long, 6 mm. wide.

Closely related to *C. mariana* L., under which name it has been reported from Mexico.

4. *Clitoria multiflora* Mart. & Gal. Bull. Acad. Brux. 10²: 188. 1843.

Clitoria polystachya Benth. Pl. Hartw. 60. 1840.

Tepic to Oaxaca and Veracruz; type from Mirador, Veracruz.

Erect shrub, about a meter high; leaflets mostly ovate, acuminate or acuminate, 4 to 11 cm. long; flowers white, spotted with violet, 3 to 3.5 cm. long.

5. *Clitoria triflora* S. Wats. Proc. Amer. Acad. 2: 407. 1887.

Durango, Jalisco, and Michoacán; type from Río Blanco, Jalisco.

Plants erect, 30 to 60 cm. high, suffrutescent; leaflets oblong-lanceolate, 4 to 9.5 cm. long, obtuse or acute; flowers dark purple and lilac; fruit about 4 cm. long and 6 to 7 mm. wide.

Clitoria monticola T. S. Brandeg.,¹ described from Baja California, is closely related, judging from the description. The writer has seen no material of it.

6. *Clitoria humilis* Rose, Contr. U. S. Nat. Herb. 5: 169. 1899.

Known only from the type locality, Sierra Madre of Durango.

Plants herbaceous or suffrutescent, 10 to 20 cm. high or larger; leaflets oval or oblong; flowers apparently white.

38. **DIOCLEA** H. B. K. Nov. Gen. & Sp. 6: 437. 1823.

1. *Dioclea guianensis* Benth. Ann. Wien. Mus. Naturg. 2: 134: 1838.

Tabasco. Central America and northern South America; type from British Guiana.

Scandent shrub with pinnately 3-foliolate leaves, the leaflets broad, 5 to 12 cm. long, short-acuminate, pubescent; flowers purple or blue, 3 cm. long, in long, spikelike racemes; fruit flat, about 9 cm. long and 1.5 cm. wide. "Haba de monte" (Panama).

39. **CANAVALIA** Adans. Fam. Pl. 2: 325. 1763.

Scandent or prostrate herbs or shrubs; leaves pinnately 3-foliolate; flowers large, racemose; fruit flat, bivalvate.

Several herbaceous species occur in Mexico. The generic name was originally written *Canavali*.

Valves of the fruit each with 2 central costae; leaflets glabrous beneath or nearly so.

Valves of the fruit each with one central costa; leaflets usually pilose beneath.

Lower calyx lobes minute, lance-ovate, very acute; calyx thinly sericeous or glabrate.

Lower calyx lobes large, orbicular; calyx very densely sericeous.

3. *C. hirsuta*.

1. *Canavalia acuminata* Rose, Contr. U. S. Nat. Herb. 1: 322. 1895.

Known only from the type locality, Manzanillo, Colima.

Scandent shrub, nearly glabrous; flowers large, cream-colored; fruit 15 to 20 cm. long, flat; seeds brownish black.

2. *Canavalia villosa* Benth. Ann. Wien. Mus. Naturg. 2: 135. 1838.

Canavalia rostrata Benth. Ann. Wien. Mus. Naturg. 2: 135. 1838.

¹ Univ. Calif. Publ. Bot. 6: 500. 1919.

Wenderothia discolor Schlecht. *Linnaea* 12: 331. 1838.

Wenderothia pilosa Mart. & Gal. Bull. Acad. Brux. 10²: 191. 1843.

Wenderothia glabra Mart. & Gal. Bull. Acad. Brux. 10²: 193. 1843.

Sinaloa to Nuevo León, Tabasco, and Chiapas. Central America.

Scandent shrub or herb; leaflets 6 to 11 cm. long, usually oval, short-acuminate; flowers violet, showy, 3.5 cm. long; fruit about 15 cm. long and 2 cm. wide, densely pilose. "Patito" (Michoacán, Guerrero); "frijolillo" (Sinaloa, Puebla, Tabasco); "gallinitas" (*Urbina*).

3. *Canavalia hirsuta* (Mart. & Gal.) Standl.

Wenderothia hirsuta Mart. & Gal. Bull. Acad. Brux. 10²: 192. 1843.

Veracruz to Guerrero and Chiapas; type from Oaxaca. Guatemala.

Scandent shrub, similar to *C. villosa*.

The bractlets at the base of the calyx are much larger than in the preceding species.

40. **ERIOSEMA** Desv. Ann. Sci. Nat. 9: 421. 1826.

Low shrubs or herbs, unarmed; leaves pinnate, 3-foliolate or rarely unifoliate, the leaflets gland-dotted beneath; flowers yellow, racemose, often large and showy; fruit compressed, bivalvate, short, usually 2-seeded.

Flowers in elongate racemes.

Flowers about 1.5 cm. long; lobes of the calyx scarcely longer than the tube.

1. *E. multiflorum*.

Flowers 2 cm. long; lobes of the calyx fully twice as long as the tube.

2. *E. grandiflorum*.

Flowers in very short headlike racemes.

Pubescence of the lower surface of the leaflets closely appressed.

3. *E. diffusum*.

Pubescence of the lower surface of the leaflets chiefly loose and spreading.

Corolla 12 to 14 mm. long; peduncles shorter than the racemes; leaflets of the lower leaves less than twice as long as wide-----4. *E. palmeri*.

Corolla less than 10 mm. long; peduncles usually longer than the racemes; leaflets more than twice as long as wide-----5. *E. pulchellum*.

1. *Eriosema multiflorum* Robinson, Proc. Amer. Acad. 29: 316. 1894.

Known only from the type locality, rocky hills near Tequila, Jalisco.

Shrub, 0.6 to 1 meter high; leaves subsessile, the 3 leaflets oblong, rounded at apex, rugose.

2. *Eriosema grandiflorum* (Schlecht. & Cham.) Seem. Bot. Voy. Herald 345. 1857.

Rhynchosia grandiflora Schlecht. & Cham. *Linnaea* 5: 588. 1830.

Sonora to Oaxaca and Veracruz; type from Hacienda de la Laguna, Veracruz.

Erect shrub, 1 to 2 meters high; leaflets mostly oblong, 4 to 9 cm. long, obtuse or acute, densely pubescent; flowers in long racemes, large and showy. "Jarilla de la sierra" (Sinaloa).

3. *Eriosema diffusum* (H. B. K.) Don, Hist. Dichl. Pl. 2: 347. 1832.

Glycine diffusa H. B. K. Nov. Gen. & Sp. 6: 420. pl. 572. 1823.

Sinaloa to Chiapas and Veracruz. Central America and Colombia (type locality).

Plants erect, herbaceous or suffrutescent, closely but sparsely sericeous; leaflets linear-oblong to oval, 2.5 to 7 cm. long; fruit short, densely pilose. "Guapo" (Guatemala); "guapillo" (Guatemala, Honduras, Blake); "hierba del duende" (Sinaloa).

An infusion of the plant is used in Guatemala for female diseases.

4. *Eriosema palmeri* S. Wats. Proc. Amer. Acad. 22: 408. 1887.

San Luis Potosí to Jalisco and Tepic; type from Tequila, Jalisco.

Plants low, herbaceous or suffrutescent, copiously hirsute with fulvous or brown hairs; roots tuberous-thickened.

Specimens reported from Veracruz as *E. crinitum* (H. B. K.) Don probably belong to this species.

Rhynchosia hirsuta Mart. & Gal.¹ is either this plant or a closely related one.

5. *Eriosema pulchellum* (H. B. K.) Don, Hist. Dichl. Pl. 2: 348. 1832.

Glycine pulchella H. B. K. Nov. Gen. & Sp. 6: 422. 1823.

Chihuahua to Veracruz and Oaxaca. Central America; Colombia (type locality).

Plants suffrutescent; leaflets mostly oblong, 2.5 to 7 cm. long, obtuse.

The leaves are sometimes unifoliolate on young plants.

41. **DOLICHOLUS** Medic. Vorles. Churpf. Phys. Ges. 2: 354. 1787.

Plants herbaceous or frutescent, scandent or prostrate or rarely erect; leaves usually pinnately 3-foliolate, rarely unifoliolate; flowers racemose; fruit bivalvate.

A few herbaceous species not enumerated here are found in Mexico.

Plants erect-----1. **D. pringlei**.

Plants scandent.

Flowers 1.5 to 2 cm. long or larger.

Leaflets acute; bracts broadly ovate, acute-----2. **D. macrocarpus**.

Leaflets long-acuminate; bracts lanceolate or lance-ovate, acuminate.

3. **D. discolor**.

Flowers 1 cm. long or shorter.

Calyx lobes subequal, the upper ones 3 times as long as the tube or longer.

4. **D. longeracemosus**.

Calyx lobes unequal, the upper ones about as long as the tube.

Fruit more or less hispid, not constricted between the seeds.

Leaflets longer than broad, not reticulate-veined; fruit long-hispid; stems scarcely at all viscid-pubescent-----5. **D. nigropunctatus**.

Leaflets about as broad as long, conspicuously reticulate-veined; fruit short-hispid; stems densely viscid-pilose-----6. **D. potosinus**.

Fruit velutinous-puberulent, often constricted between the seeds.

Fruit 4 to 5 mm. wide, not constricted between the seeds.

7. **D. minimus**.

Fruit 8 to 12 mm. wide, constricted between the seeds.

8. **D. phaseoloides**.

1. **Dolicholus pringlei** Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Rhynchosia pringlei Rose, Contr. U. S. Nat. Herb. 3: 316. 1895.

Oaxaca; type from Las Sedas.

Erect shrub, 1 to 1.5 meters high; leaflets strongly reticulate-veined, 2.5 to 5 cm. long and nearly as wide, densely pubescent; flowers large, in long narrow panicles; fruit hirsute; seeds dark brown.

2. **Dolicholus macrocarpus** (Benth.) Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Rhynchosia macrocarpa Benth. Pl. Hartw. 11. 1839.

Chihuahua and Durango to Hidalgo; type from Aguascalientes.

Plants scandent, herbaceous or suffrutescent; leaflets 3 to 11 cm. long, densely pubescent; flowers large, in long racemes; fruit about 4 cm. long and 1.2 cm. wide, densely pubescent; seeds dark brown.

¹ Bull. Acad. Brux. 10²: 198. 1843.

3. *Dolicholus discolor* (Mart. & Gal.) Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Rhynchosia discolor Mart. & Gal. Bull. Acad. Brux. 10²: 198. 1843.

Rhynchosia australis Rose, Contr. U. S. Nat. Herb. 8: 48. 1903. Not *R. australis* Benth. 1864.

Rhynchosia cuernavacana Rose, Contr. U. S. Nat. Herb. 8: 313. 1905.

Dolicholus cuernavacanus Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Durango to Morelos and Chiapas; perhaps also in Sonora; type from Oaxaca. Guatemala.

Leaflets mostly deltoid-ovate, 3.5 to 9 cm. long; flowers large and showy, in long racemes.

4. *Dolicholus longeracemosus* (Mart. & Gal.) Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Rhynchosia longeracemosa Mart. & Gal. Bull. Acad. Brux. 10²: 198. 1843.

Tamaulipas and Nuevo León to Oaxaca and Guerrero; type from Veracruz. Central America.

Plants scandent, herbaceous or suffrutescent; flowers yellow, in long racemes; seeds mottled with light and dark brown.

Perhaps not distinct from *D. reticulatus* (Swartz) Millsp., of the West Indies.

5. *Dolicholus nigropunctatus* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Rhynchosia nigropunctata S. Wats. Proc. Amer. Acad. 22: 408. 1887.

Veracruz and Jalisco; type from Guadalajara.

Plants scandent; petals yellow within, brownish outside.

6. *Dolicholus potosinus* (T. S. Brandeg.) Standl.

Rhynchosia potosina T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 181. 1911.

San Luis Potosí; type from Guascama.

Plants scandent, very viscid.

It is probable that this is not distinct from *D. nigropunctatus*.

7. *Dolicholus minimus* (L.) Medic. Vorles. Churpf. Phys. Ges. 2: 354. 1787.

Dolichos minimus L. Sp. Pl. 726. 1753.

Rhynchosia minima DC. Prodr. 2: 385. 1825.

Rhynchosia mexicana Hook. & Arn. Bot. Beechey Voy. 287. 1836-39.

Baja California and Sonora to Zacatecas, Yucatán, and Chiapas. Widely distributed in the tropics of both hemispheres.

Slender vine, herbaceous or suffrutescent; flowers small, yellow, often striped with red outside; seeds dark brown or black. "Frijolillo" (Cuba).

This has been reported from Yucatán as *Galactia multiflora* Robinson.

8. *Dolicholus phaseoloides* (Swartz) Kuntze, Rev. Gen. Pl. 3²: 62. 1898.

Glycine phaseoloides Swartz, Prodr. Fl. Ind. Occ. 105. 1788.

Glycine precatoria Willd. Enum. Pl. 2: 755. 1809.

Rhynchosia phaseoloides DC. Prodr. 2: 385. 1825.

Rhynchosia precatoria DC. Prodr. 2: 385. 1825.

Rhynchosia erythrinoides Schlecht. & Cham. Linnaea 5: 587. 1830.

Dolicholus vailiae Rose, Contr. U. S. Nat. Herb. 10: 101. 1906.

Sonora to San Luis Potosí, Veracruz, and Oaxaca. Widely distributed in tropical America.

Plants scandent, herbaceous or suffrutescent; flowers small, yellow, striped with brown; seeds particolored, half black and half scarlet. "Frijolillo" (Veracruz); "peonía" (Jalisco, San Luis Potosí); "negritos" (San Luis Potosí, Guerrero, Jalisco); "atecuixtli" (Nahuatl, "crab-eyes"); "colorín chiquito" (Guerrero, Morelos, Durango, Oaxaca); "ojo de cangrejo" (Guerrero, Morelos, etc.); "pulguitas" (Guerrero, Oaxaca); "ojo de zanate" (Sinaloa); "frijol

de chintlatahua" (Oaxaca, *Reko*); "colorincito," "ojo de chanata" (Durango, *Patoni*); "ojitos de picho" (Tabasco, *Rovirosa*); "senecuilche," "xenecuilche," "pipilzintli" (*Nueva Farmacopea Mexicana*); "purensapichu" (Michoacán, Tarascan, *León*); "peronilla" (Colombia); "bejuco de paloma," "peronías" (Porto Rico); "fruta de pitillo" (Guatemala, Honduras, *Blake*).

The handsome seeds are sometimes used as beads. The seeds are believed popularly to be poisonous and to cause a kind of insanity.

42. *ERYTHRINA* L. Sp. Pl. 706. 1753.

REFERENCE: Standley, The Mexican and Central American species of *Erythrina*, Contr. U. S. Nat. Herb. 20: 175-182. 1919.

Trees or shrubs, rarely herbs, usually with spiny branches; leaves pinnately 3-foliolate; flowers in axillary or terminal racemes, showy, red or reddish; standard petal large or elongate, the other petals small, the wings sometimes wanting; fruit stipitate, linear, bivalvate.

The species are very common in many parts of Mexico, and their properties are well known there, but in literature there has been great confusion concerning the specific names. The larger forms are often planted as hedges because of their showy flowers and well-armed branches. Most of the species, unfortunately, flower when devoid of leaves. The plants were used for hedges by the early inhabitants of Mexico, and they are sometimes planted now for coffee shade. Branches take root readily when placed in the ground. The wood is very soft and light and is used for corks, for carving small figures and images, and for various other purposes. The bark is said to yield a yellow dye. The succulent flowers are often cooked and eaten as a vegetable or prepared as a salad.

The handsome seeds, usually of various shades of red, are strung as necklaces, and also used by children in games. They were employed by the early Mexicans in a game, somewhat like dice, known as "patol." It is of interest to find that this name is now employed by the Hopi and other Pueblo Indians for a stick-dice game.

The seeds of one of the Mexican species have been studied by Altamirano, who found in them erythroidine, a powerful paralyzant of the motor system, erythroresin, an emetic, coralin, and erythric acid. The extract has been suggested as a substitute for curare. The poisonous properties of the seeds are well known in Mexico, and they are used to destroy noxious animals. They have been employed also as a hypnotic agent. Species of *Erythrina* growing in other regions are known to have poisonous seeds, as in the case of the Javan *E. lithosperma* Blume, from whose seeds a tetanizing alkaloid, hypaphorine, has been extracted.

The bark and stems have similar poisonous properties, and they are employed in tropical America to stupefy fish. From the bark an alkaloid, erythrine, has been extracted, which has a powerful effect on the nervous system. In Brazil the bark is employed in small doses as a hypnotic, purgative, and diuretic. The roots are used in Mexico for their supposed sudorific properties. The leaves are reputed emmenagogue, and a decoction of the flowers is used in treating chest affections. The juice of the stems is applied to scorpion stings.

A large number of vernacular names are reported from Mexico, but in most cases the specific application is doubtful. The usual names for the seeds are "colorín" and "patol" (from the Nahuatl, *patolli*); for the flowers "pitos." The following names are listed in literature: "Zompantli," "zompante," "zompantle," "zumpantle," "tzompantli," "tzompantle" (from the Nahuatl *tzon-pantli*, "hair-banner"; also *tzon-pan-cuahuitl*, "hair-banner-tree");

"cozquelite" (*Reko*); "purenchequa," "pureque" (Michoacán, Tarascan); "tzinacnquahuitl"; "chijol" (from the Nahuatl *chi-xo-lli*, "swollen-pod," *Reko*); "chocolín" (seeds); "pichoco"; "jiquimite," "iquimite"; "peonfa" (Jalisco, Chihuahua); "chilicote" (Chihuahua); "chottza," "demthy" (Otomí, *Buelna*).

One species of doubtful determination is figured, without description, by Hernández¹ under the name "macayxtli."

Standard petals very broad, oval. Calyx bilobate; seeds brown.

1. *E. breviflora*.

Standard narrow, linear or linear-oblong.

Fruit and ovary aculeate.

Calyx dentate-----2. *E. setosa*.

Calyx cleft on one side at the apex, not dentate-----3. *E. leptorhiza*.

Fruit and ovary not aculeate.

Calyx cleft on one side at the apex, or conspicuously bilobate.

Calyx cleft on one side at the apex-----4. *E. rubrinervia*.

Calyx bilobate-----5. *E. montana*.

Calyx truncate.

Standard densely lanate or tomentulose.

Seeds about 8 mm. long; standard 7 cm. long; fruit deeply constricted between the seeds-----6. *E. lanata*.

Seeds about 12 mm. long; standard 5 to 5.5 cm. long; fruit shallowly constricted between the seeds-----7. *E. occidentalis*.

Standard glabrous or nearly so.

Leaflets, at least the terminal ones, conspicuously sinuate-lobate.

8. *E. herbacea*.

Leaflets never lobate.

Seeds about 15 mm. long; leaflets usually rounded or very obtuse at apex-----9. *E. flabelliformis*.

Seeds about 10 mm. long; leaflets usually acute or acuminate at apex.

Standard 8 cm. long; fruit deeply constricted between the seeds; leaflets aculeate beneath-----10. *E. goldmanii*.

Standard 6.5 cm. long or shorter; fruit only slightly constricted between the seeds; leaflets not aculeate----11. *E. americana*.

1. *Erythrina breviflora* DC. Prodr. 2: 413. 1825.

Erythrina latiflora Sessé & Moc. Pl. Nov. Hisp. 55. 1887.

Erythrina petraea T. S. Brandeg. Zoe 5: 247. 1908.

Jalisco to Morelos and Puebla; type from Ayacapixtla.

Shrub, 3 to 5 meters high, usually with spiny stems; leaflets 8 to 19 cm. long, broadly rhombic, pubescent beneath and often aculeolate along the veins, short-pointed; racemes short, rather few-flowered; banner about 3 cm. long; seeds brown, about 17 mm. long.

Specimens from San Luis Tultitlanapa, Puebla, are remarkable in having leaflets only 2 to 3.5 cm. long, but the material appears to be properly referable to this species. The shrub flowers when in full leaf.

2. *Erythrina setosa* Mart. & Gal. Bull. Acad. Brux. 10³: 194. 1843.

Mountains of Oaxaca and perhaps elsewhere; type from Regla and the eastern cordillera of Oaxaca.

Stems probably always herbaceous, about 60 cm. high, prickly, nearly glabrous; leaflets 6 to 12 cm. long, acute or acutish, glabrous or nearly so, aculeolate

¹ Thesaurus 382. 1651.

beneath along the veins; racemes short and dense, on very long peduncles; banner 4.5 to 6 cm. long, glabrous.

Erythrina horrida DC.¹ is probably the older name for the species. It was based upon one of Sessé and Mocino's plates which, however, is too poor for certain identification. It is possible that *E. horrida* is rather to be referred to *E. leptorhiza*.

3. *Erythrina leptorhiza* DC. Prodr. 2: 413. 1825.

Michoacán to Hidalgo and Mexico.

Stems probably always herbaceous, 30 to 60 cm. high, usually prickly; leaflets 4 to 13 cm. long, acute or obtuse, puberulent or glabrate, often aculeolate beneath along the veins, the venation usually prominent and reticulate; banner 7 to 8 cm. long; fruit 2 to 4-seeded, slightly constricted between the seeds, densely aculeate; seeds nearly black, about 1.5 cm. long. "Patol," "colorín negro" (Michoacán); "cochizquilitl" (*Urbina*).

The roots are thick and fleshy or somewhat woody. The name *Erythrina leptocalyx* Rose was applied to specimens of this species, and has appeared in print, but it has never been properly published.

4. *Erythrina rubrinervia* H. B. K. Nov. Gen. & Sp. 6: 434. 1823.

Oaxaca, Chiapas, and Veracruz. Guatemala to Colombia; Cuba; type from Fusagasugá, Colombia.

Shrub or tree, 2.5 to 9 meters high, with broad crown, the branches spiny or unarmed; leaflets 6 to 18 cm. long, usually acute or acuminate, glabrous or nearly so, paler beneath; banner 7 to 8.5 cm. long; fruit strongly constricted between the seeds; seeds 8 to 10 mm. long, scarlet. "Pito" (Guatemala).

5. *Erythrina montana* Rose & Standl. Contr. U. S. Nat. Herb. 20: 179. 1919.

Durango to Jalisco; type from the Sierra Madre near Santa Teresa, Tepic.

Stems probably always herbaceous, 60 cm. high, unarmed; leaflets 4 to 13 cm. long, rounded to acute at apex, glabrous or nearly so, conspicuously reticulate-veined, usually minutely aculeolate beneath along the veins; standard 5 to 7 cm. long, glabrous; fruit 1 to 4-seeded, slightly constricted between the seeds.

The flowers seem to vary considerably in color, being purplish green, or amber-colored tinted with salmon.

6. *Erythrina lanata* Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 81. f. 1. 1899.

Guerrero and Oaxaca; type from Acapulco, Guerrero.

Shrub with spiny branches; leaflets 4 to 7 cm. long or larger, pointed, glabrous or nearly so, paler beneath; seeds scarlet, 7 to 8 mm. long.

7. *Erythrina occidentalis* Standl. Contr. U. S. Nat. Herb. 20: 180. 1919.

Sinaloa and Tepic; type from Mazatlán, Sinaloa.

Shrub or small tree, often 5 to 6 meters high, with gray spiny branches, leafless at anthesis; leaflets 5 to 17 cm. long, acute or acutish, tomentulose beneath when young but soon glabrate; racemes dense, elongate; flowers rose or red; fruit 5 to 10-seeded; seeds scarlet, about 12 mm. long. "Colorín" (Sinaloa).

The wood is used to some extent, and is said to be durable in dry places. Bottle stoppers are often made from it.

8. *Erythrina herbacea* L. Sp. Pl. 706. 1753.

Tamaulipas and San Luis Potosí. Southeastern United States.

Shrub or small tree, 1 to 3 meters high or larger, with few stiff branches, the trunk very spiny; leaflets 4 to 8 cm. long, usually acute or acutish, glabrous or nearly so, usually somewhat 3-lobed; banner 5 to 5.5 cm. long, red or reddish;

¹ Prodr. 2: 413. 1825.

seeds 5 to 10, scarlet, about 1 cm. long. "Colorín," "patol colorín" (Tamaulipas); "patol" (San Luis Potosí).

In San Luis Potosí the seeds are used to poison rats and dogs. The soft wood is employed for making figures of saints, etc. In Mexico this species is apparently always a shrub or tree, but in Florida it is often herbaceous and sometimes a scandent shrub.

9. *Erythrina flabelliformis* Kearney, Trans. N. Y. Acad. 14: 32. 1894.

Erythrina purpusi T. S. Brandeg. Zoe 5: 158. 1903.

Baja California to Sonora, San Luis Potosí, and Morelos. Southern Arizona (type from Fort Huachuca) and New Mexico.

Shrub or small tree with spiny branches; leaflets 4 to 8 cm. long, rarely acute, usually broader than long, tomentulose beneath at first but soon glabrate; racemes usually dense and many-flowered; banner red, 4 to 6 cm. long; fruit sometimes 30 cm. long, with 2 to many seeds, rather shallowly constricted between the seeds; seeds usually dark red. "Colorín," "chilicote" (Durango); "coralina" (Baja California).

This is no doubt one of the species to which the name *E. coralloides* has been frequently applied. Brandegee¹ states that in Baja California the boys play with the large red seeds, for which they employ the name "chilacayote," a name used also for the seeds of species of *Marah* or *Megarrhiza*, of the family Cucurbitaceae. Palmer reports that in Durango the seeds are used as a remedy for toothache, and the wood for carving figures of saints, etc.

10. *Erythrina goldmanii* Standl. Contr. U. S. Nat. Herb. 20: 181. 1919.

Chiapas; type from San Vicente.

Branches spiny; leaflets 4 to 9 cm. long, pilose when young but soon glabrate, armed beneath with a few recurved prickles; fruit several-seeded; seeds about 1 cm. long, scarlet.

11. *Erythrina americana* Mill. Gard. Dict. ed. 8. *Erythrina* no. 5. 1768.

Erythrina carnea Ait. Hort. Kew. 3: 8. 1789.

Mexico and Veracruz to Chiapas and Yucatán; type from Veracruz.

Shrub or tree, sometimes 9 meters high, with spiny branches; leaflets 7 to 22 cm. long, glabrous or nearly so; flowers red; fruit few or many-seeded; seeds 10 to 12 mm. long, usually scarlet. "Colorín" (Puebla); "chacmolché" (Yucatán, Maya); "pito" (Veracruz).

This is probably the species for which the names "chontal," "madre chontal," "madre cacao," and "madre brava" are used in Tabasco. It is probable also that *E. coralloides* DC.² is a synonym of this species, although possibly that is rather the proper name for *E. flabelliformis*. De Candolle's name was based upon one of Sessé and Mociño's drawings, but the tracing of the latter seen by the writer is too imperfect for definite identification. *E. americana* has been reported from Mexico as *E. corallodendron* L., a West Indian species with red and black seeds which is not known to occur in Mexico.

DOUBTFUL SPECIES.

ERYTHRINA DIVARICATA DC. Prodr. 2: 414. 1825. Based upon one of Sessé and Mociño's plates, which is said to represent a Mexican plant.

ERYTHRINA LONGIPES DC. Prod. 2: 413. 1825. This also was based upon a plate of Sessé and Mociño.

¹ T. S. Brandegee, Flora of the Cape Region of Baja California, Proc. Calif. Acad. II. 3: 108-227. 1891.

² Prodr. 2: 413. 1825.

ERYTHRINA PRINCEPS Dietr. in Otto & Dietr. Allg. Gartenz. 2: 305. 1834. Described from Mexico. Not identifiable from the description.

ERYTHRINA ROSEA Dietr. in Otto & Dietr. Allg. Gartenz. 2: 253. 1834. Described from Mexico. Identity doubtful.

43. GALACTIA Adans. Fam. Pl. 2: 322. 1763.

Scandent or erect herbs or shrubs; leaves pinnately 3 or 5-foliolate, the leaflets large or small; flowers small or large, usually racemose; fruit linear, bivalvate.

Leaflets 4 to 9 cm. wide. Plants scandent-----1. *G. viridiflora*.
Leaflets less than 3.5 cm. wide.

Flowers in axillary clusters-----2. *G. brachystachya*.
Flowers racemose.

Racemes stout, dense, sessile, mostly shorter than the leaves.

3. *G. multiflora*.

Racemes slender, interrupted, pedunculate, mostly longer than the leaves.

Plants erect; leaflets acute or acuminate-----4. *G. incana*.

Plants scandent or trailing; leaflets often obtuse.

Leaflets glabrous on the upper surface-----5. *G. acapulcensis*.

Leaflets variously pubescent on the upper surface.

Leaflets bright green on the upper surface, not closely sericeous on either surface-----6. *G. striata*.

Leaflets grayish, closely sericeous on both surfaces.

Leaflets white beneath with a soft silky pubescence, oval or ovate.

7. *G. argentea*.

Leaflets grayish beneath with rather stiff pubescence, usually oblong-----8. *G. wrightii*.

1. *Galactia viridiflora* (Rose) Standl.

Odonia viridiflora Rose, Contr. U. S. Nat. Herb. 10: 103. pl. 33. 1906.

Guerrero to Morelos; type from Iguala, Guerrero.

Scandent shrub; leaflets about as broad as long, pubescent; flowers greenish white, 1.2 cm. long, in very long racemes.

2. *Galactia brachystachya* Benth. Ann. Wien. Mus. Naturg. 2: 127. 1838.

Coahuila to Guerrero and Oaxaca; type from Zimapán, Hidalgo.

Slender scandent shrub; leaflets oblong or oval, 1 to 4 cm. long; flowers purplish, 1 cm. long; fruit about 2 cm. long and 6 mm. wide.

3. *Galactia multiflora* Robinson, Proc. Amer. Acad. 29: 315. 1894.

Jalisco to Oaxaca; type from Tequila, Jalisco.

Erect or scandent shrub, sometimes 1.5 meters high; leaflets oblong to orbicular, 2 to 5 cm. long; flowers purplish, about 1.2 cm. long; fruit 3 to 4 cm. long, 5 to 6 mm. wide.

4. *Galactia incana* (Rose) Standl.

Odonia incana Rose, Contr. U. S. Nat. Herb. 10: 102. pl. 32. 1906.

Sinaloa and Tepic; type collected between Aguacate and Dolores, Tepic.

Leaflets ovate or oblong, 3.5 to 7 cm. long; racemes often 25 cm. long.

5. *Galactia acapulcensis* Rose, Contr. U. S. Nat. Herb. 5: 137. 1897.

Baja California, Guerrero, and Morelos; type from Acapulco, Guerrero.

Leaflets oblong or oval, 3 to 7 cm. long, thin; flowers 1 cm. long.

Perhaps not distinct from *G. striata*.

6. *Galactia striata* (Jacq.) Urban, Symb. Antill. 2: 320. 1900.

Glycine striata Jacq. Hort. Vindob. 1: 32. pl. 76. 1770.

Galactia brevistyla Schlecht. Linnaea 12: 288. 1838.

Odonia retusa Rose, Contr. U. S. Nat. Herb. 10: 102. 1906.

Chihuahua to Jalisco, Chiapas, and Yucatán. Widely distributed in tropical America.

Plants slender, scandent, sometimes to a height of 3 meters, herbaceous or suffrutescent; flowers small, purple.

This has been reported from Mexico as *G. tenuiflora* Willd.

7. *Galactia argentea* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 181. 1915.

Known only from the type locality, Cerro de Picacho, Oaxaca.

Scandent shrub, densely silvery-sericeous throughout; leaflets oval or oblong, 2 to 4 cm. long; flowers purple.

8. *Galactia wrightii* A. Gray, Pl. Wright. 1: 44. 1852.

Galactia tephrodes A. Gray, Pl. Wright. 2: 34. 1853.

Chihuahua and Sonora. Western Texas (type locality) to southern Arizona.

Plants slender, scandent, sericeous; leaflets oblong or elliptic, 2 to 5 cm. long; fruit about 4.5 cm. long, 4 to 5 mm. wide, pubescent.

44. CAJANUS DC. Cat. Hort. Monsp. 85. 1813.

1. *Cajanus indicus* Spreng. Syst. Veg. 3: 248. 1826.

Cytisus cajan L. Sp. Pl. 739. 1753.

Cajanus cajan Millsp. Field Mus. Bot. 2: 53. 1900.

Cultivated in Mexico and sometimes escaping. Native country not certainly known, but perhaps tropical Asia; widely cultivated and naturalized in tropical regions.

Erect shrub or herb, 1 to 3 meters high; leaves pinnately 3-foliate, the leaflets ovate or oblong, 3 to 8 cm. long, acute, puberulent and gland-dotted beneath; flowers large, yellow, often striped or spotted with red, in short racemes; fruit oblong-linear, bivalvate, pilose; seeds small, gray or brownish. "Frijol de palo" (Nicaragua, Panama, Costa Rica); "frijolillo" (Costa Rica); "garbanzo falso" (Nicaragua); "guandú" (Costa Rica, Porto Rico); "gandul," "gandures" (Porto Rico); "timolillo," "quinbolillo" (Costa Rica); "chicharros," "quinconcho" (Venezuela); "frijol guandus" (Colombia).

The English name "pigeon-pea" is said to have been given because pigeons are fond of the seeds. The plant is extensively cultivated in some tropical regions for its edible seeds, and in India it is said to hold third rank among the leguminous plants cultivated for food. The seeds are eaten either ripe or green. When cultivated the plant is usually treated as an annual, but if not cut it becomes a truly woody shrub. It is often grown for forage, and in Madagascar the leaves have been utilized as food for silkworms. In Bengal the plant has been grown as a host plant for lac insects. The stems are used in Asia for roofs and baskets, and they have been burnt into charcoal for gunpowder. Diuretic, astringent, antidysenteric, deterrent, laxative, and vulnerary properties are ascribed to the plant. With regard to the flowers there are two chief varieties, one with yellow petals, the other with the standard purplish outside.

45. MUCUNA Adans. Fam. Pl. 2: 325. 1763.

Scandent herbs or shrubs; leaves pinnate, 3-foliate; flowers large, fasciculate or racemose; fruit thick and hard, usually covered with stinging hairs.

Some species of the genus are grown extensively as forage plants.

Fruit with transverse crests.....1. *M. sloanei*.

Fruit without transverse crests.

Fruit 4.5 to 5 cm. wide, flat; leaflets densely lustrous-sericeous beneath.

2. *M. argyrophylla*.

Fruit less than 2 cm. wide, very thick; leaflets sparsely sericeous beneath.

3. *M. pruriens*.

1. *Mucuna sloanei* Fawe. & Rendle, Journ. Bot. Brit. & For. 55: 36. 1917.

Michoacán and Guerrero to Veracruz and Oaxaca. Tropical America and western Africa.

Scandent shrub or herb; leaflets about 9 cm. long, silvery-sericeous beneath; flowers large, yellow; fruit 4 to 5 cm. wide, densely covered with bristly hairs; seeds subglobose, dark brownish gray, 2.5 cm. in diameter. "Pica-pica" (Oaxaca, Veracruz); "ojo de venado" (Guerrero, Veracruz, Oaxaca, Panama); "ojo de borrico" (Veracruz); "ojo de buey" (Oaxaca, Porto Rico); "matos del monte," "matos" (Porto Rico).

The seeds were eaten by the Caribs of the West Indies, and were formerly used in Jamaica for the manufacture of buttons and snuff-boxes. In Mexico they are sometimes worn as amulets. They are said also to be purgative and diuretic. The leaves are reported to yield a black dye. The hairs of the pods cause intense irritation when in contact with the skin. Formerly these hairs, like those of *M. pruriens*, mixed with molasses, formed a mixture of wide usage, administered internally, for the destruction of intestinal parasites in man. The hairs are softened by soaking in molasses, and are said to have no injurious effect upon the lining of the alimentary canal.

This is probably the plant reported from Mexico by Sessé and Mocino¹ as *Dolichos altissimus*.

2. *Mucuna argyrophylla* Standl., sp. nov.

Chiapas and Oaxaca; type from Ocuilapa, Chiapas (Nelson 3060; U. S. Nat. Herb. no. 234283).

Young branches densely appressed-pilose; petioles slender, 6.5 to 10 cm. long, the petiolules 5 to 8 mm. long; leaflets 8.5 to 16 cm. long, 5.5 to 10 cm. wide, abruptly short-acuminate at apex, the terminal one broadly elliptic-oval or rounded-oval, rounded at the base, the lateral ones usually smaller, oblique, very unequal at base, the leaflets thin, hispidulous on the upper surface, beneath densely silvery-sericeous with lustrous hairs; peduncles often 50 cm. long or longer, slender, the racemes dense, 2.5 to 6.5 cm. long, the pedicels recurved, 4 to 5 cm. long; calyx about 12 mm. long and broad, densely sericeous, the teeth very short, obtuse; standard petal 2 cm. wide (when flattened out), the blade 2 cm. long, the claw 5 mm. long; wings about as long as the standard, 7 to 8 mm. wide; keel 4.5 cm. long, about 1 cm. wide, rounded at apex; fruit about 20 cm. long and 4.5 cm. wide, 2 to 4-seeded, densely hispid with short brown hairs, sessile, the valves thin, smooth.

3. *Mucuna pruriens* (L.) DC. Prodr. 2: 405. 1825.

Dolichos pruriens L. Syst. Nat. ed. 10. 2: 1162. 1750.

Veracruz. Widely distributed in the tropics of both hemispheres.

Scandent or procumbent shrub or herb; flowers dark purple, in pendent racemes; fruit 7 to 10 cm. long, very densely covered with stinging hairs; seeds small, blackish brown. "Pica-pica" (Veracruz, Costa Rica, Cuba); "guzano de pica-pica" (Nicaragua).

The English names are "cowage" and "cowitch." In India the powdered seeds are said to be used as an aphrodisiac, and the green seeds are cooked and eaten. The seeds are said to be used sometimes as a substitute for coffee.

46. *BRADBURYA* Raf. Fl. Ludov. 104. 1817.

Plants scandent, herbaceous or suffrutescent; leaves pinnate, 3-foliolate, or sometimes unifoliate; flowers large, showy, the axillary peduncles with one or more flowers; fruit linear, bivalvate.

One or two herbaceous species also occur in Mexico.

¹ Pl. Nov. Hisp. 117. 1887.

- Leaves unifoliate, the leaflets hastate.....1. *B. sagittata*.
 Leaves 3-foliate.
 Leaflets hastate.....2. *B. schottii*.
 Leaflets not hastate.
 Fruit 8 to 10 mm. wide; upper calyx lobes nearly obsolete...3. *B. plumieri*.
 Fruit 4 to 6 mm. wide; upper calyx lobes equaling or longer than the tube.
 Upper calyx lobes about as long as the tube; bracts densely sericeous.
 4. *B. pubescens*.
 Upper calyx lobes much longer than the tube; bracts puberulent.
 5. *B. virginiana*.
1. *Bradburya sagittata* (Humb. & Bonpl.) Rose, Contr. U. S. Nat. Herb. 8: 46. 1903.
Glycine sagittata Humb. & Bonpl.; Willd. Enum. Pl. 757. 1809.
Centrosema hastatum Benth. Ann. Wien. Mus. Naturg. 2: 120. 1838.
Centrosema dubium Hemsl. Biol. Centr. Amer. Bot. 1: 294. 1880.
 Veracruz to Colima and Oaxaca. Costa Rica; Colombia (type locality).
 Plants herbaceous or suffrutescent; leaflets 6 to 11 cm. long, acuminate, glabrate; petiole winged; flowers about 4.5 cm. long; fruit 8 to 14 cm. long, 6 to 8 mm. wide, with a long slender beak.
2. *Bradburya schottii* Millsp. Field Mus. Bot. 1: 364. 1898.
Centrosema schottii K. Schum. in Just's Bot. Jahresb. 26¹: 353. 1900.
 Yucatán; type from Nohpat.
 Plants scandent to a height of 3 meters; flowers 3.5 cm. long; fruit 12.5 to 15 cm. long, 6 mm. wide.
3. *Bradburya plumieri* (Turp.) Kuntze, Rev. Gen. Pl. 1: 164. 1891.
Clitoria plumieri Turp.; Pers. Syn. Pl. 2: 303. 1807.
Centrosema plumieri Benth. Ann. Wien. Mus. Naturg. 2: 118. 1838.
 Guerrero to Veracruz, Yucatán, and Chiapas. Widely distributed in tropical America.
 Scandent shrub or herb; leaflets suborbicular to oval-oblong, 3.5 to 10 cm. long, apiculate or short-acuminate; flowers 4.5 to 5 cm. long, dark purple to pinkish white; fruit 10 to 18 cm. long. "Frijolillo," "patitos" (Tabasco); "mariposa" (Campeche).
4. *Bradburya pubescens* (Benth.) Kuntze, Rev. Gen. Pl. 1: 164. 1891.
Centrosema pubescens Benth. Ann. Wien. Mus. Naturg. 2: 119. 1838.
Clitoria schiedeana Schlecht. Linnaea 12: 284. 1838.
 ? *Clitoria grandiflora* Mart. & Gal. Bull. Acad. Brux 10²: 189. 1843.
Bradburya schiedeana Rose, Contr. U. S. Nat. Herb. 8: 46. 1903.
 Guerrero to San Luis Potosí, Veracruz, and Chiapas. Widely distributed in tropical America.
 Plants scandent, herbaceous or suffrutescent; leaflets elliptic or ovate, 4 to 10 cm. long, pubescent, short-acuminate; flowers 3 to 4 cm. long, yellowish or purple; fruit about 15 cm. long. "Flor de pito" (Porto Rico).
5. *Bradburya virginiana* (L.) Kuntze, Rev. Gen. Pl. 1: 164. 1891.
Clitoria virginiana L. Sp. Pl. 753. 1753.
Centrosema virginiana Benth. Ann. Wien. Mus. Naturg. 2: 120. 1838.
 Tamaulipas to Yucatán, Chiapas, and Oaxaca. Widely distributed in tropical America; southern United States; western Africa.
 Plants usually herbaceous but sometimes scandent to a height of 6 meters; leaflets ovate or oblong, 3 to 7.5 cm. long, bright green, acute; flowers 2 cm. long, blue or purplish; fruit 10 to 15 cm. long. "Sonajera azul," "hierba de bulla," "chochito," "erica de negra" (Porto Rico).

Various medicinal uses are reported from Porto Rico for the plant. Grosourdy states that the flowers yield a blue dye.

47. CALOPOGONIUM Desv. Ann. Sci. Nat. 9: 423. 1826.

Another species, *C. galactoides* Benth., a herbaceous plant, also occurs in Mexico.

1. Calopogonium caeruleum (Benth.) Hemsl. Biol. Centr. Amer. Bot. 1: 301. 1880.

Stenolobium caeruleum Benth. Ann. Wien. Mus. Naturg. 2: 125. 1838.

Tepic to Veracruz and Chiapas. Central America, West Indies, and South America; type from Brazil.

Scandent or trailing shrub or herb; leaves pinately 3-foliolate, the leaflets rhombic, obtuse or acute; flowers small, violet, in long spikelike racemes; fruit flattened, 5 to 7 cm. long, 8 mm. wide.

48. ANDIRA Lam. Encyl. 1: 171. 1783.

Unarmed trees; leaves pinnate, the leaflets large or of medium size; flowers pink or violet, paniculate; fruit drupaceous, ovoid or obovoid, indehiscent.

The seeds of some South American species have anthelmintic properties.

Leaflets glabrous beneath, acute or abruptly acuminate; flowers about 1 cm. long-----

1. A. jamaicensis.

Leaflets densely tomentose beneath, rounded or very obtuse at the apex; flowers about 1.8 cm. long-----

2. A. galeottiana.

1. Andira jamaicensis (W. Wright) Urban, Symb. Antill. 4: 298. 1905.

Geoffraea jamaicensis W. Wright, Phil. Trans. Lond. 67: 512. 1777.

Geoffraea inermis Swartz, Prodr. Veg. Ind. Occ. 106. 1788.

Andira excelsa H. B. K. Nov. Gen. & Sp. 6: 385. 1823.

Andira inermis H. B. K. Nov. Gen. & Sp. 6: 385. 1823.

Michoacán to Chiapas; reported from Tabasco and Yucatán. West Indies, Central America, South America, and western Africa; type from Jamaica.

Tree, sometimes 30 meters high; leaflets usually 9 or 11, oblong or ovate, large, acuminate; flowers small, paniculate, purple or reddish violet, sometimes pink; fruit rounded, oval, or obovate, 2.5 to 4 cm. long or larger. "Cuillmbuca" (Mochoacán, Guerrero); "yabo," "yaba" (Yucatán, Cuba); "maca colorada," "pacay," "macallo," "moca" (Tabasco); "macayo" (Tabasco, Oaxaca); "pilón" (Guiana); "moca," "moca blanca" (Porto Rico); "guacamayo" (Guatemala, Honduras, Blake).

Wood hard and durable, varying from yellowish to dark brown or even black, susceptible of a high polish, the specific gravity reported as 0.748 and 0.880. In Tabasco it is valued for construction purposes. The tree has a disagreeable odor. In Porto Rico it is sometimes planted for coffee shade. The bark and seeds are used as a purgative, vermifuge, febrifuge, or anthelmintic, but large doses are said to be dangerous, producing delirium or even death. The seeds are said to contain a poisonous alkaloid.

2. Andira galeottiana Standl. Contr. U. S. Nat. Herb. 20: 217. 1919.

Veracruz and Puebla; type from Catemaco, Veracruz.

Leaflets 5 to 13, oblong to obovate-oblong, 3 to 13 cm. long, glabrate on the upper surface; racemes dense, 6 to 9 cm. long, forming a large panicle; ovary glabrous. "Macayo" (Puebla).

49. AMERIMNON Jacq. Enum. Pl. Carib. 27. 1760.

Trees or shrubs, unarmed, often scandent; leaves pinnate, with numerous leaflets, rarely unifoliolate; flowers small, usually paniculate; fruit oblong or linear, flat, thin, indehiscent, 1 or few-seeded.

Some of the Asiatic and South American species yield part of the rosewood of commerce.

Leaflet 1-----1. *A. brownii*.
Leaflets 5 or more.

Leaflets glabrous beneath-----2. *A. granadillo*.
Leaflets thinly sericeous beneath.

Leaflets 1.5 to 3 cm. long-----3. *A. glabrum*.

Leaflets 3.5 to 5 cm. long-----4. *A. glomeratum*.

1. *Amerimnon brownii* Jacq. Enum. Pl. Carib. 27. 1760.

Dalbergia amerimnum Benth. Journ. Linn. Soc. Bot. 4: Suppl. 36. 1860.

Dalbergia brownii Urban, Symb. Antill. 4: 295. 1905.

Tamaulipas, Veracruz, and Oaxaca. Central America, West Indies, and South America.

Shrub, 3 to 4.5 meters high, often with long reclining branches; leaves ovate or oval, 3.5 to 7 cm. long, obtuse or acute, lustrous, glabrous; flowers white, in dense clusters. "Péndola" (Cuba).

2. *Amerimnon granadillo* Standl., sp. nov.

Oaxaca to Michoacán; type from El Tibor, Michoacán or Guerrero, altitude 100 meters (*Langlassé* 294; U. S. Nat. Herb. no. 385583).

Tree, the branchlets slender, glabrous; leaves glabrous, the rachis 9.5 to 18 cm. long, slender, glaucescent, the petiolules 2.5 to 3 mm. long; leaflets 7 to 11, elliptic-oval or ovate-oval, 3 to 7 cm. long, 1.7 to 4 cm. wide, rounded at base, obtuse or rounded-obtuse at apex, sometimes with a somewhat abrupt obtuse tip, thin, bright green and lustrous on the upper surface, paler beneath, the venation prominent and reticulate on both surfaces; cymes lax, few-flowered, the pedicels in fruit 4 to 5 mm. long, very stout; calyx persistent in fruit, thinly sericeous with short brown hairs, the lobes obtuse; fruit very flat and thin, 1 to 3-seeded, 8 to 15 cm. long, 1.7 to 2 cm. wide, sometimes slightly constricted in the middle, acuminate at apex, attenuate at base, lustrous, glabrous, reticulate-veined, the slender stipe 10 to 12 mm. long.

Collected also at Apango (Cerro Huatulco), Oaxaca, altitude 400 meters, October 10, 1917, by B. P. Reko (no. 3517).

Related to *Dalbergia retusa* Hemsl., a species of Panama, which is distinguished by the sericeous lower surface of the leaflets and broader, shorter fruit.

Amerimnon granadillo is a well-known forest tree of the west coast of Mexico, and there are several references to it in literature under the vernacular name of "granadillo." It is highly valued for use in cabinet work. A specimen of the wood has been forwarded by Dr. Reko. It is very heavy and hard, of a beautiful purple color, with broad stripes of purplish black; it takes a fine polish.

3. *Amerimnon glabrum* (Mill.) Standl.

Robinia glabra Mill. Gard. Dict. ed. 8. *Robinia* no. 5. 1768.

Dalbergia campeachiana Benth. Journ. Linn. Soc. Bot. 4: Suppl. 37. 1860.

Amerimnon campeachianum Kuntze, Rev. Gen. Pl. 1: 159. 1891.

Dalbergia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 501. 1919.

Veracruz, Morelos, and Oaxaca to Yucatán; type from Campeche.

Scandent shrub; leaflets about 9, oval, rounded at the apex, paler beneath; flowers small, white, in loose clusters; fruit 4 to 6 cm. long, 1 to 1.5 cm. wide, thin. "Cibix" (Yucatán, Maya); "bejuco de panune," "bejuco de estribo" (Oaxaca).

4. *Amerimnon glomeratum* (Hemsl.) Standl.

Dalbergia glomerata Hemsl. Diag. Pl. Mex. 8. 1878.

Known only from the type locality, Sierra Zongolica, Veracruz.

Leaflets 11 or 13, ovate-oblong, obtuse; flowers smaller than those of the last species, in dense cymes.

50. **PTEROCARPUS** L. Sp. Pl. ed. 2. 1662. 1763.

Unarmed trees; leaves pinnate, with few large leaflets; flowers large, racemose or paniculate; fruit short and broad, compressed, 1 or 2-seeded, indehiscent.

Some of the Asiatic species yield gums which are used medicinally for diarrhoea, and also for dyeing and tanning. Others yield valuable woods.

Fruit sessile or nearly so, densely cinereo-puberulent; calyx densely puberulent, the lobes acute-----1. *P. orbiculatus*.

Fruit long stipitate; calyx lobes very obtuse.

Calyx densely pubescent; leaflets acutish or obtuse at apex.

2. *P. acapulcensis*.

Calyx glabrate; leaflets cuspidate-acuminate-----3. *P. officinalis*.

1. *Pterocarpus orbiculatus* DC. Prodr. 2: 418. 1825.

Amphymenium pubescens H. B. K. Nov. Gen. & Sp. 6: 380. 1823.

Pterocarpus amphymenium DC. Prodr. 2: 418. 1825.

Pterocarpus pubescens Spreng. Syst. Veg. 4: Cur. Post. 268. 1827. Not *P. pubescens* Poir. 1804.

Pterocarpus aphyllus Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 266. pl. 16. 1903.

Guerrero, Michoacán, Oaxaca, and Veracruz.

Tree, 6 to 8 meters high, with white bark; leaflets 3 to 7, large, variable in shape, nearly glabrous; flowers yellow, rather large, racemose; fruit sub-orbicular, 4 to 5 cm. broad, surrounded by a broad thin wing. "Llora-sangre" (Guerrero); "guayabillo" (Michoacán).

Pterocarpus crispatus DC.¹ may be the same species. Its fruit is not known.

2. *Pterocarpus acapulcensis* Rose, Contr. U. S. Nat. Herb. 5: 143. 1897.

Veracruz, Guerrero, and Oaxaca; type from Acapulco, Guerrero.

Tree, 7 meters high or larger, with yellow flowers; leaflets pale beneath; fruit 5 to 6.5 cm. long. "Drago" (Guerrero, Oaxaca); "sangre de drago," "sangre drago" (Oaxaca).

This may be the species reported by Ramírez from Michoacán as *P. draco*, with the vernacular name "huahuauchi."

3. *Pterocarpus officinalis* Jacq. Stirp. Amer. 283. pl. 183, f. 92. 1763.

Pterocarpus draco L. Sp. Pl. ed. 2. 1662, in part. 1763.

Yucatán. Central America, West Indies, and northern South America.

Tree, sometimes 24 meters high, with yellow or yellowish brown flowers; wood dirty white, with a specific gravity of about 0.554. "Sangre de drago" (Guatemala, Nicaragua); "sangregado" (Nicaragua); "palo de pollo" (Porto Rico).

As in other species, when the bark is cut it exudes a blood-red juice that soon solidifies and forms a red resin which is insipid and inodorous. It was formerly used in medicine under the name of "dragon's-blood," and large amounts were at one time sent to Spain from Cartagena, Colombia.

51. **DREPANOCARPUS** Meyer, Prim. Fl. Esseq. 236. 1818.

Trees or shrubs sometimes scandent; leaves unequally pinnate, estipellate, the leaflets alternate; flowers purple or white, in short axillary racemes or in terminal panicles; fruit falcate, compressed, indehiscent, 1-seeded.

¹ Prodr. 2: 418. 1825.

Leaflets usually 7; standard petal sericeous.

- Leaflets acuminate.....1. *D. inundatus*.
 Leaflets rounded at apex.....2. *D. lunatus*.
 Leaflets 25 to 30; standard petal glabrous.....3. *D. mucronulatus*.

1. *Drepanocarpus inundatus* Mart.; Benth. Ann. Naturhist. Hofmus. Wien 2: 96. 1838.

Veracruz and Chiapas. Central America to Brazil.

Shrub, usually scandent; leaflets 5 to 9, ovate to lance-oblong, 4 to 8 cm. long, glabrous or nearly so; flowers sessile.

2. *Drepanocarpus lunatus* (L. f.) Meyer, Prim. Fl. Esseq. 238. 1818.

Pterocarpus lunatus L. f. Suppl. Pl. 317. 1781.

Reported from Veracruz. Central America, West Indies, South America, and western Africa.

Shrub, 2 to 5 meters high, armed with short recurved spines; leaflets oblong, 1.5 to 5 cm. long, with very numerous fine close nerves; flowers purple; fruit flat, short, strongly curved. Known in Porto Rico as "escambrón" or "palo de hoz."

3. *Drepanocarpus mucronulatus* Benth.; Hemsl. Diag. Pl. Mex. 8. 1878.

Known only from the type locality, Bolaños, Jalisco.

Leaflets oblong, 6 to 10 mm. long, mucronate, hirsute beneath; flowers short-pedicellate, 5 to 6 mm. long.

Of this Hemsley says, "A very distinct plant, perhaps the type of a new genus."

DOUBTFUL SPECIES.

DBEPANOCARPUS ? *CYATHIFORMIS* DC. Prodr. 2: 420. 1825. Described from somewhere in Mexico. Probably a synonym of *Dalbergia monetaria* L. f., which is not known to occur in Mexico.

52. *MACHAERIUM* Pers. Syn. Pl. 2: 276. 1807.

Scandent shrubs or erect trees, usually armed with spines; leaves pinnate; flowers small or of medium size, racemose or paniculate; fruit compressed, samara-like, 1-seeded, indehiscent.

Some of the South American species yield valuable wood which forms part of the rosewood of commerce.

- Leaflets acuminate, elliptic or ovate.....1. *M. latifolium*.
 Leaflets rounded or retuse at the apex, oblong or obovate-oblong.

- Leaflets 5 to 9.....4. *M. riparium*.
 Leaflets more than 9 in most of the leaves.

Inflorescence puberulent or with minute appressed hairs; leaflets mostly 1.5 to 2 cm. wide.....2. *M. biovulatum*.

Inflorescence setulose-pilose with stiff yellowish hairs; leaflets 6 to 8 mm. wide.....3. *M. setulosum*.

1. *Machaerium latifolium* (Benth.) Pittier, Contr. U. S. Nat. Herb. 20: 470. 1921.

Machaerium acuminatum latifolium Benth. Journ. Linn. Soc. Bot. 4: Suppl. 65. 1860.

Veracruz. Nicaragua and Costa Rica.

Shrub, probably scandent; leaflets 5 or 7, elliptic, 5 to 12 cm. long, glabrate; fruit 7 to 8 cm. long, glabrous, the thin wing 2 cm. wide or wider.

2. *Machaerium biovulatum* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 265. pl. 15. 1903.

Michoncán to Oaxaca; type from El Ocote. Guatemala.

Large scandent shrub, armed with short recurved spines; leaflets 3 to 5 cm. long, bright green, pale beneath, with numerous fine close nerves; flowers violet; fruit 5 to 6 cm. long, the wing 1.2 to 1.5 cm. wide.

It may be that two species are represented by the material referred here.

3. *Machaerium setulosum* Pittier, Contr. U. S. Nat. Herb. 20: 477. 1921.
Veracruz; type from Zacuapan.

Subscandent shrub; leaflets numerous, 2 to 3.5 cm. long, with fine parallel nerves, pubescent beneath; flowers violet.

4. *Machaerium riparium* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 500. 1919.
Known only from the type locality, Zacuapan, Veracruz.

Leaflets oblong or elliptic, about 3 cm. long, glabrous; panicles ferruginous-pubescent; fruit glabrous, 6 cm. long, the wing 1.8 cm. wide.

The writer has seen no material of this species.

53. **PLATYMISCIUM** Vog. Linnaea 11: 198. 1837.

Trees or shrubs; leaves glabrous, estipellate, the leaflets few, opposite; racemes borne on new or old branches, solitary or fasciculate; corolla yellow, glabrous; fruit oblong, flat, submembranaceous, indehiscent.

Leaflets 3; rachis of the racemes glabrous-----1. *P. trifoliolatum*.
Leaflets 5; rachis of the racemes finely puberulent-----2. *P. yucatanum*.

1. *Platymiscium trifoliolatum* Benth. Journ. Linn. Soc. Bot. 4: Suppl. 82. 1860.

Type collected between San Blas, Tepic, and Guadalajara, Jalisco.

Leaflets ovate-elliptic, acuminate, acute at base; racemes 7 to 13 cm. long, the flowers long-pedicellate, 10 to 12 mm. long; young fruit about 3.5 cm. long and 8 mm. wide.

2. *Platymiscium yucatanum* Standl., sp. nov.

Type from Izamal, Yucatán, flowering in February (*Gaumer* 377; U. S. Nat. Herb. no. 571629).

Tree, 24 meters high, the branchlets gray; leaves glabrous, the petiole about 3 cm. long; leaflets 5, ovate or ovate-oblong, 4 to 6 cm. long, 1.5 to 2.5 cm. wide, obtusely acuminate, rounded or obtuse at base, coriaceous, lustrous, the venation prominent and reticulate on both surfaces, the petiolules 5 to 6 mm. long; racemes fasciculate on old branchlets, 7.5 cm. long or less, lax, the rachis minutely puberulent; pedicels 1 to 2.5 mm. long; calyx 3 mm. long, minutely puberulent; standard petal about 7 mm. long.

The tree has been reported¹ from Yucatán as *Pterocarpus draco* L. The Maya name is given as "subinché."

54. **ICHTHYOMETHIA** P. Br. Civ. Nat. Hist. Jam. 296. 1756.

REFERENCE: Blake, Revision of *Ichthyomethia*, a genus of plants used for poisoning fish, Journ. Washington Acad. Sci. 9: 241-252. 1919.

Trees or shrubs; leaves pinnate, the leaflets opposite; flowers in lateral panicles, appearing before the leaves, pink or white and red; fruit indehiscent, broadly 2-winged on each suture, 1 to 6-seeded.

Leaflets very densely tomentose or soft-pilose beneath.

Leaflets tomentose beneath-----1. *I. grandifolia*.

Leaflets short-pilose beneath-----2. *I. mollis*.

Leaflets strigose or puberulent beneath.

Leaflets densely incurved-puberulent beneath, the hairs parallel with the veinlets; stipe of the fruit equaling or slightly exceeding the calyx.

3. *I. communis*.

Leaflets strigose beneath, the hairs crossing the veinlets transversely; stipe much exceeding the calyx-----4. *I. americana*.

¹ Field Mus. Bot. 1: 368. 1898.

1. *Ichthyomethia grandifolia* (Donn. Smith) Blake, Journ. Washington Acad. Sci. 9: 245. 1919.

Derris grandifolia Donn. Smith, Bot. Gaz. 56: 55. 1913.

Puebla and Oaxaca. Guatemala; type from Cerro Gordo.

Tree; leaflets 7 to 11, oval, 5.5 to 10 cm. long, crisped-pilosulous above, rounded at apex; calyx 7 to 8 mm. long; banner petal glabrous, 10 mm. long; fruit 4 to 9 cm. long, 3 to 5-seeded.

2. *Ichthyomethia mollis* (Rose) Blake, Journ. Washington Acad. Sci. 9: 246. 1919.

Piscidia mollis Rose, Contr. U. S. Nat. Herb. 1: 98. 1891.

Sonora and Sinaloa; type from Alamos, Sonora.

Shrub or tree, 3 to 16 meters high, the trunk sometimes 70 cm. in diameter; leaflets 7 to 13, oval, 3 to 8 cm. long, densely pilosulous on the upper surface; fruit 2.5 to 5 cm. long, 1 to 3-seeded. "Palo blanco" (Sonora, Sinaloa).

The wood is of some importance for building purposes. The flowers have not been collected.

3. *Ichthyomethia communis* Blake, Journ. Washington Acad. Sci. 9: 247. 1919.

Tamaulipas and San Luis Potosí to Yucatán. Honduras, Cuba, and Florida (type from Ramrod Key).

Tree, sometimes 25 meters high; leaflets 7 or 9, oblong or elliptic, 4 to 12 cm. long, acute or short-pointed; calyx 4.5 mm. long; banner cinereous-pubescent outside; fruit 2.5 to 7.5 mm. long, 1 to 6-seeded; wood weak, close-grained, yellowish brown, its specific gravity about 0.87. "Haabí," "habí," "haabín" (Yucatán, Maya); "chijol" (Tamaulipas, Veracruz); "flor de papagallo" (Ramírez); "coculte," "javín" (Veracruz, Villada); "guaná hedionda" (Cuba).

This has been confused with *I. piscipula* (L.) Hitchc. (*Erythrina piscipula* L.; *Piscidia erythrina* L.; *Piscidia piscipula* Sarg.), a species confined apparently to Jamaica, where it is known as "dogwood." The properties discussed below are probably common to all or most of the species.

The wood is very durable, especially in water, and takes a fine polish. It has been used for boat building, fuel, and charcoal. Robelo states that in Mexico there is a popular belief that the wood petrifies after many years, beginning at the heart. The dry bark, especially that of the root, has a strong and disagreeable odor of opium; it produces a burning sensation in the mouth. It contains substances (one of which has been named piscidin) which are narcotic and analgesic, and has been used as an anodyne in neuralgia, nervous insomnia, whooping cough, etc. The extract of the bark is sometimes employed in tropical America for relieving toothache, applied locally, and that of the Jamaican species to cure mange in dogs. The best-known use of the tree, however, is its employment for poisoning or stupefying fish, the bark and leaves being crushed and thrown into the water. It is said that the Caribs used the juice for poisoning their arrows, but this appears doubtful.

4. *Ichthyomethia americana* (Sessé & Moc.) Blake, Journ. Washington Acad. Sci. 9: 248. 1919.

Piscidia americana Sessé & Moc. Pl. Nov. Hisp. 116. 1887.

Michoacán and Guerrero; type from Apatzingán, Michoacán. Guatemala.

Tree; leaflets 9 to 13, oval-oblong or elliptic-oblong, 4 to 8 cm. long, rounded to acute at the apex; calyx 6 to 7 mm. long; standard 15 mm. long, cinereous-puberulent outside; fruit 1.5 to 7.5 cm. long, 1 to 6-seeded. "Tatzungo," "zat-zumbo" (Michoacán, Tarascan); "cocuile," "colorín de peces," "matapez" (Guerrero).

55. LONCHOCARPUS H. B. K. Nov. Gen. & Sp. 6: 383. 1823.

REFERENCE: Pittier, Contr. U. S. Nat. Herb. 20: 37-93. *pl.* 1-6. *f.* 1-43. 1917.

Unarmed trees or shrubs; leaves pinnate; flowers often large and showy, racemose or paniculate; fruit compressed, thin or thick, indehiscent.

Same species are used in South America as fish poisons. The leaves of some are said to have irritant and vomitive properties.

Leaves unifoliolate-----1. *L. unifoliolatus*.

Leaves with 3 or more leaflets.

Leaflets glabrous beneath or when young sparsely pilose along the costa.

Pedicels mostly longer than the calyx; leaflets and calyx punctate.

Plants wholly glabrous-----2. *L. longistylus*.

Plants sparsely pubescent on the inflorescence and the costa of the leaflets.

3. *L. longipedicellatus*.

Pedicels shorter than the calyx; leaflets and calyx not punctate.

Fruit cochleate; leaflets 5 to 9-----4. *L. cochleatus*.

Fruit flat; leaflets 3 or 5, rarely 7.

Flowers about 1 cm. long-----5. *L. hondurensis*.

Flowers about 1.5 cm. long.

Leaflets 6 to 9 cm. long, acutish-----6. *L. megalanthus*.

Leaflets 9 to 11 cm. long, cuspidate-acuminate-----7. *L. mexicanus*.

Leaflets more or less pubescent beneath over the whole surface.

Leaflets acute or acutish at apex, or abruptly apiculate.

Leaflets small, most of them 3 to 5 cm. long, the upper ones acute at base.

Standard densely sericeous; keel petals auriculate.

8. *L. minimiflorus*.

Standard thinly sericeous; keel petals not auriculate.

Leaflets 9 to 15-----9. *L. lanceolatus*.

Leaflets 5 or 7-----10. *L. yucatanensis*.

Leaflets large, most of them 6 to 12 cm. long, usually rounded or very obtuse at base.

Leaflets 5 or 7.

Leaflets cuspidate-acuminate-----11. *L. caudatus*.

Leaflets very short-acuminate.

Lateral nerves of the leaves very conspicuous and prominent beneath; calyx conspicuously dentate-----12. *L. oaxacensis*.

Lateral nerves inconspicuous; calyx subtruncate.

Calyx densely sericeous-----13. *L. guatemalensis*.

Calyx glabrous or nearly so-----14. *L. purpusii*.

Leaflets 9 or more in most of the leaves.

Lateral nerves of the leaflets 10 to 12-----15. *L. affinis*.

Lateral nerves of the leaflets 5 to 8.

Standard petals 16 to 18 mm. long-----16. *L. palmeri*.

Standard 10 to 14 mm. long.

Leaflets finely sericeous beneath-----17. *L. robustus*.

Leaflets scaberulous-puberulent beneath-----18. *L. sericeus*.

Leaflets rounded or very obtuse at apex, never apiculate, often emarginate.

Venation of the leaflets not impressed on the upper surface.

Pubescence of the calyx brown; leaflets 1.5-3 cm. long.

19. *L. comitensis*.

Pubescence of the calyx gray or whitish; leaflets mostly more than 3 cm. long.

Leaflets oval-----20. *L. constrictus*.

Leaflets oblong-----21. *L. emarginatus*.

Venation of the leaflets conspicuously impressed on the upper surface.

Upper margin of the fruit conspicuously thickened—18. *L. sericeus*.

Upper margin of the fruit not thickened.

Ovules 7 or 8; fruit thin-----22. *L. rugosus*.

Ovules 2 or 3; fruit coriaceous.

Fruit 7 to 11.5 cm. long-----23. *L. eriocarinalis*.

Fruit about 4 cm. long-----24. *L. jaliscensis*.

1. *Lonchocarpus unifoliolatus* Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 90. 1860.

Puebla and perhaps elsewhere in southern Mexico, the type from some uncertain locality.

Small tree; leaflets ovate, 10 to 12.5 cm. long, acuminate; flowers pink, racemose.

2. *Lonchocarpus longistylus* Pittier, Contr. U. S. Nat. Herb. 20: 62. f. 10. 1917.

Yucatán; type from Xbalché.

Tree with purplish flowers; leaflets 11 to 15, oblong or ovate, 3.5 to 8.5 cm. long; fruit 1 or 2-seeded, 8 to 8.5 cm. long, 3 cm. wide, with thin margins. "Bal-ché," "xbal-ché" (Maya).

3. *Lonchocarpus longipedicellatus* Pittier, Contr. U. S. Nat. Herb. 20: 61. f. 8. 1917.

Known only from the type locality, Jiquipilas, Chiapas.

Tree; leaflets 7 or 9, oblong or ovate, 3.5 to 10.5 cm. long, obtuse or acute; flowers purplish.

4. *Lonchocarpus cochleatus* Pittier, Contr. U. S. Nat. Herb. 20: 68. pl. 4, C. 1917.

Known only from the type locality, El Calabazal, Guerrero.

Tree, 4 to 5 meters high; leaflets 4 to 9.5 cm. long, obtuse or acuminate; fruit 4 to 9.5 cm. long, 2.5 to 4.5 cm. wide, with thin edges.

5. *Lonchocarpus hondurensis* Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 91. 1860.

Tabasco. Honduras (type locality) and British Honduras.

Tree, 6 to 8 meters high; leaflets usually 5, 3.5 to 10 cm. long; flowers purplish red. "Gusano" (Tabasco).

6. *Lonchocarpus megalanthus* Pittier, Contr. U. S. Nat. Herb. 20: 70. f. 19. 1917.

Sinaloa and Tepic; type from Tepic.

Tree, about 10 meters high, with low branches; leaves deciduous, the leaflets 3.5 to 9 cm. long.

7. *Lonchocarpus mexicanus* Pittier, Contr. U. S. Nat. Herb. 20: 71. f. 20. 1917.

Known only from the type locality, San Andrés Tuxtla, Veracruz, altitude 500 meters.

Tree with purplish flowers.

8. *Lonchocarpus minimiflorus* Donn. Smith, Bot. Gaz. 44: 110. 1907.

Chiapas. Guatemala; type from Santa Bárbara.

Tree, 8 to 10 meters high, with purple flowers; leaflets 7 to 13.

9. *Lonchocarpus lanceolatus* Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 92. 1860.

Sinaloa to Oaxaca.

Shrub or small tree with purple flowers; leaflets 9 to 15, 2 to 4 cm. long; fruit usually 1-seeded. "Cabo de hacha" (Sinaloa).

10. *Lonchocarpus yucatanensis* Pittier, Contr. U. S. Nat. Herb. 20: 74. f. 24. 1917.

Known only from the type locality, Progreso, Yucatán.

Leaflets 3 to 6 cm. long; flowers pink or purplish.

11. *Lonchocarpus caudatus* Pittier, Contr. U. S. Nat. Herb. 20: 68. pl. 4, A. 1917.

Known only from the type locality, Acatlán, Puebla.

Tree; leaflets 6.5 to 12.5 cm. long; fruit glabrous, 1 or 2-seeded, 6 to 10 cm. long, 3 cm. wide, with thin margins.

12. *Lonchocarpus oaxacensis* Pittier, Contr. U. S. Nat. Herb. 20: 66. f. 14. 1917.

Known only from the type locality, Jayacatlán, Oaxaca, altitude 1,500 meters.

Tree; leaflets 4.5 to 8.5 cm. long; flowers purplish.

13. *Lonchocarpus guatemalensis* Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 87. 1860.

Veracruz and perhaps elsewhere in southern Mexico. Central America; type from Guatemala.

Deciduous tree with pinkish or purplish flowers.

14. *Lonchocarpus purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 500. 1919.

Known only from the type locality, Zacuapan, Veracruz.

Tree, 5 to 6 meters high; leaflets 5 or 7, oval or elliptic, 5 to 6 cm. long, glabrous above, strigillose beneath; flowers dark purple; ovules 2 or 3.

15. *Lonchocarpus affinis* Pittier, Contr. U. S. Nat. Herb. 20: 56. pl. 1, C. f. 3. 1917.

Veracruz; type from Orizaba.

Leaflets 13 or 15, 3 to 12.5 cm. long; flowers purplish; fruit 1 or 2-seeded, 5.5 to 9 cm. long, 1.6 to 1.8 cm. wide, the upper margin slightly thickened.

16. *Lonchocarpus palmeri* Rose, Contr. U. S. Nat. Herb. 1: 322. 1895.

Known only from the type locality, Manzanillo, Colima.

Tree, 6 to 10 meters high, with spreading crown, the trunk 15 to 30 cm. in diameter; flowers purplish; fruit 1 to 5-seeded, 3 to 8 cm. long, 2.8 cm. wide, the upper margin thickened.

17. *Lonchocarpus robustus* Pittier, Contr. U. S. Nat. Herb. 20: 83. f. 34. 1917.

Known only from the type locality, Yajalón, Chiapas.

Leaflets 9 to 13, 4 to 8 cm. long; flowers pinkish or purplish.

18. *Lonchocarpus sericeus* (Poir.) H. B. K. Nov. Gen. & Sp. 6: 383. 1823.

Robinia sericea Poir. in Lam. Encycl. 6: 226. 1804.

Sinaloa to Guerrero. West Indies and northern South America; reported from western Africa.

Small tree with pinkish or purplish flowers; leaflets 7 to 13, 3.5 to 9 cm. long; fruit 1 to 5-seeded, 5 to 12 cm. long, 2.3 cm. wide, the upper margin much thickened. "Cocorocho" (Guatemala).

19. *Lonchocarpus comitensis* Pittier, Contr. U. S. Nat. Herb. 20: 76. 1917.

Known only from the vicinity of the type locality, Comitán, Chiapas.

Shrub or small tree; leaflets 7 to 11, obovate, ovate, or oblong; flowers 1.5 cm. long.

20. *Lonchocarpus constrictus* Pittier, Contr. U. S. Nat. Herb. 20: 79. pl. 6, A. f. 28. 1917.

Colima and Guerrero; type from Manzanillo, Colima.

Shrub or small tree, 2 to 5 meters high; leaflets 5 to 11; flowers reddish purple; fruit 1 to 3-seeded, 5.5 to 10.5 cm. long, 6 to 7 mm. wide.

21. *Lonchocarpus emarginatus* Pittier, Contr. U. S. Nat. Herb. 20: 80. *f.* 30. 1917.

Oaxaca; type collected near San Gerónimo.

Leaflets 5 to 11, emarginate; flowers pink or purplish.

22. *Lonchocarpus rugosus* Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 92. 1860.

Guerrero and Yucatán, type from Campeche. Central America.

Tree with deep pink flowers; leaflets 9 to 17, 2.5 to 6.5 cm. long; fruit 1 to 6-seeded, 4 to 14 cm. long, 1.7 to 2 cm. wide. "Masicarón" (Honduras).

23. *Lonchocarpus eriocarinalis* Micheli, Mém. Soc. Phys. Hist. Nat. Genève 34: 267. 1903.

Colima and Guerrero; type from El Valle Grande, Guerrero.

Tree, 6 to 8 meters high; leaflets 7 to 11, ovate, 3 to 6.5 cm. long; flowers deep red; fruit 1 to 3-seeded. "Palo de oro" (Guerrero).

24. *Lonchocarpus jaliscensis* Pittier, Contr. U. S. Nat. Herb. 20: 60. 1917.

Known only from the type locality, Bolaños, Jalisco.

Leaflets 7 to 13, 1.5 to 5 cm. long.

Doubtfully distinct from *L. eriocarinalis*.

DOUBTFUL SPECIES.

LONCHOCARPUS OBOVATUS Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 93. 1860. Type from Chilá, Puebla.

LONCHOCARPUS PARVIFLORUS Benth. Journ. Proc. Linn. Soc. Bot. 4: Suppl. 89. 1860. Type from Mexico.

LONCHOCARPUS PHASEOLIFOLIUS Benth. Journ. Proc. Linn. Soc. Bot. 4: 93. 1860. Type from Tehuantepec.

ROBINIA ACUMINATA Schlecht. Linnaea 12: 306. 1838. Type from Mapilque. According to Schlechtendal, this plant belongs to the genus, like the following species.

ROBINIA LATIFOLIA Mill. Gard. Dict. ed. 8. *Robinia* no. 9. 1768. Type from Campeche.

ROBINIA ROSEA Mill. Gard. Dict. ed. 8. *Robinia* no. 4. 1768. Type from Campeche.

ROBINIA SCHIEDEANA Schlecht. Linnaea 12: 306. 1838. Type collected between Veracruz and Santa Fé.

56. *MUELLEA* L. *f.* Suppl. Pl. 52. 1781.

1. *Muellera mexicana* (Zucc.) Benth. Journ. Linn. Soc. Bot. 4: Suppl. 117. 1860.

Cyanobotrys mexicana Zucc. Abh. Akad. Wiss. München 4: 28. 1845.

Described from cultivated plants of Mexican origin.

Leaflets 5 to 11, ovate or oblong, acuminate, densely pellucid-punctate; pedicels 2-flowered; fruit subcompressed, subtorulose, 2.5 to 5 cm. long, 1 to 3-seeded, smooth, glabrate.

The plant is wholly doubtful, and the name may have been based upon a mixture.

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23, PART 3

TREES AND SHRUBS OF MEXICO (OXALIDACEAE-TURNERACEAE)

By PAUL C. STANDLEY



WASHINGTON
GOVERNMENT PRINTING OFFICE
1923

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

II

PREFACE.

The third installment of the Trees and Shrubs of Mexico, by Mr. Paul C. Standley, Assistant Curator of the United States National Herbarium, treats the families Oxalidaceae to Turneraceae, both inclusive. Several of the largest and most important groups of Mexican trees are included, such as the Meliaceae, which contains the true mahoganies of the genus *Swietenia*; the Euphorbiaceae, or spurge family; the Malvaceae, or mallow family; and the Sterculiaceae, among whose representatives is the cacao, *Theobroma cacao*, perhaps the most important economically of all the native Mexican trees.

The accounts of the families Meliaceae and Polygalaceae have been furnished by Dr. S. F. Blake of the United States Department of Agriculture.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

TREES AND SHRUBS OF MEXICO.¹

By PAUL C. STANDLEY.

65. OXALIDACEAE. Wood-sorrel Family.

One other genus, *Biophytum*, occurs in Mexico.

1. OXALIS L. Sp. Pl. 433. 1753.

Low shrubs or sometimes herbs, pubescent; leaves alternate, pinnately 3-foliate; flowers small, perfect, usually cymose; sepals 5, inferior; petals 5 (yellow in the species here listed), deciduous; stamens 10, the filaments united into a tube below; styles filiform or subulate; fruit a small oblong or columnar capsule, 5-celled.

Numerous herbaceous species are found in Mexico. The name "socoyol" (from the Nahuatl *xocoyolli*, "sorrel") is applied to some species.

Longer filaments not appendaged.....1. *O. camporum*.

Longer filaments appendaged on the back.

Leaflets acute or acuminate.

Leaflets linear or linear-oblong.....2. *O. angustifolia*.

Leaflets ovate or lance-ovate.....3. *O. sepium*.

Leaflets, at least most of them, emarginate at the apex.

Capsule glabrous.....4. *O. yucatanensis*.

Capsule pubescent on the angles.....5. *O. neaei*.

1. *Oxalis camporum* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 377. 1913.

Veracruz; type from Baños del Carrizal.

Leaflets 2.5 cm. long and 1 cm. wide or smaller, pubescent.

2. *Oxalis angustifolia* H. B. K. Nov. Gen. & Sp. 5: 249. 1822.

Lotoxalis angustifolia Rose, Contr. U. S. Nat. Herb. 10: 115. 1906.

Known only from the type locality, near La Venta del Peregrino.

Plants about 20 cm. high; leaflets 1.5 to 2.5 cm. long, glabrous; petals twice as long as the sepals.

3. *Oxalis sepium* St. Hil. Fl. Bras. Merid. 1: 111. 1825.

Oxalis acuminata Schlecht. Linnaea 5: 224. 1830.

Oxalis lindenii Turcz. Bull. Soc. Nat. Moscou 31¹: 429. 1858.

Lotoxalis sepium Small, N. Amer. Fl. 25: 48. 1907.

Guerrero and Oaxaca to Veracruz. Central America, West Indies, and South America; type from Brazil.

¹The first installment of the Trees and Shrubs of Mexico, comprising the families Gleicheniaceae to Betulaceae, was published as Part 1 of Volume 23, Contributions from the U. S. National Herbarium, pp. 1-170, October 11, 1920; the second installment, comprising the families Fagaceae to Fabaceae, as Part 2, pp. 171-515, July 14, 1922.

Slender shrub, sometimes 2 meters high, with reddish brown branches; leaflets mostly 2 to 4 cm. long, pubescent; sepals 3 to 4 mm. long, the petals twice as long; capsule 5 to 7 mm. long.

4. *Oxalis yucatanensis* (Rose) Standl.

Lotoxalis occidentalis Rose, Contr. U. S. Nat. Herb. 10: 115. 1906. Not *Oxalis occidentalis* Knuth, 1915.

Lotoxalis yucatanensis Rose, Contr. U. S. Nat. Herb. 10: 116. 1906.

Sinaloa to Guerrero and Yucatán; type from Yucatán. Central America.

Slender shrub, rarely more than 30 cm. high; leaflets 1 to 2.5 cm. long, glabrous or sparsely pubescent beneath; sepals 4 to 5 mm. long; capsule 6 to 8 mm. long.

5. *Oxalis neaei* DC. Prodr. 1: 691. 1824.

Oxalis tephrodes Turcz. Bull. Soc. Nat. Moscou 31¹: 427. 1858.

Oxalis psilotrichia Turcz. Bull. Soc. Nat. Moscou 31¹: 427. 1858.

Oxalis fasciculata Turcz. Bull. Soc. Nat. Moscou 32¹: 272. 1859.

Lotoxalis neaei Rose, Contr. U. S. Nat. Herb. 10: 115. 1906.

Guerrero to Veracruz and Chiapas; type from Acapulco, Guerrero. Central America and South America.

Slender shrub, a meter high or less, or often herbaceous; leaflets 1 to 3 cm. long, pubescent on both sides; sepals 3 to 4 mm. long; capsule 4 to 6 mm. long.

66. ERYTHROXYLACEAE. Coca Family.

1. ERYTHROXYLON L. Syst. Nat. ed. 10. 1035. 1759.

REFERENCE: Britton, N. Amer. Fl. 25: 59-66. 1907.

Glabrous trees or shrubs; leaves alternate, entire, thin, stipulate, petiolate; flowers small, solitary, or fasciculate in the leaf axils; fruit a small drupe.

Erythroxylon coca Lam., of South America, is the well-known coca plant, from which cocaine is obtained. It is cultivated extensively in Peru and Bolivia.

Stipules large, conspicuously striate; leaves acute.

Calyx lobes ovate-----1. *E. tabascense*.

Calyx lobes orbicular-ovate-----2. *E. lucidum*.

Stipules small, not striate; leaves rounded or very obtuse at apex.

Leaves large, usually 3.5 to 7 cm. long.

Pedicels filiform, 5 to 12 mm. long-----3. *E. havanense*.

Pedicels stout, 4 to 6 mm. long-----4. *E. mexicanum*.

Leaves small, all or most of them less than 3 cm. long.

Leaves broadly ovate-----5. *E. compactum*.

Leaves ovate to broadly oval, broadest at or below the middle.

Branchlets glaucescent; pedicels 5 to 7 mm. long-----6. *E. pringlei*.

Branchlets not glaucescent; pedicels 2 to 4 mm. long-----7. *E. pallidum*.

1. *Erythroxylon tabascense* Britton, N. Amer. Fl. 25: 66. 1907.

?*Erythroxylon ellipticum* Ramírez; Villada, Naturaleza 3: 53. pl. 4. 1898.

Not *E. ellipticum* R. Br. 1863.

Tabasco, and probably in Veracruz; type from San Sebastián, Tabasco.

Shrub with brown branches; leaves 8 to 14 cm. long; petals 1 to 3.5 mm. long. "Zapotillo" (Veracruz, Ramírez).

The infusion of the leaves is said to be used as a beverage.

2. *Erythroxylon lucidum* H. B. K. Nov. Gen. & Sp. 5: 179. 1822.

Reported from Mexico, but no specimens seen by the writer. Costa Rica to Colombia; type from Colombia.

Small tree; leaves 8 to 15 cm. long.

3. *Erythroxylon havanense* Jacq. Enum. Pl. Carib. 21. 1760.

Oaxaca and Veracruz. Cuba; type from Havana.

Shrub or small tree, 6 meters high or less; leaves 3 to 8 cm. long, pale beneath; flowers white; fruit 4 to 7 mm. long, orange or yellow.

4. *Erythroxylon mexicanum* H. B. K. Nov. Gen. & Sp. 5: 178. 1822.

Sonora to Tamaulipas, Veracruz, and Guerrero; perhaps also in Yucatán; type from Chilpancingo, Guerrero.

Shrub, 1.5 to 3 meters high; leaves 3 to 7 cm. long, pale beneath; fruit 6 to 10 mm. long. "Pata de pájaro" (Sinaloa).

5. *Erythroxylon compactum* Rose, Contr. U. S. Nat. Herb. 8: 313. 1905.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Shrub, 3 meters high or less; leaves mostly 1 to 1.5 cm. long; flowers mostly solitary.

This and the next species are very closely related.

6. *Erythroxylon pringlei* Rose, Contr. U. S. Nat. Herb. 8: 314. 1905.

Known only from the type locality, near Iguala, Guerrero.

Shrub or small tree, 3.5 to 4.5 meters high; leaves 1.5 to 3 cm. long; fruit red, 7 to 8 mm. long.

7. *Erythroxylon pallidum* Rose, Contr. U. S. Nat. Herb. 8: 314. 1905.

Vicinity of the type locality, San Juan Capistrano, Zacatecas.

Shrub; leaves 2 to 3 cm. long.

67. ZYGOPHYLLACEAE. Lignum-vitae Family.

Shrubs or trees, unarmed, often strong-scented and resinous; leaves opposite or alternate, simple, digitate, or pinnate, the leaves or leaflets entire; flowers perfect, regular or nearly so; sepals 5, free, usually imbricate; petals 5; stamens twice as many as the petals; fruit a capsule, often splitting into several carpels.

Leaves mostly opposite, digitate or even-pinnate.

Leaves digitate, usually 3 or 5-foliate; flowers pink or purplish.

1. FAGONIA.

Leaves even-pinnate; flowers yellow, blue, or violet.

Leaflets 2; petals yellow-----**2. COVILLEA.**

Leaflets more than 2; petals blue or violet.

Stamens with scalelike appendages at base; stipules persistent.

3. PORLIERIA.

Stamens not appendaged; stipules deciduous-----**4. GUAIAACUM.**

Leaves mostly alternate, odd-pinnate or simple.

Fruit covered with long straight hairs; leaves simple, linear or oblanceolate.

Flowers yellow-----**5. SERICODES.**

Fruit tomentose or puberulent; leaves pinnate or, if simple, oval.

Flowers purplish; petals 4; leaves pinnate-----**6. MORKILLIA.**

Flowers yellowish; petals 5; leaves usually simple-----**7. VISCAINO.**

1. **FAGONIA** L. Sp. Pl. 386. 1753.

REFERENCE: Standley, Proc. Biol. Soc. Washington 24: 243-250. 1911.

Small shrubs or herbs; leaves opposite, digitately 1 to 7-foliolate, the leaflets small, entire; flowers small, solitary, pink or purplish; fruit small, composed of 5 carpels.

Most of the species scarcely deserve to be classed as shrubs.

Leaves wanting; stipules triangular-subulate, 1 mm. long or shorter; sepals persistent-----1. **F. scoparia**.

Leaves present; stipules subulate, usually much more than 1 mm. long; sepals caducous.

Leaflets 5 or 7-----2. **F. palmeri**.

Leaflets 3.

Ovary glabrous-----3. **F. laevis**.

Ovary and mature fruit pubescent.

Leaflets glabrous.

Stems densely glandular-----4. **F. viscosa**.

Stems scaberulous, not at all glandular-----5. **F. californica**.

Leaflets pubescent, often glandular.

Pedicels shorter than the fruit.

Leaflets 8 to 13 mm. long; stems densely glandular.

6. **F. pachyacantha**.

Leaflets 3 to 10 mm. long; stems sparsely or often scarcely at all glandular-----7. **F. barclayana**.

Pedicels longer than fruit.

Leaflets linear; stipules 4 to 5 mm. long; stems sparsely pilose.

8. **F. insularia**.

Leaflets lanceolate or linear-oblong; stipules 2 mm. long; stems sparsely scaberulous-----9. **F. rosei**.

1. **Fagonia scoparia** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 181. 1911.

Known only from the type locality, Cerro del Macho, Coahuila.

Slender erect shrub, about 30 cm. high, leafless; petals purplish pink, 5 mm. long.

2. **Fagonia palmeri** Vasey & Rose, Contr. U. S. Nat. Herb. 1: 82. 1890.

Baja California; type from Santa Rosalia.

Densely branched undershrub, forming clumps about 45 cm. high; leaflets linear, 3 to 10 mm. long; petals pinkish.

3. **Fagonia laevis** Standl. Proc. Biol. Soc. Washington 24: 249. 1911.

Northern Baja California. Southern California and Arizona; type from Yuma, Arizona.

Plants suffrutescent, decumbent, densely branched, glabrous; leaflets 2 to 8 mm. long.

4. **Fagonia viscosa** Rydb. N. Amer. Fl. 25: 104. 1910.

Sonora (type locality) and Baja California. Southern California.

Leaflets 8 to 15 mm. long, 3 to 8 mm. wide; petals purple, 6 to 8 mm. long.

5. **Fagonia californica** Benth. Bot. Voy. Sulph. 10. 1844.

Baja California; type from Magdalena Bay. Southern California to Utah.

Densely branched, suffrutescent, about 30 cm. high; petals 5 to 8 mm. long.

6. **Fagonia pachyacantha** Rydb. N. Amer. Fl. 25: 105. 1910.

Known only from the type collection, from somewhere in Baja California.

Suffrutescent, 30 to 60 cm. high; leaflets linear, 8 to 15 mm. long; petals 6 to 8 mm. long.

7. *Fagonia barclayana*¹ (Benth.) Rydb. N. Amer. Fl. 25: 104. 1910.
Fagonia californica barclayana Benth. Bot. Voy. Sulph. 10. 1844.
 Baja California; type from Magdalena Bay.
 Leaflets 8 to 20 mm. long; petals 5 mm. long; fruit 4 to 5 mm. long.
8. *Fagonia insularis* Standl. Proc. Biol. Soc. Washington 24: 247. 1911.
 Known only from Carmen Island, Baja California.
 Leaflets 1 to 9 mm. long; petals 5 mm. long; fruit 3 to 4 mm. long.
9. *Fagonia rosei* Standl. Proc. Biol. Soc. Washington 24: 247. 1911.
 Known only from the type locality, Tiburón Island, Baja California.
 Leaflets 2 to 3 mm. long; petals purplish, 7 mm. long.

2. **COVILLEA**² Vail, Bull. Torrey Club 22: 229. 1895.

1. *Covillea tridentata* (DC.) Vail, Bull. Torrey Club 26: 302. 1899.
Zygophyllum tridentatum DC. Prodr. 1: 706. 1824.
Larrea mexicana Moric. Pl. Nouv. Amer. 71. 1839.
Larrea glutinosa Engelm. in Wislitz. Mem. North. Mex. 93. 1848.
Larrea tridentata Coville, Contr. U. S. Nat. Herb. 4: 75. 1893.
 Baja California and Sonora to Tamaulipas, Querétaro, and Durango. Western Texas to Utah and southern California.

Strong-scented shrub, 1 to 3.5 meters high; leaves opposite, persistent, composed of 2 oblong to obovate leaflets, these oblique, united at base, 5 to 10 mm. long; flowers solitary, the petals yellow, 8 to 10 mm. long; fruit of 5 carpels, densely pilose with long hairs. Mostly generally known as "gobernadora;" "hediondilla" (Sonora, New Mexico); "falsa alcaparra" (Sonora, San Luis Potosí, *Ramírez*); "guamis" or "huamis" (San Luis Potosí, Chihuahua); "hediondo" (California).

The creosote bush is one of the most characteristic shrubs of the dry plains of northern Mexico, often covering wide areas to the exclusion of most other woody plants. The flower buds, pickled in vinegar, are said to be eaten like capers. The plant is much used in domestic medicine, especially for rheumatism, a decoction of the leaves being employed for baths or fomentations. The decoction is said, also, to have remarkable antiseptic properties, and is applied to bruises and sores. It is taken internally for gastric disturbances and for venereal diseases. A reddish brown lac is often deposited upon the branches by a small scale insect. This lac is used in some parts of Mexico for dyeing leather red, and the Coahuilla Indians of California employ it as cement. The same Indians use a decoction of the plant for intestinal complaints and for tuberculosis. The Pima Indians of Arizona drink a decoction of the leaves as an emetic, and apply the boiled leaves as poultices to wounds and sores.

¹ George Barclay was a gardener at Kew, who accompanied H. M. S. *Sulphur* for the purpose of making botanical collections.

² Named for Frederick Vernon Coville (1867-), Curator of the U. S. National Herbarium. Mr. Coville was botanist of the U. S. Death Valley Expedition of 1891, and published a volume dealing with the botanical features of that region (Contr. U. S. Nat. Herb. 4), and he has published many other papers upon a wide range of botanical subjects. He made a collection of plants in Sonora in 1903.

3. PORLIERIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 55. 1794.

1. *Porlieria angustifolia* (Engelm.) A. Gray, Pl. Wright. 1: 28. 1852.

Guaiacum angustifolium Engelm. in Wislitz. Mem. North Mex. 113. 1848.

Coahuila to Tamaulipas; type from Parras, Coahuila. Southwestern Texas.

Shrub or small tree, sometimes 7 meters high, with a trunk 25 cm. in diameter, the branches stout, crooked; leaves pinnate, persistent, the leaflets 8 to 12, linear, 1.5 cm. long or shorter; flowers 1 to 2 cm. broad, sweet-scented, purple; wood hard, compact, taking a fine polish, the heartwood dark brown, the sapwood yellow, the specific gravity about 1.10. "Guayacán" (Coahuila, Tamaulipas, Texas).

The bark of the roots is sometimes made into balls and sold in the markets as a kind of "amole"; it is valued for washing woolen goods, since it does not fade the colors, and is esteemed also as a disinfectant. A decoction of the wood or bark is employed in domestic medicine as a sudorific and vascular stimulant, especially in rheumatism and venereal diseases; it is reputed to be used as an emmenagogue. The durable wood is used for fence posts and other purposes. Known in Texas as "soap-bush."

4. GUAIIACUM L. Sp. Pl. 381. 1753.

Trees or shrubs; leaves opposite, abruptly pinnate, the leaflets few, thick, entire, unequal; flowers large and showy, blue or purple; fruit an angled capsule.

Guaiacum officinale L., the lignum-vitae, has been reported from Mexico, but probably incorrectly.

Leaflets broadly oblong or obovate, usually 8 to 15 mm. wide. 1. *G. sanctum*. Leaflets linear or linear-oblong, usually 3 to 7 mm. wide.

Ovary pubescent.....2. *G. palmeri*.
Ovary glabrous.....3. *G. coulteri*.

1. *Guaiacum sanctum* L. Sp. Pl. 382. 1753.

Guaiacum verticale Orteg. Hort. Matr. Dec. 93. 1798.

Yucatán and probably in Tabasco; perhaps also in Veracruz. West Indies and southern Florida; type from Porto Rico.

Tree, sometimes 10 meters high, the trunk short, the bark thin, pale or white; leaflets 4 to 10, 2 to 3.5 cm. long, glabrous; petals 7 to 11 mm. long; fruit 1.4 to 1.7 cm. long; wood resinous, light yellow, becoming green on exposure, very hard, with a characteristic odor, the specific gravity about 1.15. "Guayacán."

This species has been reported from many other parts of Mexico, apparently because it has been confused with *G. coulteri*. The wood is used for railroad ties and other purposes.

Both *G. sanctum* and *G. officinale* L., the latter a West Indian species, are official in the U. S. Pharmacopoeia. The extract of the wood, which is known as "lignum-vitae," has stimulant and diaphoretic properties. It was introduced into Europe as early as 1508 by the Spaniards, who had learned that it was used by the Indians as a remedy for syphilis. It was long highly esteemed as a remedy for syphilitic affections, and for gout, rheumatism, scrofula, and cutaneous diseases, but it is now believed to have no distinct influence upon such diseases. The resin also is employed, being stimulant, alterative, diaphoretic, and in large doses purgative. The bark and wood contain saponin.

One of the species of *Guaiacum* is illustrated by Hernández and treated¹ at length in a chapter entitled "De Hoaxacan, seu Ligno Sancto."

¹ Thesaurus 62-65. 1651.

2. *Guaiacum palmeri* Vail, N. Amer. Fl. 25: 107. 1910.

Dry plains and hills, Sonora and Sinaloa; type from Guaymas, Sonora.

Shrub or small tree; leaflets 4 to 10, 0.8 to 2.2 cm. long; petals blue, about 1.5 cm. long; fruit 1 to 1.5 cm. long.

It is probable that this plant is only a form of *G. coulteri*.

3. *Guaiacum coulteri* A. Gray, Mem. Amer. Acad. II. 5: 312. 1855.

Guaiacum planchoni A. Gray; Vail & Rydb. N. Amer. Fl. 25: 107. 1910.

Sonora to Oaxaca; type collected between Rayón and Ures, Sonora.

Shrub or small tree, 1 to 12 meters high, with crooked branches; leaflets 6 to 10, 1 to 2.5 cm. long, glabrous or nearly so; flowers fragrant, the petals blue or violet, 1 to 1.5 cm. long; fruit about 1.5 cm. long. Known throughout its range as "guayacán;" "árbol santo" (Puebla, *Ramírez*); "palo santo" (Oaxaca, Jalisco); "matlaquahuitl" (Nahuatl, *Ramírez*); "yaga-na" (Oaxaca, Zapotec, *Reko*); "yutnu-tandaa" (Oaxaca, Mixtec, *Reko*).

The plant was reported from Mexico by Mociño and Sessé as *G. afrum* L. The wood is hard and resinous, strong and durable, and is good for firewood, being used sometimes for fuel in railroad engines. It is employed also for making articles in which great strength is required. The tree is believed to have essentially the same properties as *G. sanctum*.

The writer has not seen type material of *G. planchoni*, which was described from Oaxaca, but other material from that state differs in no way from *G. coulteri*, and the characters supposed to separate the two species seem not to hold in the material examined.

5. *SERICODES* A. Gray, Pl. Wright. 1: 28. 1852.**1. *Sericodes greggii* A. Gray, Pl. Wright. 1: 28. 1852.**

Durango, Zacatecas, Coahuila, and Nuevo León; type from San Lorenzo (Coahuila?).

Low, densely branched shrub; leaves fascicled, linear or oblanceolate, 8 to 12 mm. long, strigose; flowers small, yellowish; fruit a small capsule, separating into 5 carpels, densely covered with long white hairs.

6. *MORKILLIA* Rose & Painter, Smiths. Misc. Coll. 50¹: 33. 1907.

Erect shrubs; leaves alternate, odd-pinnate, with large entire leaflets; flowers very large, deep rose-purple, solitary or geminate; fruit a large 4-winged capsule. Leaflets acute or obtuse; wings of the fruit produced at the apex, the sinus narrow-----

-----1. *M. mexicana*.
Leaflets acuminate; wings of the fruit scarcely produced, the sinus broad and open-----2. *M. acuminata*.

1. *Morkillia mexicana* (Moc. & Sessé) Rose & Painter, Smiths. Misc. Coll. 50¹: 33. 1907.

Chitonia mexicana Moc. & Sessé; DC. Prodr. 1: 707. 1824.

Hidalgo, Puebla, and Oaxaca.

Shrub, 3 to 5 meters high, with grayish white bark; leaflets 7 to 15, 3 to 5 cm. long, densely pubescent; petals 3 to 4 cm. long; fruit 4 to 6 cm. long. "Guayacán" (Oaxaca).

2. *Morkillia acuminata* Rose & Painter, Smiths. Misc. Coll. 50¹: 34. 1907.

Known only from the type locality, mountains between Victoria and Jaumave Valley, Tamaulipas.

Shrub, 3 to 5 meters high, densely pubescent; leaflets 3 to 9, 1 to 3 cm. long; petals 2.5 to 3 cm. long; fruit 5 cm. long.

7. **VISCAINOA** Greene, Pittonia 1: 163. 1888.1. **Viscainoa geniculata** (Kellogg) Greene, Pittonia 1: 163. 1888.*Staphylea geniculata* Kellogg, Proc. Calif. Acad. 2: 22. 1859.

Baja California and western Sonora; type from San Sebastián Bay, Baja California.

Shrub, 1.5 to 3.5 meters high, cinereous-pubescent, with crooked branches; leaves alternate, simple or pinnate, with 3 or 5 leaflets, these mostly oval, 2 to 5 cm. long; flowers large, yellowish white; fruit a capsule, 2 to 3 cm. long, usually 4-lobed. "Guayacán" (Baja California).

68. **RUTACEAE. Rue Family.**

REFERENCE: P. Wilson, N. Amer. Fl. 25: 173-224. 1911.

Aromatic trees or shrubs, often armed with spines, usually furnished with glands in bark, leaves, and fruit; leaves opposite or alternate, estipulate, simple or compound; flowers perfect or unisexual, large or small; calyx inferior, with 3 to 5 lobes or sepals; petals 3 to 5, usually imbricate, sometimes united; stamens as many or twice as many as the petals; ovary of 1 to 5 or more free or united carpels; styles free or connate; fruit a follicle, capsule, samara, drupe, or berry.

No herbaceous plants of the family are natives of Mexico. The rue family includes the important tropical citrus fruits, of which the following, and perhaps some others, are cultivated in Mexico. *Citrus medica* L., the citron ("cidra," "cedro limón," "cidrero"), with large fruits containing scant pulp, the rind of which is candied and used in confectionery; *C. limonia* Osbeck, the lemon ("limón," limón agrio," "limonero"; "nimû," Otomí; "tzapposh," Mixe); *C. aurantifolia* (Christm.) Swingle,¹ the lime ("lima," "lima chica," "limón dulce," "lima chicon"); *C. aurantium* L., the sour orange ("naranja agria"); *C. sinensis* Osbeck, the common or sweet orange ("naranja," "naranja dulce"; "yaga-naraxo," Zapotec; "tzaptzouk," "tzapkiuk," "tzaptzuik," Mixe; "nanxa," "xidni," Otomí); *C. grandis* Osbeck, the grapefruit, pomelo, or shaddock ("toronja"); *Triphasia trifolia* (Burm.) P. Wilson, the lime-berry ("limoncito"), a small tree, grown for ornament. Some of these trees have escaped from cultivation in the warmer parts of Mexico.

The citrus fruits were introduced into Mexico by the Spaniards immediately after the Conquest. Bernal Díaz del Castillo² claims for himself the honor of introducing the orange into Mexico, in 1518, while he was with Grijalva's expedition. His account is as follows: "As this country [in Tabasco, at the mouth of the Tonalá River] is infested by mosquitos, in order to avoid them I went to sleep in a large temple, near which I at this time sowed seven or eight seeds of oranges, which I had brought from Cuba. They grew very well, for the priests of the temple took care of them when they saw that they were uncommon plants. This I mention, because they were the first trees of the kind that ever grew in New Spain. After the conquest of Mexico, this province being considered as offering the greatest advantages, was chosen by most of the principal persons amongst the conquerors, of which number I was one; and on my arrival there I went in search of, and found my young trees flourishing, and having transplanted them, they all did very well."

¹ Often known incorrectly as *Citrus limetta*.

² True history of the Conquest of Mexico, translation by Keating, p. 23. 1800.

Fruit a drupe.

Leaves digitately 3 to 7-foliolate.

Style lateral-----1. **SARGENTIA**.

Style terminal-----2. **CASIMIROA**.

Leaves simple, 1-foliolate, or pinnate.

Style lateral; leaves linear or nearly so, simple-----3. **CNEORIDIUM**.

Style terminal; leaves compound, or, if simple, much broader than linear.

Stamens as many as the petals-----4. **STAURANTHUS**.

Stamens twice as many as the petals-----5. **AMYRIS**.

Fruit a capsule or samara, or of follicles.

Corolla gamopetalous; filaments more or less united with the corolla tube.

Leaves 1-foliolate-----6. **ERYTHROCHITON**.

Corolla polypetalous; filaments free from the petals.

Ovules 5 or more in each carpel. Leaves simple-----7. **THAMNOSMA**.

Ovules 2 or 1 in each carpel.

Fruit a samara or samara-like. Leaves digitate, the leaflets 3.

Carpels of the fruit separating at maturity; flowers usually perfect.

8. **HELIETTA**.

Carpels not separating; flowers polygamous.

Samara woody, wingless or nearly so-----9. **TARAVALIA**.

Samara not woody, surrounded by a broad wing-----10. **PTELEA**.

Fruit a capsule or of 1 or more follicles.

Stamens as many as the petals.

Flowers unisexual; plants usually armed with spines. Leaves pinnate-----11. **ZANTHOXYLUM**.

Flowers perfect; plants unarmed.

Leaves pinnate; fruit of 1 or 3 follicles-----12. **PILOCARPUS**.

Leaves simple, 1-foliolate, or digitate; fruit a woody capsule.

13. **ESENBECKIA**.

Stamens twice as many as the petals or more.

Calyx deciduous; leaves digitate.

Leaves alternate; sepals very unequal-----14. **PELTOSIGMA**.

Leaves opposite; sepals subequal-----15. **CHOISYA**.

Calyx persistent; leaves pinnate.

Ovary 2-celled. Leaflets 5 or 7, 3 to 7 mm. long.

16. **MEGASTIGMA**.

Ovary 5-celled.

Calyx of 5 distinct or nearly distinct sepals; leaflets 11 to 25, 6 to 12 mm. long.-----17. **POLYASTER**.

Calyx 5-dentate; leaflets 5 to 11, 2.5 to 10 cm. long.

18. **DECATROPIS**.

1. **SARGENTIA** S. Wats. Proc. Amer. Acad. 25:144. 1890.

1. **Sargentia greggii** S. Wats. Proc. Amer. Acad. 25: 144. 1890.

Nuevo León, Tamaulipas, and San Luis Potosí; type from Monterrey, Nuevo León.

Tree, sometimes 13 meters high; bark smooth, gray, peeling off in thin plates; leaves alternate, persistent, digitately 2 or 3-foliolate, 3 to 10 cm. long, obtuse or acutish, nearly glabrous, entire; flowers small, white; fruit fleshy, edible, 1.5 to 2 cm. long, yellow; seeds brown, 1.2 to 1.4 cm. long. "Limoncillo" (Tamaulipas, San Luis Potosí); "chapote amarillo" (Nuevo León); "naranjillo" (Tamaulipas).

The wood is said to be used for fuel, carts, and other purposes.

2. **CASIMIROA**¹ Llave & Lex. Nov. Veg. Descr. 2: 2. 1825.

Unarmed trees or shrubs; leaves persistent, alternate, digitate, the leaflets coriaceous, usually entire; flowers small, perfect; fruit a drupe, 2 to 5-celled, with a single seed in each cell.

Leaflets densely velvety-pubescent beneath.

Leaflets 3, obtuse; petioles 1.5 to 3 cm. long-----1. *C. pubescens*.

Leaflets usually 5, acuminate; petioles 3 to 12 cm. long-----2. *C. tetrameria*.

Leaflets glabrous beneath or nearly so, sometimes pilose along the costa.

Fruit 1.2 to 1.8 cm. in diameter-----3. *C. pringlei*.

Fruit 5 to 10 cm. in diameter.

Leaflets obtuse-----4. *C. watsonii*.

Leaflets acuminate.

Leaflets 5 or rarely 7, the lateral ones sessile or on short stout petiolules.

5. *C. edulis*.

Leaflets usually 3, the lateral ones on slender petiolules 1 to 3 cm. long.

6. *C. sapota*.

1. *Casimiroa pubescens* Ramírez, Anal. Inst. Med. Nac. Mex. 2: 19. pl. 5. 1896.

Querétaro and San Luis Potosí; type from El Madroño, Sierra Gorda, Querétaro, altitude 2,400 meters.

Shrub, about 2 meters high, much branched, densely pubescent; leaflets 3 or sometimes 1, oblong-obovate to elliptic, 4 to 6.5 cm. long; fruit depressed-globose, about 4 cm. broad, pubescent, the pulp white and scanty; seeds 5 or 6. "Zapote de rata" (Querétaro).

2. *Casimiroa tetrameria* Millsp. Field Mus. Bot. 1: 401. 1898.

Yucatán and Michoacán; type from Xcholac, Yucatán. Guatemala to Costa Rica.

Tree, 6 to 15 meters high, with rounded crown; leaflets oblong-ovate to elliptic, usually 7 to 16 cm. long, entire or obscurely crenate. "Matasano" (Costa Rica, Honduras).

The fruit of this species is not known to the writer, but it is probably similar to that of *C. edulis*. This species has been confused with *C. sapota*, but it is more closely related to *C. edulis*, of which it may be only a pubescent form.

3. *Casimiroa pringlei* (S. Wats.) Engl. in Engl. & Prantl, Pflanzenfam. 3⁴: 178, 1896.

Sargentia pringlei S. Wats. Proc. Amer. Acad. 26: 134. 1891.

Nuevo León, San Luis Potosí, and Durango; type from San José Pass, San Luis Potosí.

Shrub or small tree, 3 to 5 meters high, with grayish bark; leaflets 2 or 3, obovate or elliptic, 3 to 9 cm. long, obtuse or acutish, glabrous or nearly so, entire; flowers greenish yellow; fruit subglobose or oval, 1.2 to 1.8 cm. broad; seeds 10 to 12 mm. long.

¹The genus was dedicated to Casimiro Gómez, of whom the authors write as follows: "Casimiro Gómez, ad Cardonal ex tribu Ottemitarum edito, viro sobrio ac temperanti, in gerendo bello, prompto, sagaci animosissimo, ipsi, quod a luxu abhorrens, et se milites suos humili victu ac vestitu conservans ac ducens, exigua Ottemitarum manu, innumerabilia ac gloriosissima pro patriae bono gesserit."

4. *Casimiroa watsonii* Engler; P. Wilson, N. Amer. Fl. 25: 214. 1911.

Known only from the type locality, near Guadalajara, Jalisco.

Leaflets 3 or 4, elliptic to oblanceolate, 3 to 7.5 cm. long, entire or nearly so, glabrate; fruit sweet and edible, containing 1 or 2 seeds.

It seems rather doubtful whether this is distinct from *C. pringlei*.

5. *Casimiroa edulis* Llave & Lex. Nov. Veg. Descr. 2: 2. 1825.

Sonora to Jalisco; often cultivated; reported from many other parts of Mexico, but probably because of confusion with *C. sapota*. Guatemala.

Large or medium-sized tree, with broad dense crown; leaflets almost always 5, elliptic, oval, or broadly ovate, bright green, nearly or quite glabrous, often lustrous; flowers white; fruit 8 to 10 cm. broad, yellowish, with sweet pulp; seeds usually 5, 1.8 to 2.3 cm. long. The following names are reported, but most of them probably belong equally or exclusively to *C. sapota*: "Zapote blanco" (the most common name); "zapote;" "chapote;" "matasano" (Oaxaca); "cochitzapoti" (Nahuatl, "sleepy-zapote"); "iztactzapoti" (Nahuatl; "white-zapote"); "ccaxmuttza" (Otomí, *Buelna*).

This species may have a wider range than is indicated, but all the Mexican specimens seen by the writer come from the Pacific coast. It is not absolutely certain that this species, rather than *C. sapota*, is the one described by Llave and Lexarza, but their description seems to agree better with it.

The white sapote (including also *Casimiroa sapota*) is a well-known tree in Mexico, but is little grown outside that country. It is cultivated in the West Indies and has been introduced into southern California. The fruit varies in size and quality. It somewhat resembles an apple, and the best varieties are as large as a good-sized orange. The tender yellowish skin is thin, like that of an apple; the pulp is soft and cream-colored, of delicate texture, with a pleasant sweet flavor. The fruit ripens in July and August. It is much eaten in Mexico and is commonly sold in the markets.

The fruits are popularly believed to induce sleep if eaten in quantity, and to calm rheumatic pains. The bark, leaves, and especially the seeds are said to contain a glucoside, casimiroisine, which has a hypnotic and sedative effect upon cerebral centers. A small dose, it is stated, produces, at the end of an hour, deep sleep which lasts four to six hours. This principle, obtained chiefly from the seeds, has been used by Mexican physicians.

The white sapote is described by Hernández,¹ who says:

"The *Cochitzapoti* is a large irregular tree, with thin foliage of ternate leaves like those of the orange; the trunk is spattered with white spots; the flowers are yellow and medium-sized; the fruit, of the shape and size of a quince, is called by the Spaniards *Zapote blanco*; it is edible and of agreeable flavor, but it is not to be counted a wholesome food; the stone which it contains is a deadly poison. The bark of the tree is dry and somewhat sweet, with a certain bitterness; the leaves, crushed and applied to the nipples of the nurse, cure diarrhea in infants; the seeds, crushed and roasted, cure putrid ulcers and proud flesh, and by exciting suppuration produce new flesh and hasten healing; if eaten, the fruits induce drowsiness, whence the name. The tree grows in hot and cold regions."

6. *Casimiroa sapota* Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1857: 157. 1858.

San Luis Potosí and Querétaro to Jalisco and Oaxaca. Type from Nicaragua.

Tree, similar to the preceding species; leaflets nearly always 3, smaller and narrower, on very long petiolules. "Zapote" (Querétaro); "zapote blanco" (Jalisco); "matasano" (Nicaragua).

¹Thesaurus 89. 1651.

This species has been considered the same as *C. edulis*, but to the writer it seems amply distinct, the leaves of the two being very different. All the species of the genus are represented by inadequate herbarium material.

3. CNEORIDIUM Hook. f.; Benth. & Hook. Gen. Pl. 1: 312. 1862.

1. Cneoridium dumosum (Nutt.) Hook. f.; Baill. Hist. Pl. 4: 498. 1873.

Pitavia dumosa Nutt.; Torr. & Gray, Fl. N. Amer. 1: 215. 1838.

Baja California. Southern California; type from San Diego.

Densely branched shrub, 0.5 to 1.5 meters high; leaves opposite or fasciculate, linear or oblong-linear, 1.5 to 2.5 cm. long, green, entire or nearly so; flowers very small; fruit a capsule, 5 to 6 mm. broad.

4. STAURANTHUS Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 91. 1853.

Unarmed trees; leaves alternate, simple or unifoliolate, gland-dotted; flowers small, in terminal or axillary racemes or panicles; fruit a 1-seeded drupe.

Leaves 3.5 to 7 cm. wide, abruptly short-acuminate at apex; flowers racemose.

1. S. perforatus.

Leaves 1.5 to 2.5 cm. wide, gradually attenuate to apex; flowers mostly paniculate -----

2. S. konzattii.

1. Stauranthus perforatus Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 92. 1854.

Zanthoxylum ghiesbreghtii Turcz. Bull. Soc. Nat. Moscou 32¹: 274. 1859.

Veracruz; type collected between Totutla and Huatusco.

Glabrous tree; leaves unifoliolate, the petioles 0.8 to 2.2 cm. long, the leaflets oblong-elliptic, 10 to 18 cm. long.

2. Stauranthus konzattii Rose & Standl., sp. nov.

Type from Cerro San Antonio, Oaxaca, altitude 1,700 meters (*Konzatti* 2445; U. S. Nat. Herb. no. 841056).

Glabrous tree or shrub, with reddish brown branches; leaves simple, the petioles stout, 5 to 8 mm. long, subterete, the blades lanceolate or oblong-lanceolate, 6 to 9.5 cm. long, 1.3 to 2.5 cm. wide, rounded or obtuse at the base, gradually attenuate from the middle or lower to the acute or subobtuse apex, coriaceous, bright green, sublustrous above, the venation plane or prominulous, scarcely paler beneath, the costa slender but prominent, the other venation prominulous, conspicuously gland-dotted; flowers few, in small terminal or axillary racemes or panicles, the pedicels stout, 2 mm. long or shorter; calyx 1.8 mm. broad, the lobes very obtuse; ovary smooth; fruit globose, about 8 mm. in diameter; seed globose, 7 mm. in diameter.

Only one other species of the genus is known, *S. perforatus* Liebm. It differs from the present plant in having unifoliolate leaves, the leaflet being much larger and broader than the leaf of *S. konzattii*, and abruptly short-acuminate at the apex. The Veracruz plant, moreover, has longer petioles and axillary racemes. The flowers of *S. konzattii* are not known, and until they have been studied, the generic position of the plant must remain in doubt. It may be that it should be referred rather to *Amyris*.

5. AMYRIS L. Syst. Nat. ed. 10. 996. 1759.

Unarmed trees or shrubs; leaves opposite or alternate, pinnate, sometimes unifoliolate, the leaflets entire or crenulate; flowers small, perfect, paniculate, white or yellowish white; fruit a drupe.

Leaflet 1.

Petioles 2 to 5 mm. long ----- **1. A. monophylla.**

Petioles 15 to 24 mm. long ----- **2. A. rekoi.**

Leaflets 3 or more.

Leaves opposite.

Leaflets usually 7 to 11, sometimes 5, densely puberulent beneath.

3. *A. madreensis*.

Leaflets 3 or 5, glabrous beneath or nearly so.

Lateral leaflets subcordate at base, rounded at apex, pale beneath.

4. *A. purpusi*.

Lateral leaflets obtuse at base, acuminate at apex, green beneath.

5. *A. balsamifera*.

Leaves alternate.

Leaflets 1 to 3 cm. long, 0.5 to 1.5 cm. wide, the terminal one short-stalked.

6. *A. texana*.

Leaflets 3 to 10 cm. long, 2 to 9 cm. wide, the terminal one long-stalked.

Petioles not winged; leaflets acute, ovate or rhombic-ovate.

7. *A. sylvatica*.

Petioles usually winged; leaflets acuminate, elliptic to rhombic-lanceolate.

8. *A. thyrsoiflora*.

1. *Amyris monophylla* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 381. 1909.

Oaxaca and Puebla; type from San Luis Tultitlanapa, Puebla.

Glabrous shrub; leaflet ovate to oval, 2.5 to 5 cm. long, rounded or obtuse at apex, coriaceous, entire or nearly so.

2. *Amyris rekoii* Blake, Contr. Gray Herb. n. ser. 53: 56. 1918.

Tepic and Oaxaca; type from Cafetal Nueva Esperanza, Department of Pochutla, Oaxaca, altitude 700 meters.

Glabrous tree or shrub; leaflet lance-ovate to oblong-ovate, 6.5 to 11.5 cm. long, acuminate; fruit bluish black, 5 mm. in diameter.

3. *Amyris madreensis* S. Wats. Proc. Amer. Acad. 25: 144. 1890.

Nuevo León and San Luis Potosí; type from mountains near Monterrey, Nuevo León. Southwestern Texas.

Very leafy shrub; leaflets rhombic, 1.5 to 3 cm. long, coriaceous, entire or crenate; fruit 10 to 12 mm. long.

4. *Amyris purpusi* P. Wilson, Bull. Torrey Club 37: 86. 1910.

Known only from the type locality, Zacuapan, Veracruz.

Small tree; leaflets 3, oval or ovate, 2 to 4 cm. long, entire or nearly so.

5. *Amyris balsamifera* L. Syst. Nat. ed. 10. 1000. 1759.

Sinaloa to Guerrero. West Indies, South America, and southern Florida; type from Jamaica.

Shrub or tree, sometimes 7 meters high, with a trunk 20 cm. in diameter; leaflets 3 or 5, 5 to 13 cm. long, entire or crenulate; flowers white; fruit obovoid or elliptic, 6 to 13 mm. long, bluish black, aromatic; wood hard, close-grained, orange, very resinous, its specific gravity about 1.04. "Limoncillo" (Sinaloa).

The Mexican material may represent a distinct species, but the material at hand is too incomplete to determine this point.

6. *Amyris texana* (Buckl.) P. Wilson, Torreya 8: 139. 1908.

Zanthoxylum texanum Buckl. Bull. Torrey Club 10: 90. 1883.

Amyris parvifolia A. Gray, Proc. Amer. Acad. 23: 226. 1888.

Nuevo León. Western Texas; type from Corpus Christi.

Glabrous aromatic shrub, 1 to 2 meters high, leaflets 3, ovate, obtuse.

"Chapotillo" (Nuevo León).

7. *Amyris sylvatica* Jacq. Stirp. Amer. 107. 1763.

Veracruz and perhaps elsewhere. Central America, West Indies, and northern South America; type from Cartagena, Colombia.

Glabrous shrub or tree, 2 to 9 meters high; leaflets crenate, bright green; fruit 4.5 to 7 mm. long, black or reddish. "Tea" (Porto Rico).

8. *Amyris thyrsoflora* Turcz. Bull. Soc. Nat. Moscou 31¹: 475. 1858.

Veracruz.

Glabrous shrub or tree; leaflets crenate or entire, coriaceous, lustrous; flowers white, fragrant.

6. *ERYTHROCHITON* Nees & Mart. Nov. Act. Acad. Caes. Leop. Carol. 11: 151. 1823.

1. *Erythrochiton lindeni* (Baill.) Hemsl. Biol. Centr. Amer. Bot. 1: 166. 1879.

Toxosiphon lindeni Baill. Adansonia 10: 312. 1872.

Tabasco; type from Teapa. Central America.

Shrub, about 2 meters high; leaves long-petiolate, the leaflet 1, oval or elliptic, 10 to 35 cm. long, entire, glabrous; flowers white, in scorpioid cymes, the sepals 2 to 4 cm. long.

7. *THAMNOSMA* Torr. & Frém. in Frém. Rep. Exped. Rocky Mount. 313. 1845.

Erect shrubs or sometimes herbs; leaves alternate, linear or reduced to scales, entire; flowers small, racemose; fruit a 2-lobed capsule.

Petals 3 to 5 mm. long; leaves present; seeds 1.5 to 2 mm. long—1. *T. texana*.

Petals 8 to 14 mm. long; leaves usually absent; seeds 4 to 6 mm. long

2. *T. montana*.

1. *Thamnosma texana* (A. Gray) Torr. U. S. & Mex. Bound. Bot. 42. 1859.

Rutosma texana A. Gray, Gen. Fl. Amer. 2: 144. 1849.

Chihuahua to Nuevo León and San Luis Potosí. Western Texas (type locality) to Colorado and Arizona.

Slender shrub, 50 cm. high or less, or often herbaceous; leaves linear, 5 to 15 mm. long; flowers yellowish or purplish.

2. *Thamnosma montana* Torr. & Frém. Rep. Exped. Rocky Mount. 313. 1845.

Northern Baja California and probably northern Sonora. California to Arizona and Utah; type from Nevada.

Glandular shrub, 30 to 60 cm. high, the branches often spinose, yellowish green; leaves 5 to 10 mm. long but early deciduous; flowers purple. "Cordoncillo" (Arizona).

A decoction of the plant is used by the Pima and Apache Indians as a remedy for gonorrhoea, and in Arizona it is employed as a general tonic and blood purifier.

8. *HELIETTA* Tulasne, Ann. Sci. Nat. III. 7: 280. 1847.

1. *Helietta parvifolia* (A. Gray) Benth. in Hook. Icon. Pl. 14: 66. 1882.

Ptelea parvifolia A. Gray; Hemsl. Biol. Centr. Amer. Bot. 1: 170. 1879.

Coahuila to Tamaulipas and Querétaro; type from Carrizal, Nuevo León. Western Texas.

Shrub or tree, sometimes 8 meters high, with a slender trunk 15 cm. in diameter; bark thin, dark brown, scaly; leaves opposite, persistent, digitate, the leaflets 3, obovate, 1 to 5 cm. long, obtuse, usually entire, glabrous, flowers small, white, cymose; fruit 6 to 8 mm. long, with thin wings; wood hard, close-grained, orange-brown, the specific gravity about 0.88. "Barreta" (Nuevo León, Tamaulipas, Coahuila, Texas).

9. TARAVALIA Greene, Leaflets 1: 222. 1906.**1. Taravalia aptera** (Parry) Greene, Leaflets 1: 222. 1906.*Ptelea aptera* Parry, Proc. Davenport Acad. 4: 39. 1884.*Ptelea nucifera* Greene, Contr. U. S. Nat. Herb. 10: 75. 1906.*Ptelea obscura* Greene, Contr. U. S. Nat. Herb. 10: 76. 1906.

Baja California; type from Bahia de Todos Santos.

Shrub or small tree, sometimes 5 meters high; leaves alternate, digitate, the leaflets 3, gland-dotted, 1 to 3 cm. long, obtuse or acute; flowers few, small, white; fruit nutlike, indehiscent.

10. PTELEA L. Sp. Pl. 118. 1753.**1. Ptelea trifoliata** L. Sp. Pl. 118. 1753.*Ptelea pentandra* Moc. & Sessé; DC. Prodr. 2: 83. 1825.*Ptelea angustifolia* Benth. Pl. Hartw. 9. 1839.*Ptelea subintegra* Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.*Ptelea coahuilensis* Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.*Ptelea obtusata* Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.*Ptelea pumila* Greene, Contr. U. S. Nat. Herb. 10: 61. 1906.*Ptelea scutellata* Greene, Contr. U. S. Nat. Herb. 10: 62. 1906.*Ptelea cuspidata* Greene, Contr. U. S. Nat. Herb. 10: 62. 1906.*Ptelea sancta* Greene, Contr. U. S. Nat. Herb. 10: 63. 1906.*Ptelea glauca* Greene, Contr. U. S. Nat. Herb. 10: 64. 1906.*Ptelea acutifolia* Greene & Rose, Contr. U. S. Nat. Herb. 10: 68. 1906.*Ptelea megacarpa* Rose; Greene, Contr. U. S. Nat. Herb. 10: 68. 1906.*Ptelea laetissima* Greene & Rose, Contr. U. S. Nat. Herb. 10: 69. 1906.

Sonora to Tamaulipas and Oaxaca. Widely distributed in the United States.

Shrub or small tree, sometimes 7 meters high, with a trunk 20 cm. in diameter, the whole plant with a disagreeable odor; bark thin, smooth or nearly so, dark gray, reddish brown on young branches; leaves alternate, digitately 3-foliate, the leaflets very variable in shape and size, glabrous or pubescent; flowers greenish white, cymose; fruit a samara, 1 to 2.5 cm. long; wood hard, close-grained, yellowish brown, its specific gravity about 0.83. "Cola de zorrillo" (Chihuahua).

In the United States, where the plant is known as "hop-tree" and "wafer-ash," the fruit has been employed as a substitute for hops. The root has a bitter, pungent, and slightly acrid but not disagreeable taste and a somewhat aromatic odor. It contains the alkaloid berberine. It has been employed as a remedy for dyspepsia and as a mild tonic.

Many segregates from this species have been published besides the Mexican ones cited above. The species exhibits a large amount of variation, but it seems impossible to divide the specimens into groups by any constant character. Wilson, in the North American Flora, has recognized three species, but the key characters given for the species are obviously of little value. Of the Mexican segregates, *P. pumila* is the most distinct, because of its very small leaflets.

11. ZANTHOXYLUM L. Sp. Pl. 270. 1753.

Shrubs or trees, often armed with spines; leaves alternate, even-pinnate, odd-pinnate, or rarely unifoliate, deciduous or persistent, the leaflets entire or crenulate; flowers small, whitish or yellowish; fruit of 1 to 5 follicles.

The dried bark of two United States species, *Z. americanum* Mill. and *Z. clava-herculis* L., which are known as "prickly ash," is official in the U. S. Pharmacopoeia. It contains one or more alkaloids and is used as a stimulant

and, externally, as a counter irritant, especially in the treatment of chronic rheumatism. One of the Australian species is reported to be a violent convulsive poison, and is said to be used by the natives for poisoning fish.

Leaves even-pinnate.

Sepals and petals each 4 or 5-----19. *Z. microcarpum*.

Sepals and petals each 3.

Follicles 4 to 4.8 mm. long, blackish; marginal glands of the leaflets obsolete.
1. *Z. pringlei*.

Follicles 5 to 7 mm. long, brown; marginal glands of the young leaflets conspicuous-----2. *Z. procerum*.

Leaves odd-pinnate.

Leaflets rounded or very obtuse at apex, small, 1.5 cm. wide or narrower.

Leaflets 3-----3. *Z. liebmannianum*.

Leaflets 5 or more.

Leaflets 25 to 61-----4. *Z. elegantissimum*.

Leaflets 5 to 17.

Flowers in short, often lateral spikes or spikelike racemes.

Follicles 3.5 to 4 mm. broad, the stipe usually long and slender.

5. *Z. fagara*.

Follicles 4 to 5.5 mm. broad, the stipe short and stout--6. *Z. affine*.

Flowers usually in terminal or lateral panicles or in long slender racemes.

Calyx of oblong or ovate, distinct sepals-----7. *Z. purpusii*.

Calyx of triangular or suborbicular lobes, persistent.

Leaflets 7 to 15; follicles 5 to 7 mm. long-----8. *Z. insulare*.

Leaflets 5 or 7; follicles 3.5 to 4 mm. long-----9. *Z. culantrillo*.

Leaflets acute or acuminate, or, if obtuse, 2.5 cm. wide or larger.

Sepals 4; leaflets 3 or rarely 5-----10. *Z. limoncello*.

Sepals 5; leaflets 5 or more in most of the leaves.

Branches of the inflorescence corky-thickened; plants glabrous or nearly so.

Seeds 4 to 5 mm. long; follicles 4.5 to 8 mm. long; leaflets abruptly short-pointed-----11. *Z. caribaeum*.

Seeds 6 to 8 mm. long; follicles 9 to 15 mm. long; leaflets usually tapering to an acuminate tip.

Follicles sessile-----12. *Z. nelsoni*.

Follicles with a slender stipelike base-----13. *Z. elephantiasis*.

Branches of the inflorescence not corky-thickened; plants glabrous or pubescent.

Sepals suborbicular, strongly imbricate in flower---14. *Z. bijugum*.

Sepals oblong or ovate, not strongly imbricate in flower.

Leaflets glabrous-----15. *Z. melanostictum*.

Leaflets more or less pubescent beneath.

Calyx of distinct sepals, deciduous-----16. *Z. mollissimum*.

Calyx of united sepals, persistent.

Follicles 6 to 8 mm. long; pedicels stout; leaflets 9 to 14 cm. long-----17. *Z. goldmani*.

Follicles 4.5 to 5.5 long; pedicels slender; leaflets 5 to 7.5 cm. long-----18. *Z. arborescens*.

1. *Zanthoxylum pringlei* S. Wats. Proc. Amer. Acad. 26: 134. 1891.

Known only from the type locality, Tamasopo Canyon, San Luis Potosí.

Tree, sometimes 13 meters high, the trunk 30 cm. in diameter, grayish, armed with short stout spines; leaflets 4 to 10, oblong, 3 to 7 cm. long, acute

or acuminate, glabrous, entire; flowers in large dense terminal panicles; fruit with an odor of camphor.

2. *Zanthoxylum procerum* Donn. Smith, Bot. Gaz. 23: 4. 1897.

Oaxaca. Costa Rica; type from Santa María de Dota.

Nearly glabrous tree, 10 to 15 meters high, armed with spines, even on the leaf rachis; leaflets 4 to 12, oblong to elliptic, 6.5 to 17 cm. long, abruptly acuminate, lustrous, nearly entire; flowers white, in large terminal corymbs. "Palo de ropa" (Oaxaca); "lagartillo" (Costa Rica).

3. *Zanthoxylum liebmannianum* (Engl.) P. Wilson, Bull. Torrey Club 37: 85. 1910.

Fagara liebmanniana Engl. Bot. Jahrb. Engler 21: Beibl. 54: 20. 1896.

Zanthoxylum longipes Rose, Contr. U. S. Nat. Herb. 5: 163. 1899.

Puebla and Oaxaca; type from San Juan del Estado, Oaxaca.

Shrub or small tree, 3 to 4.5 meters high, unarmed or sparsely prickly; leaflets 1 to 3 cm. long, yellowish green, crenulate; seeds black, lustrous.

4. *Zanthoxylum elegantissimum* (Engl.) P. Wilson, Bull. Torrey Club 37: 85. 1910.

Fagara elegantissima Engl. Bot. Jahrb. Engler 21: Beibl. 54: 25. 1896.

Veracruz; type from Chiconquiaco.

Glabrate shrub with slender flexuous branches, armed with small prickles; leaflets oval-oblong, 4 to 10 mm. long, entire or nearly so; flowers in large terminal panicles.

5. *Zanthoxylum fagara* (L.) Sarg. Gard. & For. 3: 186. 1890.

Schinus fagara L. Sp. Pl. 389. 1753.

Fagara pterota L. Syst. Nat. ed. 10. 897. 1759.

Fagara lentiscifolia Humb. & Bonpl.; Willd. Enum. Pl. 165. 1809.

Zanthoxylum pterota H. B. K. Nov. Gen. & Sp. 6: 3. 1823.

?*Zanthoxylum marginatum* Sessé & Moc. Fl. Mex. ed. 2. 231. 1894.

Baja California and Sonora to Tamaulipas, Veracruz, Yucatán, and Chiapas. Florida and Texas; Central America; West Indies; South America; type from Jamaica.

Shrub or tree, sometimes 10 meters high, with a strong odor; bark thin, gray, covered with thick corky projections, the branches armed with hooked prickles; leaf rachis broadly winged, the leaflets 5 to 13, 0.7 to 2.5 cm. long, crenulate; flowers yellowish green, dioecious; wood yellow, very hard, compact, reddish brown, the specific gravity about 0.74. "Colima" (Nuevo León, Tamaulipas, Chihuahua, Texas); "limoncillo" (Sinaloa, Cuba); "xic-ché" (Yucatán, Maya); "uña de gato" (Tamaulipas, Colombia); "palo mulato" (Jalisco, Ramírez); "tomeguín," "espino" (Cuba); "espino rubial" (Porto Rico); "correosa" (Texas); "uñagato" (Tamaulipas).

Known in the Bahamas as "wild lime." The young leaves are frequently tinged with bronze. A decoction of the leaves is used in domestic medicine; that of the bark is said to be sudorific and to act as an arterial and nervous stimulant. The leaves and bark have a pungent and acrid flavor, and have been used as a spice. The bark is said to give a yellow dye.

6. *Zanthoxylum affine* H. B. K. Nov. Gen. & Sp. 6: 3. 1823.

Michoacán to Hidalgo and Puebla; type from Lake Cuitzeo, Michoacán.

Shrub or small tree, 3 to 4.5 meters high, armed with slender prickles; leaf rachis winged, the leaflets 7 to 17, 0.5 to 1.5 cm. long, entire or crenulate. "Palo mulato" (Michoacán, Ramírez).

7. *Zanthoxylum purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 381. 1909.
Known only from the type locality, San Luis Tultitlanapa, Puebla.

Densely branched, spiny shrub, 1 to 2 meters high; leaflets 5 or 7, 5 to 15 mm. long, crenulate.

8. *Zanthoxylum insulare* Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 79. 1899.
Tres Mariás and Socorro islands; type from María Madre Island. Jamaica; northern South America.

Glabrous shrub or tree, 4 to 18 meters high, the trunk grayish, armed with corky spines 1.5 to 3 cm. long; branches usually unarmed; leaflets 1.5 to 7 cm. long, coarsely crenate.

9. *Zanthoxylum culantrillo* H. B. K. Nov. Gen. & Sp. 6: 2. 1823.

Morelos. Guatemala to Peru; type from Peru.

Shrub or small tree, pubescent; leaf rachis winged, the leaflets 0.7 to 3.5 cm. long, crenate or nearly entire; flowers yellowish green.

10. *Zanthoxylum limoncello* Planch. & Oerst.; Triana & Planch. Ann. Sci. Nat. V. 14: 312. 1872.

Zanthoxylum foetidum Rose, Contr. U. S. Nat. Herb. 5: 112. 1897.

Morelos. Central America; type from Volcán de Chiriquí, Panama.

Shrub or small tree, 2 to 6 meters high, armed with stout prickles; leaf rachis not winged, the leaflets 2 to 7.5 cm. long, nearly glabrous; flowers greenish, with unpleasant odor. "Limoncillo," "zorrillo" (Costa Rica).

11. *Zanthoxylum caribaeum* Lam. Encycl. 2: 39. 1786.

Zanthoxylum occidentale Rose, Contr. U. S. Nat. Herb. 5: 164. 1899.

Sinaloa and Tepic. West Indies and northern South America; type from Barbados.

Tree, 5 to 20 meters high, the trunk spiny; leaf rachis terete, the leaflets 7 to 13, 4.5 to 12 cm. long, glabrate, crenate. "Zorrillo" (Sinaloa); "espino rubial" (Porto Rico).

In the West Indies the bitter bark has been used for fevers and venereal diseases. The wood is said to be very durable.

12. *Zanthoxylum nelsoni* Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 79. 1899.
Known only from the type locality, María Madre Island, Tepic.

Glabrous tree, 7.5 to 20 meters high; leaf rachis terete, the leaflets 11 to 15, 4.5 to 10 cm. long, crenulate, conspicuously gland-dotted.

13. *Zanthoxylum elephantiasis* Macfad. Fl. Jam. 1: 193. 1837.

Veracruz and perhaps elsewhere. Costa Rica and Panama; West Indies; type from Jamaica.

Tree, 5 to 18 meters high, the trunk sometimes 50 cm. in diameter; bark grayish, covered with large corky sharp-pointed cushions; branches prickly; leaf rachis terete, often prickly, the leaflets 5 to 17, 3.5 to 10.5 cm. long; flowers greenish yellow; sapwood thick, light brown, or nearly white, the heartwood darker, tinged with yellow, hard, light, fine-grained, taking a good polish, durable in the ground. "Ruda" (Panama); "pino macho" (Santo Domingo).

14. *Zanthoxylum bijugum* (Engl.) P. Wilson, Bull. Torrey Club 37: 86. 1910.
Fagara bijuga Engl. Bot. Jahrb. Engler 21: Beibl. 54: 23. 1896.

Known only from the type locality, Tlacolula, Oaxaca.

Pubescent tree; leaflets 5, coriaceous, 2.5 to 6 cm. long.

15. *Zanthoxylum melanostictum* Schlecht. & Cham. Linnaea 5: 231. 1830.

?*Fagara crassifolia* Engl. Bot. Jahrb. Engler 21: Beibl. 54: 21. 1896.

Veracruz and probably elsewhere.

Shrub or tree, unarmed or prickly; leaflets 3 to 7, coriaceous, 6 to 15 cm. long, entire or crenulate.

16. *Zanthoxylum mollissimum* (Engl.) P. Wilson, Bull. Torrey Club 37: 86. 1910.

Fagara mollissima Engl. Bot. Jahrb. Engler 21: Beibl. 54: 22. 1896.

Known only from the type locality, Mina de Dolores.

Leaflets 9 to 11, 4 to 8.5 cm. long, entire or nearly so, densely pubescent.

17. *Zanthoxylum goldmani* Rose; P. Wilson, N. Amer. Fl. 25: 195. 1911.

Known only from the type locality, between Culiacán and Las Flechas, Sinaloa.

Branches prickly; leaflets 7, coriaceous, crenate, pubescent beneath.

18. *Zanthoxylum arborescens* Rose, Contr. U. S. Nat. Herb. 5: 112. 1897.

Zanthoxylum peninsulare T. S. Brandeg. Zoe 5: 249. 1908.

Southern Baja California and Sinaloa; type from Imala, Sinaloa.

Small tree, 3 to 4 meters high, the branches unarmed or with few short prickles; leaflets 3 to 7, pubescent.

19. *Zanthoxylum microcarpum* Griseb. Fl. Brit. W. Ind. 138. 1859.

Fagara microcarpa Krug & Urb.; Urban, Bot. Jahrb. Engler 21: 570. 1896.

Oaxaca. Costa Rica; Lesser Antilles; South America; type from Dominica.

Tree, sometimes 13 meters high, the bark covered with stout compressed prickles; leaflets 10 to 30, oblong or oblong-lanceolate, 3 to 9 cm. long, acute, serrate-crenate, pubescent or glabrate; panicles terminal, 10 to 15 cm. long; follicles 1 or 2, 4 to 5 mm. in diameter.

DOUBTFUL SPECIES.

FAGARA FALCIFOLIA Engl. Bot. Jahrb. Engler 21: Beibl. 54: 24. 1896. Type from Mirador, Veracruz. Based upon sterile specimens.

ZANTHOXYLUM PENTANOME DC. Prodr. 1: 725. 1824. Described from Mexico. Referred doubtfully by Wilson to synonymy under *Z. monophyllum* (Lam.) P. Wilson. That, however, is not represented by herbarium specimens from Mexico. It is distinguished by 1-foliolate leaves. The name *Z. pentanome* has been much used in works relating to Mexican plants. Some species so named is reported to be a remedy for the "vómito negro" and for venereal diseases. It is said to be known as "palo mulato."

12. *PILOCARPUS* Vahl, Eclog. Amer. 1: 29. 1796.

The leaves of *P. jaborandi* Holmes and *P. microphyllus* Stapf, of Brazil, are official in the U. S. Pharmacopoeia, and leaves of other species also are used. They contain two alkaloids, pilocarpine and jaborine, which are the most reliable of diaphoretics. They are widely employed for the treatment of dropsy, pleurisy, rheumatism, Bright's disease, and similar affections.

1. *Pilocarpus longipes* Rose, Contr. U. S. Nat. Herb. 5: 112. 1897.

Pilocarpus insularis Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 80. 1899.

Tepic to Guerrero; type from Acapulco, Guerrero.

Unarmed shrub or tree, 2 to 6 meters high; leaves alternate, pinnate, the leaflets usually 3 or 5, oblong to obovate, 3 to 10 cm. long, obtuse or retuse, entire, glabrous; flowers small, racemose; fruit of 1 or 3 carpels, these conspicuously ridged; seeds large, black.

Perhaps not essentially different from *P. racemosus* Vahl, of the West Indies.

13. *ESENBECKIA* H. B. K. Nov. Gen. & Sp. 7: 246. 1825.

Unarmed trees or shrubs; leaves alternate or rarely opposite, simple or 1 to 5-foliolate, the leaflets gland-dotted; flowers small, perfect, racemose or paniculate; fruit a hard woody capsule, very rough outside.

Leaves simple, the petioles not jointed.

Fruit about 2 cm. broad; petioles 1 to 12 mm. long-----1. *E. hartmanii*.

Fruit 3 to 4 cm. broad; petioles 10 to 35 mm. long-----2. *E. flava*.

Leaves compound, with 3 or 5 leaflets.

Leaflets densely pubescent beneath-----3. *E. macrantha*.

Leaflets glabrous beneath or nearly so.

Inflorescence racemose, few-flowered; leaves short-petiolate, the glands large and conspicuous-----4. *E. collina*.

Inflorescence paniculate; leaves long-petiolate, with small inconspicuous glands.

Sepals puberulent outside; flowers 6 to 8 mm. broad--5. *E. pentaphylla*.

Sepals glabrous outside; flowers 5 to 5.5 cm. broad---6. *E. berlandieri*.

1. *Esenbeckia hartmanii* Robins. & Fern. Proc. Amer. Acad. 30: 115. 1894.

Sonora and Sinaloa; type from La Tinaja, Sonora.

Shrub, 2 to 3 meters high, with thick stiff branches; leaves oblong to oval, entire, 2 to 8 cm. long, rounded or retuse at apex, pubescent beneath.

2. *Esenbeckia flava* T. S. Brandeg. Zoe 1: 378. 1891.

Southern Baja California; type from San José del Cabo.

Shrub or small tree, sometimes 9 meters high, with a trunk 20 cm. in diameter; leaves oblong or oval, 5 to 14 cm. long, pubescent beneath; flowers white, 1.4 cm. broad; fruit covered with spinelike projections; wood yellow. "Palo amarillo."

3. *Esenbeckia macrantha* Rose, Contr. U. S. Nat. Herb. 5: 111. 1897.

Oaxaca and Puebla; type collected near Dominguito, Oaxaca.

Tree, 4 to 6 meters high; leaflets 3, 15 to 20 cm. long, obtuse or short-acuminate; flowers white, 8 to 10 mm. broad; fruit 3 cm. broad.

4. *Esenbeckia collina* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 183. 1915.

Known only from the type locality, Cerro del Picacho, Oaxaca.

Leaflets 3, 3 to 5 cm. long, rounded or retuse at apex.

5. *Zanthoxylum fagara* (L.) Sarg. Gard. & For. 3: 186. 1890.

Galipea pentaphylla Macfad. Fl. Jam. 1: 196. 1837.

Yucatán. Jamaica (type locality).

Tree, sometimes 15 meters high, with brownish or grayish bark; leaflets usually 5, 6 to 17 cm. long; flowers yellowish white. "Yax-hocob" (Yucatán, Maya).

The plant of Yucatán may not be distinct from *E. berlandieri*.

6. *Esenbeckia berlandieri* Baill. Adansonia 10: 151. 1871.

Esenbeckia acapulcensis Rose, Contr. U. S. Nat. Herb. 5: 111. 1897.

Esenbeckia ovata T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 327. 1920.

Guerrero, Tamaulipas, San Luis Potosí, and Veracruz; type from Tampico, Tamaulipas.

Tree, 4.5 to 6 meters high, with a trunk 7 to 12 cm. in diameter; leaflets 3 or 5, dark green, 4 to 17 cm. long, rounded at apex. "Jopoy" (Tamaulipas, Palmer).

14. *PELTOSTIGMA* Walp. Repert. Bot. 5: 386. 1846.

1. *Peltostigma pteleoides* (Hook.) Walp. Repert. Bot. 5: 387. 1846.

Pachystigma pteleoides Hook. Icon. Pl. pl. 698, 699. 1844.

Hidalgo and probably elsewhere. Central America; Jamaica (type locality).

Tree, 5 to 8 meters high; leaves alternate, digitately 3 or 5-foliate, the leaflets 5 to 20 cm. long, acute or acuminate, bright green, glabrate, entire or nearly so; flowers white, fragrant, 3 to 5.5 cm. broad; fruit of 6 to 10 large hard carpels.

15. CHOISYA H. B. K. Nov. Gen. & Sp. 6: 4. 1823.

REFERENCE: Standley, Proc. Biol. Soc. Washington 27: 221-224. 1914.

Unarmed shrubs; leaves opposite or subopposite, persistent, digitately 3 to 13-folliolate; flowers perfect, white, in axillary cymes; fruit of 3 or 5 carpels.

Leaflets 3, oblong to ovate, 5 to 30 mm. wide.....1. *C. ternata*.

Leaflets 5 to 13, linear, 1 to 4 mm. wide.

Pubescence of the pedicels of minute appressed hairs. Leaflets 8 to 13.

2. *C. dumosa*.

Pubescence of the pedicels of slender spreading hairs.

Leaflets 3 to 5, 2 to 4 mm. wide, broadest at or above the middle, the margins plane or nearly so, repand-denticulate.....3. *C. mollis*.

Leaflets usually 7 to 11, rarely 5, 1.3 mm. wide or narrower, of uniform width throughout, the margins strongly revolute, entire or nearly so.

4. *C. palmeri*.

1. *Choisya ternata* H. B. K. Nov. Gen. & Sp. 6: 6. 1823.

Juliania caryophyllata Llave & Lex. Nov. Veg. Descr. 2: 4. 1825.

Puebla and Oaxaca; reported from San Luis Potosí and the Valley of Mexico; often cultivated in gardens.

Aromatic shrub; leaflets 2 to 8 cm. long, rounded or emarginate at apex, entire, glabrate; petals white, 1 to 1.5 cm. long. "Hierba del clavo" (Oaxaca, San Luis Potosí, Valley of Mexico); "flor del clavo" (Valley of Mexico, Ramírez); "clavillo," "clavo de olor" (Conzatti).

The infusion of the plant is reputed to have antispasmodic properties.

2. *Choisya dumosa* (Torr.) A. Gray, Proc. Amer. Acad. 23: 224. 1888.

Astrophyllum dumosum Torr. U. S. Rep. Expl. Miss. Pacif. 2³: 161. 1854.

Chihuahua and Coahuila. Western Texas and southern New Mexico; type from New Mexico.

Shrub, 1 to 1.5 meters high, the branches and petioles roughened with large glands; leaflets 1 to 4 cm. long; petals about 8 mm. long. "Zorrillo" (New Mexico).

3. *Choisya mollis* Standl. Proc. Biol. Soc. Washington 27: 223. 1914.

Known only from the type locality, which is not definitely known but is probably in northern Sonora.

Leaflets 1.2 to 4 cm. long, rounded at apex.

4. *Choisya palmeri* Standl. Proc. Biol. Soc. Washington 27: 234. 1914.

Coahuila and Zacatecas; type from Chojo Grande, Coahuila.

Leaflets 0.6 to 1.7 cm. long; follicles 5 to 6 mm. long, glandular.

16. MEGASTIGMA Hook. f.; Benth & Hook. Gen. Pl. 1: 299. 1862.

1. *Megastigma galeottii* Baill. Adansonia 10: 331. 1872.

Fagara pumila Engl. Bot. Jahrb. Engler 21: Beibl. 54: 21. 1896.

Puebla and Oaxaca; type from cactus plains of Oaxaca.

Small straggling shrub with crooked branches; leaves alternate, pinnate, the leaflets 5 or 7, ovate to orbicular, 3 to 7 mm. long, entire; flowers white, short-racemose, the petals 2 to 2.5 mm. long; fruit a follicle, 2.5 to 3 mm. in diameter.

17. POLYASTER Hook. f.; Benth. & Hook. Gen. Pl. 1: 299. 1862.

1. *Polyaster boronioides* Hook. f.; Benth. & Hook. Gen. Pl. 1: 299. 1862.

?*Zanthoxylum inerme* Sessé & Moc. Fl. Mex. ed. 2. 230. 1894.

Polyaster ehrenbergii Engl. Bot. Jahrb. Engler 21: Beibl. 54: 26. 1896.

Tamaulipas to Hidalgo; type from Zimapán, Hidalgo.

Shrub, 2 meters high, unarmed; leaves alternate, pinnate, the rachis narrowly winged, the leaflets 11 to 25, oblong, 6 to 12 mm. long, minutely crenulate; flowers small, paniculate; fruit of 2 to 5 small carpels.

Sessé and Mociño give the vernacular name of *Zanthoxylum inerme* as "gobernadora."

18. DECATROPIS Hook. f.; Benth. & Hook. Gen. Pl. 1: 298. 1862.

1. *Decatropis bicolor* (Zucc.) Radlk. Sitzungsab. Math. Phys. Akad. Wiss. München 16: 306. 1886.

Simaba bicolor Zucc. Flora 15²: Beibl. 72. 1832.

Decatropis coulteri Hook. f.; Benth. & Hook. Gen. Pl. 1: 299. 1862.

Nuevo León, Tamaulipas, Veraacruz, and Hidalgo.

Shrub or small tree, 2 to 7 meters high, unarmed; leaves alternate, pinnate, the leaflets 5 to 11, lanceolate, 2.5 to 10 cm. long, thick, acute, green above, tomentose beneath; flowers small, white, in large terminal panicles; fruit of 2 to 5 small carpels.

69. KOEBERLINIACEAE. Junco Family.

REFERENCE: Barnhart, N. Amer. Fl. 25: 101-102. 1910.

1. **KOEBERLINIA** Zucc. Flora 15²: Beibl. 73. 1832.

1. *Koeberlinia spinosa* Zucc. Flora 15²: Beibl. 73. 1832.

Northeastern Sonora to Tamaulipas and Hidalgo. Western Texas to southern Arizona.

Shrub or tree, sometimes 8 meters high, with a trunk 30 cm. in diameter, the branches short, stiff, green, spine-tipped; leaves alternate, minute, scale-like, soon deciduous; flowers small, greenish, short-racemose; fruit a small berry; wood hard, close-grained, dark brown or nearly black, its specific gravity about 1.12. Known generally in Mexico and Texas as "junco"; "abrojo" (*Ochoterena*); "corona de Cristo" (Arizona).

The wood is resinous and burns readily, giving off a disagreeable odor. The plant is little more than a great mass of spines, and often forms impenetrable thickets.

70. SURIANACEAE. Bay-cedar Family.

1. **SURIANA** L. Sp. Pl. 284. 1753.

1. *Suriana maritima* L. Sp. Pl. 284. 1753.

Yucatán. On coastal sands and rocks, Florida, West Indies, South America, and in the Old World; type from Bermuda.

Shrub or small tree, sometimes 8 meters high, with a trunk 30 cm. in diameter, but usually much smaller; bark rough, irregularly fissured, brown; leaves alternate, thick, linear-spatulate, 1.5 to 4 cm. long, entire, densely pubescent; flowers small, yellow, clustered; sepals 5, persistent; petals 5, imbricate, 7 to 9 mm. long, erose at apex; fruit of small carpels, 4.5 mm. long; wood very hard and heavy, reddish brown. "Cuabilla" (Cuba); "gitarón," "temporana" (Porto Rico).

Known in the Bahamas as "bay-cedar."

71. SIMAROUBACEAE. Simaruba Family.

REFERENCE: Small, N. Amer. Fl. 25: 227-239. 1911.

Shrubs or trees; leaves usually alternate, simple or pinnate; flowers perfect or unisexual, usually small; fruit a drupe, berry, capsule, or samara, the seeds usually solitary.

Besides the genera here listed, *Simaba cedron* Planch. has been reported from Mexico, but the writer has seen no specimens.

Leaves simple, sometimes reduced to scales.

Leaves reduced to scales; petals 7 or 8-----1. **HOLACANTHA**.

Leaves well developed; petals 4-----2. **CASTELA**.

Leaves pinnate.

Fruit samara-like-----3. **ALVARADOA**.

Fruit drupaceous or baccate.

Leaflets 3-----4. **PICRELLA**.

Leaflets 5 or more in all or most of the leaves.

Carpels of the fruit 1-ovulate.

Stigmas distinct; leaflets usually 11 to 21-----5. **SIMAROUBA**.

Stigmas united; leaflets usually 5-----6. **QUASSIA**.

Carpels 2-ovulate.

Carpels distinct-----7. **RECCHIA**.

Carpels united-----8. **PICRAMNIA**.

1. **HOLACANTHA** A. Gray, Mem. Amer. Acad. II. 5: 310. 1854.

1. **Holacantha emoryi** A. Gray, Mem. Amer. Acad. II. 5: 310. 1854.

Reported from northern Sonora. Southern Arizona; type collected between Tucson and the Gila River.

Shrub, 2 to 3 meters high, much branched, the branches spinose, green or brownish; leaves reduced to small scales; flowers dioecious, small, solitary or clustered; fruit of 6 to 10 small drupes. "Corona de Cristo" (Arizona).

2. **CASTELA** Turp. Ann. Mus. Hist. Nat. 7: 78. 1806.

Shrubs or small trees, the branchlets spinose or spurlike; leaves small, narrow, simple, entire or nearly so; flowers small, dioecious, solitary or clustered; sepals 4, distinct or nearly so; petals 4; stamens 8; fruit of 1 or more small drupes.

Leaves green beneath, the pubescence not white-----1. **C. peninsularis**.

Leaves covered beneath with a fine whitish pubescence.

Petals narrowly obovate; leaves narrowly obovate-----2. **C. texana**.

Petals broadly obovate; leaves obovate or ovate.

Leaves obtuse at apex-----3. **C. tortuosa**.

Leaves retuse-----4. **C. retusa**.

1. **Castela peninsularis** Rose, Contr. U. S. Nat. Herb. 12: 278. 1909.

Castelaria peninsularis Small, N. Amer. Fl. 25: 231. 1911.

Dry plains and hillsides, Baja California; type from San José del Cabo.

Densely branched, spiny shrub, 1 meter high or less; leaves oval or broadly obovate, 1 to 2 cm. long, coriaceous; flowers red; petals 3 mm. long; fruit about 8 mm. long.

2. **Castela texana** (Torr. & Gray) Rose, Contr. U. S. Nat. Herb. 12: 278. 1909.

Castela nicholsoni texana Torr. & Gray, Fl. N. Amer. 1: 680. 1840.

Castelaria texana Small, N. Amer. Fl. 25: 231. 1911.

Castela salubris Boas, Beitr. Anat. Syst. Simarub. 44. 1912.

Dry plains and hillsides, Coahuila, Tamaulipas, and San Louis Potosí. Southwestern Texas.

Densely branched shrub, 1 to 2.5 meters high, with stiff whitish spinose branches; leaves 0.5 to 1.5 cm. long, obtuse; flowers bright red or purplish, about 3 mm. long; fruit red, 6 to 8 mm. long. "Bisbirinda" (Tamaulipas); "amargoso" (Nuevo León, Texas); "chaparro amargoso" (Texas).

A decoction of the very bitter bark is employed in domestic medicine for fevers, intestinal disturbances, and eczema. It has astringent and perhaps tonic properties.

The type of *C. salubris* came from Tamaulipas, and the name is doubtless to be referred here. Collections from Oaxaca and Puebla also were cited; these are probably referable to *C. tortuosa*.

3. *Castela tortuosa* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 108. 1854.
Castelaria tortuosa Small, N. Amer. Fl. 25: 231. 1911.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Shrub, 1 to 2 meters high, with crooked spiny branches; leaves 0.8 to 1.5 cm. long; flowers reddish purple, 2.5 mm. long.

4. *Castela retusa* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 110. 1854.
Oaxaca; type from San Carlos.

Very spiny shrub; leaves lustrous on the upper surface. "Amargoso," "palo amargoso" (*Reko.*).

The writer has seen no material of this or of *C. tortuosa*.

The species of the genus are closely related, and it is doubtful whether all those listed above are distinct.

DOUBTFUL SPECIES.

CASTELA LYCHNOPHOROIDES Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 111. 1854. Type from Tehuacán, Puebla. Referred doubtfully to the genus by Liebmann.

3. **ALVARADOA**¹ Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 100. 1854.

1. *Alvaradoa amorphoides* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 100. 1854.

Alvaradoa mexicana Liebm.; Benth. Pl. Hartw. 344. 1857.

Southern Chihuahua to Jalisco and Chiapas; Yucatán and Campeche; type from Bolaños, Jalisco. Central America, West Indies, and southern Florida.

Tree, 3 to 8 meters high (reported to reach a height of 18 meters); leaves pinnate, the leaflets 19 to 51, oval or oblong, 1 to 2.5 cm. long, finely sericeous beneath; flowers small, dioecious, green or yellowish white, in long racemes; fruit a lanceolate samara 1 to 1.5 cm. long, pilose. "Bel-ciniché," "xbesinic-ché" (Yucatán, Maya); "palo de hormigas" (Yucatán); "plumajillo" (Guatemala); "pié de gallo" (Sinaloa); "tamarindillo" (Cuba).

4. **PICRELLA** Baill. Adansonia 10: 150. 1871.

1. *Picrella trifoliata* Baill. Adansonia 10: 150. pl. 10. 1871.

Described from plants cultivated at Paris, believed to be of Mexican origin; the plant is not known otherwise.

Slender shrub; leaves palmately 3-foliolate, the leaflets ovate, oval, or obovate, 1 to 2.5 cm. long, entire; flowers small, perfect, in small axillary panicles.

5. **SIMAROUBA** Aubl. Pl. Guian. 2: 859. 1775.

1. *Simarouba glauca* DC. Ann. Mus. Paris 17: 424. 1811.

Yucatán. Florida, West Indies, and Central America; probably also in northern South America; type from Cuba.

Tree, sometimes 30 meters high; leaves persistent, pinnate, the leaflets usually 11 to 21, oblong, 5 to 10 cm. long, glabrate, pale beneath; flowers small, greenish, in rather large loose panicles; fruit drupaceous, oval, 1.5 to 2 cm. long, red or dark purple; wood soft, brownish. "Xpaxakil" (Yucatán, Maya); "simaruba" (Costa Rica); "aceituno" (Nicaragua, El Salvador, Panama);

¹ The genus was named in honor of Pedro de Alvarado, one of the associates of Cortés.

"aceltuno negrito" (Nicaragua); "jucumico" (El Salvador); "palo blanco" (Cuba).

In Costa Rica an infusion of the bark is used as a remedy for intermittent fevers. The fruit is edible.

6. **QUASSIA** L. Sp. Pl. ed. 2. 553. 1762.

1. **Quassia amara** L. Sp. Pl. ed. 2. 553. 1762.

Native of northern South America; cultivated in Colima, Guerrero, and Oaxaca, and apparently naturalized in some localities.

Small tree; leaf rachis winged, the leaflets usually 5, about 10 cm. long, thin, acute or acuminate, entire; flowers perfect, 2.5 to 4.5 cm. long, racemose or paniculate; fruit of usually 5 drupes, these 1 to 1.5 cm. long. "Cuasia."

7. **RECCHIA** Moc. & Sessé; DC. Reg. Veg. Syst. 1: 411. 1818.

REFERENCE: Loesener & Solenreder, Verh. Bot. Ver. Brand. 47: 35-62. 1905.

Trees; leaves pinnate, the leaflets large, alternate, entire; flowers small, in terminal panicles; fruit of 1 to 3 large drupes.

Leaflets 6 to 14 cm. long; petals 9 mm. long-----1. **R. connaroides**.
Leaflets 1 to 6 cm. long; petals 6.5 to 7.5 cm. long-----2. **R. mexicana**.

1. **Recchia connaroides** (Loes. & Solenr.) Standl.

Rigiostachys connaroides Loes. & Solenr. Verh. Bot. Ver. Brand. 47: 37. 1905.
Oaxaca; type from Tlacolula.

Leaflets 5 or 7, puberulent beneath, 3 to 7 cm. wide, obtuse or rounded at apex; flowers about 2 cm. broad.

2. **Recchia mexicana** Moc. & Sessé; DC. Reg. Veg. Syst. 1: 411. 1818.

Rigiostachys bracteata Planch. Lond. Journ. Bot. 6: 30. 1847.

Rigiostachys roureoides Loes. & Solenr. Verh. Bot. Ver. Brand. 47: 39. 1905.

Recchia bracteata Small, N. Amer. Fl. 25: 235. 1911.

Colima to Oaxaca.

Tree, 5 to 6 meters high; leaflets 5 to 11, obtuse or rounded at apex, sometimes acutish, puberulent beneath; panicles sometimes 45 cm. long; flowers yellow, fragrant; drupes 1 to 1.5 cm. long. "Corazón bonito" (Oaxaca).

The wood is hard and valuable.

It may be that more than one species is represented here, but the material examined by the writer appears to be conspecific. The characters which have been reported as distinguishing the species appear to be of little value.

8. **PICRAMNIA** Swartz, Prodr. Veg. Ind. Occ. 27. 1788.

Trees or shrubs; leaves persistent, pinnate, the leaflets entire, opposite or alternate, petiolulate; flowers very small, dioecious, in spikelike or branched panicles; fruit baccate.

Panicles branched; petals and sepals each 5.

Leaflets usually 3 to 9-----1. **P. polyantha**.

Leaflets 21 to 25-----2. **P. xalapensis**.

Panicles simple, spikelike; petals and sepals each 3 or 4.

Sepals and petals each 4-----3. **P. tetramera**.

Sepals and petals each 3.

Leaflets 2.5 cm. long or shorter-----4. **P. pistaciaefolia**.

Leaflets mostly 4 to 10 cm. long.

Leaflets copiously pubescent beneath at maturity-----5. **P. andicola**.

Leaflets nearly glabrous beneath at maturity.

Stamens included-----6. **P. lindeniana**.

Stamens exserted-----7. **P. antidesma**.

1. **Picramnia polyantha** (Benth.) Planch. Lond. Journ. Bot. 5: 577. 1846.
Rhus polyantha Benth. Pl. Hartw. 60. 1840.
 Puebla and Oaxaca; type from Villa Alta, mountains of Chinantla, Oaxaca.
 Slender shrub; leaflets ovate to oblong-lanceolate, 5 to 10 cm. long, acuminate or long-acuminate, more or less pubescent beneath.
2. **Picramnia xalapensis** Planch. Lond. Journ. Bot. 5: 577. 1846.
 Known only from the type locality, Jalapa, Veracruz.
 Leaflets narrowly ovate or lanceolate, 1.5 to 3.5 cm. long, glabrate; petals 2 to 2.5 mm. long, linear or linear-lanceolate.
3. **Picramnia tetramera** Turcz. Bull. Soc. Nat. Moscou 36¹: 598. 1863.
 Chiapas and probably elsewhere; described from southern Mexico.
 Leaflets 5 to 13, lanceolate, obtuse-acuminate, densely pubescent beneath; panicles longer than the leaves; fruit pubescent when young.
4. **Picramnia pistaciaefolia** Blake & Standl. Contr. U. S. Nat. Herb. 20: 218. 1919.
 Oaxaca; type from Cafetal San Rafael, Cerro Espino, altitude 800 meters.
 Slender shrub; leaflets about 17, obtuse or subacuminate, sparsely pubescent beneath; panicles 15 to 20 cm. long; fruit 1 cm. long. "Cáscara amarga."
 Used by the Indians as a remedy for syphilis.
5. **Picramnia andicola** Tulasne, Ann. Sci. Nat. III. 7: 265. 1847.
 Veracruz; type from mountains of Veracruz, at an altitude of 750 meters.
 Slender shrub, copiously pubescent; leaflets 7 to 13, oblong, ovate-oblong, or obovate, 3 to 8.5 cm. long, obtuse-acuminate; flowers reddish green.
6. **Picramnia lindeniana** Tulasne, Ann. Sci. Nat. III. 7: 266. 1847.
 Known only from the type locality, Río Puyatapengo, Teapa, Tabasco.
 Tree; leaflets 9 to 11, obliquely ovate or lanceolate, 5 to 8 cm. long; flowers white.
7. **Picramnia antidesma** Swartz, Prodr. Veg. Ind. Occ. 27. 1788.
?Picramnia teapensis Tulasne, Ann. Sci. Nat. III. 7: 265. 1847.
 Tepic to Chiapas and Tabasco. West Indies and Central America; type from Jamaica.
 Shrub or tree, sometimes 6 meters high, glabrate; leaflets usually 7 to 13, oval to ovate-oblong, usually acuminate, bright green; flowers greenish white; fruit 1.5 cm. long, orange or red. "Chilillo" (Chiapas, *Seler*); "cáscara amarga" (Panama).

The leaves and bark are bitter, with a flavor resembling that of licorice. The bark was formerly exported to Europe, where it was used as a remedy for erysipelas and venereal diseases. In the West Indies it has been employed in domestic medicine for intermittent fevers and for gastric and intestinal affections.

DOUBTFUL SPECIES.

PICRAMNIA BONPLANDIANA Tulasne, Ann. Sci. Nat. III. 7: 266. 1847. Type from Jalapa, Veracruz.

PICRAMNIA FESSONIA DC. Prodr. 2: 66. 1825. Described from Mexico.

72. BURSERACEAE. Torchwood Family.

REFERENCE: Rose, N. Amer. Fl. 25: 241-261. 1911.

Aromatic unarmed trees or shrubs; leaves alternate, estipulate, simple, pinnate, or bipinnate, the leaflets entire or crenate; flowers small, perfect or unisexual, usually paniculate; sepals 3 to 5, united below; petals as many as the

sepals and alternate with them, usually distinct; stamens twice as many as the petals, the filaments free; ovary 4 or 5-celled, the ovules usually 2 in each cell; fruit drupaceous, containing 1 to 5 stones.

Petals valvate in bud; leaves pinnately 5 or 7-foliolate, the leaflets large, entire.

1. **ICICA.**

Petals imbricate; leaves various-----2. **ELAPHRIUM.**

1. **ICICA** Aubl. Pl. Guian. 1: 337. 1775.

1. *Icica copal* Schlecht. & Cham. Linnaea 5: 601. 1830.

? *Icica leptostachya* Turcz. Bull. Soc. Nat. Moscou 31¹: 473. 1858.

Protium copal Engl. in DC. Monogr. Phan. 4: 83. 1883.

Icica palmeri Rose, N. Amer. Fl. 25: 260. 1911.

San Luis Potosí, Veracruz, and Oaxaca; type from Veracruz.

Tree; leaves pinnate, the leaflets 5 or 7, 10 to 18 cm. long, oblong, obtuse or rounded at apex, coriaceous, entire; flowers small, in axillary panicles. "Copal" (Veracruz).

Icica heptaphylla Aubl. has been reported from Yucatán, where it is said to be known as "copal" and "pom." The writer has seen no specimens of the genus from that State.

2. **ELAPHRIUM** Jacq. Enum. Pl. Carib. 3. 1760.

Shrubs or trees; leaves deciduous, simple, pinnate, or bipinnate, the leaflets entire or crenate, sometimes lobate; flowers small, solitary or in axillary panicles; fruit a small 3-angled drupe, containing a single large seed.

The species all have a strong and characteristic odor resulting from the oil contained in the plants. All or most of them yield a resin, known as "copal," which is used in various ways, especially in domestic medicine. It is employed particularly as a cement and for varnish, and is burned by the Indians as incense in the churches and during some of their pagan celebrations. The name copal, which is of Nahuatl origin, is now applied in commerce to resins which come from Africa, the East Indies, and South America, and, indeed, most of the commercial resins known as copal come from those regions. The following vernacular names are reported for plants of the genus whose specific determination is doubtful: "Tacamaca"; "papelillo" (Durango); "tecumaca"; "copalquahuitl" (Nahuatl; applied to various species); "suchicopal" (Colima, Veracruz, Jalisco); "sochicopal" (Colima, Veracruz); "copalxochitl" (Colima, Veracruz); "teponaxtle," "teponaxtli," "teponaztli," "cirujano" (Morelos). The species are so closely related that many of the vernacular names are doubtless applied to more than a single one.

Petiole and rachis not winged.

Leaves simple or unifoliolate.

Leaves crenate.

Flowers solitary, nearly sessile; leaves glabrous---1. **E. subtrifoliatum.**

Flowers paniculate, on slender pedicels; leaves pubescent.

42. **E. rhoifolium.**

Leaves entire.

Leaves lance-oblong, more than twice as long as broad; pedicels long and slender-----2. **E. cerasifolium.**

Leaves ovate or oval, less than twice as long as broad; pedicels short and stout-----3. **E. simplicifolium.**

Leaves with 3 or more leaflets.

Leaflets crenate.

Leaflets 11 to 35.

Leaflets 2 to 4 cm. long, narrowly lanceolate-----4. *E. multijugum*.Leaflets 1 to 1.5 cm. long, oblong-----5. *E. karwinskii*.

Leaflets 3 to 7.

Leaflets rounded or obtuse at apex-----1. *E. subtrifoliatum*.

Leaflets acute or acuminate.

Lateral nerves of the leaflets very numerous (about 20) and prominent-----6. *E. kerberi*.

Lateral nerves few, not conspicuous.

Leaflets acuminate-----7. *E. lancifolium*.Leaflets merely acute-----8. *E. trijugum*.

Leaflets entire.

Leaflets small, about 1 cm. long-----9. *E. schaffneri*.

Leaflets large, 3 to 12 cm. long or larger.

Ovary and fruit pubescent-----10. *E. grandifolium*.

Ovary and fruit glabrous.

Leaflets densely tomentose at maturity-----11. *E. heterophyllum*.

Leaflets glabrous at maturity or thinly pilose or puberulent.

Leaflets glaucescent beneath, with very prominent, reticulate venation-----12. *E. longipes*.

Leaflets green beneath, the venation not prominent.

13. *E. simaruba*.

Petiole and rachis winged, sometimes very narrowly so.

Leaves bipinnate.

Leaflets large, usually 1 to 2.5 cm. long.

Leaflets rounded at base-----14. *E. diversifolium*.Leaflets acute at base-----15. *E. collinum*.

Leaflets small, most of them much less than 1 cm. long.

Leaflets coriaceous, densely pilose beneath; calyx lobes shorter than the petals-----16. *E. gracile*.Leaflets comparatively thin, glabrous or nearly so; calyx lobes equaling or longer than the petals-----17. *E. bipinnatum*.

Leaves once pinnate.

Leaflets entire, never tomentose.

Leaflets linear, oblong, or rarely oval, 3 mm. wide or narrower.

Leaflets 5 to 9. Young branches pubescent-----18. *E. aridum*.

Leaflets more than 9 in all or most of the leaves.

Leaflets linear-oblong to oval-----19. *E. microphyllum*.Leaflets narrowly linear-----20. *E. galeottianum*.Leaflets lanceolate to broadly ovate or oval-elliptic, most of them more than 5 mm. wide-----21. *E. odoratum*.

Leaflets crenate or serrate, or, if entire, densely tomentose.

Leaflets glabrous beneath when mature, or pubescent only along the costa.

Leaflets about 25, linear-lanceolate-----22. *E. pringlei*.

Leaflets 3 to 15.

Leaflets long-attenuate or long-acuminate at apex.

Teeth of the leaflets very large and coarse---23. *E. penicillatum*.

Teeth of the leaves very small and appressed.

Leaflets 3 or 5-----25. *E. tecomaca*.

Leaflets usually 7 to 15.

Leaflets 7 or 9; inflorescence sessile or nearly so.

21. *E. odoratum*.

Leaflets 11 to 15; inflorescence slender-pedunculate.

26. *E. rubrum*.

Leaflets rounded to acute at apex.

Leaflets 3-----27. *E. biflorum*.

Leaflets 5 or more.

Leaflets crenate with large coarse teeth.

Base of the leaflets acute or cuneate-----28. *E. laxiflorum*.

Base of the leaflets rounded or obtuse-----37. *E. aloexylon*.

Leaflets with very small appressed teeth.

Leaflets entire or with few distant obscure teeth.

21. *E. odoratum*.

Leaflets finely crenate along almost the whole margin.

29. *E. fagaroides*.

Leaflets conspicuously pubescent beneath even at maturity, on the surface as well as on the costa.

Teeth of the leaflets small and appressed or none.

Leaflets green beneath, sparsely puberulent-----21. *E. odoratum*.

Leaflets white-tomentose beneath.

Leaflets glabrate on the upper surface, narrowly lanceolate.

30. *E. bicolor*.

Leaflets pilose on the upper surface, oblong-----31. *E. pannosum*.

Teeth large and coarse.

Leaves at maturity thick-coriaceous, strongly bullate on the upper surface, densely pubescent on both surfaces.

Leaflets 11 to 21 in all or most of the leaves----32. *E. jorullense*.

Leaflets 5 to 9.

Leaflets 1 to 1.5 cm. long-----33. *E. schiedeanum*.

Leaflets mostly 3 to 6 cm. long-----34. *E. cuneatum*.

Leaves thin at maturity, or if thick never bullate.

Fruit densely pubescent-----35. *E. submoniliforme*.

Fruit glabrous.

Leaflets at maturity glabrous on the upper surface, often lustrous, rarely pubescent, but then 12 mm. long or shorter.

Leaflets 9 to 19, with a few irregular crenations.

36. *E. filicifolium*.

Leaflets 5 to 9, regularly crenate.

Inflorescence pubescent, short-pedunculate-37. *E. aloexylon*.

Inflorescence glabrous, long-pedunculate.

38. *E. longipedunculatum*.

Leaflets densely pubescent on the upper surface at maturity, usually 2 cm. long or larger.

Leaflets 15 to 21-----39. *E. sessiliflorum*.

Leaflets 1 to 11.

Leaflets long-acuminate-----24. *E. pubescens*.

Leaflets obtuse.

Rachis conspicuously dentate-----40. *E. excelsum*.

Rachis entire.

Flowers nearly sessile-----41. *E. queretarense*.

Flowers slender-pedicellate-----42. *E. rhoifolium*.

1. *Elaphrium subtrifoliatum* Rose, N. Amer. Fl. 25: 244. 1911.

*Terebinthus subtrifoliatu*s Rose, Contr. U. S. Nat. Herb. 10: 122. 1906.

Jalisco; type collected west of Bolaños.

Low glabrous shrub with dark reddish brown branchlets; leaflets 1 or 3, ovate-rhombic, 1 to 2.5 cm. long, rounded at apex.

2. *Elaphrium cerasifolium* (T. S. Brandeg.) Rose, N. Amer. Fl. 25: 244. 1911.
Bursera cerasifolia T. S. Brandeg. Proc. Calif. Acad. II. 3: 121. 1891.
 Southern Baja California; type from San José del Cabo.
 Small tree, 4 to 8 meters high, with reddish brown branchlets; leaves bright green, 3 to 6 cm. long, glabrous.
3. *Elaphrium simplicifolium* Schlecht. Linnaea 16: 532. 1842.
Bursera schlechtendalii Engl. in DC. Monogr. Phan. 4: 41. 1883.
Bursera jonesii Rose, Contr. U. S. Nat. Herb. 3: 314. 1895.
 Jalisco to Chiapas. Guatemala.
 Shrub or small tree, 2 to 3 meters high, glabrous, with grayish or brownish branches; leaves 1 to 3.5 cm. long, rounded to acutish at apex.
4. *Elaphrium multijugum* (Engl.) Rose, N. Amer. Fl. 25: 248. 1911.
Bursera multijuga Engl. in DC. Monogr. Phan. 4: 42. 1883.
 Colima (type locality) and perhaps elsewhere; not seen by the writer.
 Leaflets acute, glabrous; panicles 1.5 to 3.5 cm. long; flowers greenish yellow. "Cuajote amarillo" (Engler).
5. *Elaphrium karwinskii* (Engl.) Rose, N. Amer. Fl. 25: 248. 1911.
Bursera karwinskii Engl. in DC. Monogr. Phan. 4: 43. 1883.
 Known only from the type locality, Tolimán, Querétaro.
 Leaflets glabrous.
6. *Elaphrium kerberi* (Engl.) Rose, N. Amer. Fl. 25: 247. 1911.
Bursera kerberi Engl. in DC. Monogr. Phan. 4: 41. 1883.
 Jalisco and Colima; type from Colima.
 Shrub or small tree; bark peeling off in thin, reddish brown sheets; leaflets 3, sessile, oblong-lanceolate to oval-oblong, 4 to 9 cm. long, finely crenate-serrate, glabrous, usually cuspidate-acuminate.
7. *Elaphrium lancifolium* Schlecht. Linnaea 17: 247. 1843.
Bursera lancifolia Engl. in DC. Monogr. Phan. 4: 42. 1883.
 Known only from the type collection, perhaps from Veracruz.
 Leaflets 3 to 7, lanceolate, 5 to 6 cm. long, glabrous.
8. *Elaphrium trijugum* (Ramírez) Rose, N. Amer. Fl. 25: 248. 1911.
Bursera trijuga Ramírez, Anal. Inst. Méd. Nac. Méx. 2: 16. pl. 2. 1896.
 Morelos; type from Distrito de Ayala.
 Leaflets 7, 4 to 7.5 cm. long, glabrous. "Cuajote chino."
9. *Elaphrium schaffneri* (S. Wats.) Rose, N. Amer. Fl. 25: 245. 1911.
Bursera schaffneri S. Wats. Proc. Amer. Acad. 22: 469. 1887.
 San Luis Potosí; type from Morales Mountains.
 Leaflets 3 to 7, obovate or suborbicular, glabrous.
Elaphrium obovatum (Turcz.) Rose¹ is a closely related species, if not the same as *E. schaffneri*. The type is from Orizaba.
10. *Elaphrium grandifolium* Schlecht. Linnaea 17: 249. 1843.
Bursera cinerea Engl. in DC. Monogr. Phan. 4: 43. 1883.
Bursera grandifolia Engl. in DC. Monogr. Phan. 4: 45. 1883.
Elaphrium occidentale Rose, N. Amer. Fl. 25: 246. 1911.
 Sinaloa to Oaxaca and Veracruz.
 Tree, 3 to 9 meters high or larger, the trunk often 45 cm. in diameter, the bark purplish green, finally peeling off in papery brownish sheets; leaf-

¹ N. Amer. Fl. 25: 245. 1911. *Bursera obovata* Turcz. Bull. Soc. Nat. Moscou 36¹: 614. 1863.

lets 3 to 9 (usually 5), 4 to 13 cm. long, abruptly acuminate at apex, copiously pubescent, at least beneath. "Palo mulato" (Oaxaca); "chutama" (Sinaloa).

The gum which exudes from the trunk is employed for caulking boats and glueing furniture.

11. *Elaphrium heterophyllum* (Engl.) Rose, N. Amer. Fl. 25: 247. 1911.

Bursera heterophylla Engl. in DC. Monogr. Phan. 4: 46. 1883.

Known only from the type locality, Tlaquiltenango, Morelos; not seen by the writer.

Leaflets 3 or 5, elliptic, 1.5 to 2 cm. long; panicles 6 to 8 cm. long.

12. *Elaphrium longipes* Rose, N. Amer. Fl. 25: 246. 1911.

Terebinthus longipes Rose, Contr. U. S. Nat. Herb. 10: 120. 1906.

Type from Matamoros, Puebla; perhaps also in Morelos.

Small glabrous tree, 3 to 4 meters high, with broad flat crown; leaflets 7 to 13, long-petiolulate, 2.5 to 5 cm. long, abruptly acuminate.

13. *Elaphrium simaruba* (L.) Rose, N. Amer. Fl. 25: 246. 1911.

Pistacia simaruba L. Sp. Pl. 1026. 1753.

Bursera gummifera L. Sp. Pl. ed. 2. 471. 1762.

? *Elaphrium ovalifolium* Schlecht. Linnaea 17: 248. 1843.

Bursera simaruba Sarg. Gard. & For. 3: 260. 1890.

Terebinthus arborea Rose, Contr. U. S. Nat. Herb. 10: 118. 1906.

Terebinthus acuminata Rose, Contr. U. S. Nat. Herb. 12: 278. 1909.

Terebinthus attenuata Rose, Contr. U. S. Nat. Herb. 12: 278. 1909.

Elaphrium subpubescens Rose, N. Amer. Fl. 25: 247. 1911.

Sinaloa to Tamaulipas, Veracruz, Yucatán, and Chiapas. Southern Florida, West Indies, Central America, and northern South America; type from Jamaica.

Tree, sometimes 25 meters high, with a trunk a meter in diameter, but usually much smaller, the branches thick and spreading; bark reddish brown, smooth, peeling off in thin sheets; leaflets usually 5 or 7, 4 to 14 cm. long, variable in shape, usually acuminate or cuspidate-acuminate, commonly more or less pubescent; flowers greenish or yellowish, sweet-scented; wood light brown, soft, weak, its specific gravity about 0.30. "Palo mulato" (Tepic, Chiapas, Tabasco, Oaxaca, Veracruz); "quiote" (Sinaloa); "palo jiote" (Chiapas, Veracruz, Guatemala, Honduras, El Salvador); "chacah" or "chaca" (Yucatán, Tamaulipas, Veracruz); "piocha" (Tamaulipas); "zongolica" (Oaxaca); "palo colorado," "mulato" (Sinaloa); "archipín"; "almácigo" (Porto Rico, Costa Rica, Santo Domingo, Panama, Colombia); "jiñocuabo," "jiñocuite" (Nicaragua); "jiote" (Sinaloa, Honduras, Guatemala); "jiñocuave," "carana," "jiñocuavo," "jiñote" (Costa Rica); "almácigo encarnado" (Porto Rico); "jicote," "chino," "chinacahuite" (Guatemala); "copón" (Honduras); "almácigo blanco" (Cuba, Santo Domingo); "almácigo colorado," "almácigo amarillo," "cachibú" (Cuba); "indio desnudo," "pellejo de indio" (Guiana); "palo chino" (Guatemala, Honduras).

The branches take root easily when placed in the ground, and the tree is often planted for shade or to form hedges. The wood, which has a strong characteristic odor, is not very durable, but it is employed for fence posts and canoes, and is burned for charcoal. From the branches a brownish gum exudes, which is often used as a substitute for glue and as a cement for mending broken china and glass. The gum is known in Costa Rica as "elequeme" and "tacamahaca." The Caribs employed it for painting their canoes to preserve them from the attacks of worms. The tree is much used in domestic medicine, the gum and sometimes the leaves being the parts employed. Diaphoretic, purgative, diuretic, and expectorant properties are attributed to it, and it is

employed for dysentery, dropsy, venereal diseases, yellow fever, and other affections.

In Florida the tree is known as "gumbolimbo," a name used also by the Jamaican negroes, an apparent corruption of "goma elemí," the name sometimes given by the Spaniards to the gum.¹ The fruit is eaten by birds and pigs.

For an illustration of *Elaphrium simaruba* see Contr. U. S. Nat. Herb. 8: pl. 21.

14. *Elaphrium diversifolium* Rose, N. Amer. Fl. 25: 248. 1911.

Bursera diversifolia Rose, Contr. U. S. Nat. Herb. 5: 113. 1897.

Chiapas; type collected between Ocuilapa and Tuxtla.

Tree, 3.5 to 7.5 meters high, copiously pubescent; leaflets 9 to 13, the lower ones pinnate, or the leaves often simply pinnate.

15. *Elaphrium collinum* (T. S. Brandeg.) Rose, N. Amer. Fl. 25: 248. 1911.

Bursera collina T. S. Brandeg. Zoe 5: 204. 1905.

Known only from the type locality, Cofradía, Sinaloa.

Leaves copiously pubescent.

16. *Elaphrium gracile* (Engl.) Rose, N. Amer. Fl. 25: 249. 1911.

Bursera gracilis Engl. in DC. Monogr. Phan. 4: 50. 1883.

Jalisco to Morelos and Chiapas; type from Xochiculco, Oaxaca. Guatemala.

Tree, sometimes 9 meters high; flowers greenish white; fruit green or brownish red. "Copal santo," "copal chino colorado," "incienso del país" (Oaxaca, Reko); "copal" (Guatemala).

It is not certain that this is specifically distinct from the next species.

17. *Elaphrium bipinnatum* (DC.) Schlecht. Linnaea 17: 631. 1843.

Amyris bipinnata DC. Prodr. 2: 82. 1825.

Bursera bipinnata Engl. in DC. Monogr. Phan. 4: 49. 1883.

Sinaloa and southern Chihuahua to Guerrero and Morelos.

Shrub or small tree, sometimes 12 meters high, with a trunk 50 cm. in diameter; leaves fernlike, with very numerous small leaflets. "Jabencillo" (Chihuahua); "copal chino," "copal amargo" (Michoacán); "copal amargoso" (Guerrero, Ramírez); "incienso del país," "tetlate," "tetlatía" (Morelos, Ramírez); "tetlatián," "tetlatín" (Ramírez); "copal amargo" (Conzatti); "palo copal" (Sinaloa); "cuajote colorado" (Villada).

The resin is employed in Sinaloa for treating wounds.

18. *Elaphrium aridum* Rose, N. Amer. Fl. 25: 249. 1911.

Terebinthus arida Rose, Contr. U. S. Nat. Herb. 10: 118. 1906.

Known only from the vicinity of the type locality, dry hills about Tehuacán, Puebla.

Low shrub; leaflets green, 4 to 6 mm. long, rounded at apex, glabrous or nearly so.

19. *Elaphrium microphyllum* (A. Gray) Rose, N. Amer. Fl. 25: 250. 1911.

Bursera microphylla A. Gray, Proc. Amer. Acad. 5: 155. 1861.

Bursera morelensis Ramírez, Anal. Inst. Méd. Nac. Méx. 2: 17. 1896.

Terebinthus multifolia Rose, Contr. U. S. Nat. Herb. 10: 120. 1906.

Dry plains and hillsides, Sonora and Baja California to Zacatecas, Morelos, and Puebla; type from Baja California. Southern Arizona.

Shrub or tree, sometimes 9 meters high, with reddish branches; leaflets usually 11 to 35, obtuse, glabrous. "Torote" (Sonora, Baja California); "torote blanco" (Sonora); "copal" (Baja California); "cuajote colorado" (Morelos).

¹ See W. E. Safford, Natural history of Paradise Key and the near-by Everglades of Florida, Smithson. Rep. 1917: 377-434. pl. 1-64. 1920.

The bark is used for tanning and dyeing, and has been exported for that purpose from Baja California. The Indians of Sonora are said to use the branches for basketry. An infusion of the bark or gum is a popular remedy for venereal diseases.

It may be that more than one species should be recognized here, but the characters that have been cited as distinguishing the three species here combined do not hold for the material examined by the writer.

20. *Elaphrium galeottianum* (Engl.) Rose, N. Amer. Fl. 25: 249. 1911.

Bursera galeottiana Engl. in DC. Monogr. Phan. 4: 47. 1883.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Small tree; leaflets 13 to 25, glabrous. "Cuajiote colorado" (Oaxaca, Villada).

Very closely related to *E. microphyllum*, and perhaps only a form of it. The leaflets, however, are narrower, and the pubescence usually more abundant.

21. *Elaphrium odoratum* (T. S. Brandeg.) Rose, N. Amer. Fl. 25: 250. 1911.

Bursera odorata T. S. Brandeg. Proc. Calif. Acad. II. 2: 138. 1889.

Bursera tenuifolia Rose, Contr. U. S. Nat. Herb. 3: 314. 1895.

Bursera aptera Ramírez, Anal. Inst. Méd. Nac. Méx. 2: 16. 1896.

Bursera purpusii T. S. Brandeg. Zoe 5: 249. 1908.

Elaphrium covillei Rose, N. Amer. Fl. 25: 250. 1911.

Elaphrium confusum Rose, N. Amer. Fl. 25: 251. 1911.

Elaphrium brachypodum Rose, N. Amer. Fl. 25: 253. 1911.

Sonora and Baja California to Morelos and Puebla; type from San Gregorio, Baja California.

Shrub or small tree; bark yellow, peeling off in thin papery sheets; leaflets 5 to 11, 1 to 3.5 cm. long, acute to rounded at apex, entire or obscurely crenulate, usually glabrous but sometimes sparsely pubescent beneath. "Cuajiote verde" (Morelos); "torote" (Baja California, Sinaloa); "chutama" (Sinaloa).

The gum is applied to cure scorpion stings, insect bites, and other wounds. It is yellowish, brown, or almost black, odorless, acrid, and bitter, and is reputed to have expectorant and drastic purgative properties. It is used also for mending broken dishes. The bark is employed for tanning hides.

The species is a variable one, the leaves varying greatly upon the same plant. All the names listed above refer to very closely related forms, which it seems impossible to separate by any constant character. For an illustration of a tree see Contr. U. S. Nat. Herb. 16: pl. 115.

This is probably the species figured by Hernández and described¹ in a chapter entitled "De Cuitlacopalli seu Stercore Copallis, Copallifera VI."

22. *Elaphrium pringlei* (S. Wats.) Rose, N. Amer. Fl. 25: 252. 1911.

Bursera pringlei S. Wats. Proc. Amer. Acad. 25: 145. 1890.

Jalisco; type from bluffs of the Río Grande de Santiago, near Guadalajara.

Small tree; leaflets linear-lanceolate, 2 to 4 cm. long, dark green above, pale beneath; flowers purplish. "Cuajiote colorado."

23. *Elaphrium penicillatum* DC. Prodr. 1: 724. 1824.

Bursera graveolens pilosa Engl. in DC. Monogr. Phan. 4: 49. 1883.

Bursera penicillata Engl. in DC. Monogr. Phan. 4: 52. 1883.

Elaphrium pilosum Rose, N. Amer. Fl. 25: 251. 1911.

Southern Chihuahua and Sinaloa to Jalisco.

Shrub, 1 to 3 meters high; leaflets 7 to 15, thin, 4 to 8 cm. long.

¹Thesaurus 48. 1651.

24. *Elaphrium pubescens* Schlecht. Linnaea 16: 527. 1842.

Yucatán and Campeche; type from Campeche.

Tree, about 15 meters high; leaflets usually 7, 3 to 5 cm. long. "Nabanché" (Yucatán).

Said to be cultivated in Yucatán and possibly an introduced species; very closely related to *Elaphrium graveolens* H. B. K. (as which it has been reported from Yucatán) of South America.

25. *Elaphrium tecomaca* (DC) Standl.

Amyris tecomaca DC. Prodr. 2: 82. 1825.

Bursera fragilis S. Wats. Proc. Amer. Acad. 21: 422. 1886.

Amyris sylvatica Sessé & Moc. Fl. Mex. ed. 2. 93. 1894. Not *A. sylvatica* Jacq. 1763.

Sinaloa and southern Chihuahua. Type (according to Sessé and Mociño) from mountains near Mazatlán (Guerrero?).

Tree, 3 to 5 meters high, glabrous, the trunk 5 to 8 cm. in diameter; leaflets 3 or 5, lanceolate or narrowly lanceolate, 3 to 6 cm. long, finely crenate-serrate. "Torote" (Chihuahua).

Sessé and Mociño give the vernacular name as "tacamahaca," and state that the gum was used for healing wounds.

26. *Elaphrium rubrum* Rose, N. Amer. Fl. 25: 252. 1911.

Terebinthus rubra Rose, Contr. U. S. Nat. Herb. 10: 121. 1906.

Sonora and Sinaloa; type collected near Colomas, Sinaloa.

Shrub or small tree; leaflets 2 to 4 cm. long, bright green, glabrous.

27. *Elaphrium biflorum* Rose, N. Amer. Fl. 25: 253. 1911.

Terebinthus biflora Rose, Contr. U. S. Nat. Herb. 10: 119. 1906.

Puebla; type from Tehuacán.

Shrub or tree, 2 to 5 meters high, with short branches; leaflets 1 to 3 cm. long, glabrate, crenate.

28. *Elaphrium laxiflorum* (S. Wats.) Rose, N. Amer. Fl. 25: 253. 1911.

Bursera laxiflora S. Wats. Proc. Amer. Acad. 24: 44. 1889.

Dry hillsides, Sonora and Sinaloa; type from Guaymas, Sonora.

Shrub or small tree with reddish brown branches; leaflets 5 to 9, most of them less than 1 cm. long, very coarsely crenate or rarely entire. "Copal" (Sonora, Sinaloa); "torote prieto" (Sonora).

29. *Elaphrium fagaroides* H. B. K. Nov. Gen. & Sp. 7: 27. pl. 611. 1824.

Bursera fagaroides Engl. in DC. Monogr. Phan. 4: 48. 1883.

Durango to Puebla; type from Querétaro.

Tree with brown branches; leaflets usually 5 or 7 and 1 to 2 cm. long. "Cuajote amarillo" (Morelos, *Urbina*); "cuajote colorado" (San Luis Potosí, *Ramírez*).

30. *Elaphrium bicolor* Schlecht. Linnaea 17: 625. 1843.

Bursera bicolor Engl. in DC. Monogr. Phan. 4: 53. 1883.

Morelos; type from Real de Cuautla.

Small tree with rounded crown; leaflets 9 to 19, 3.5 to 8 cm. long, densely white-tomentose beneath; panicles lax, 10 to 20 cm. long.

31. *Elaphrium pannosum* (Engl.) Rose, N. Amer. Fl. 25: 254. 1911.

Bursera pannosa Engl. in DC. Monogr. Phan. 4: 54. 1883.

Known only from the type locality, Mirador, Veracruz; not seen by the writer.

Leaflets 9, acute, 1.5 to 2 cm. long.

32. *Elaphrium jorullense* H. B. K. Nov. Gen. & Sp. 7: 28. pl. 612. 1824.

Elaphrium lanuginosum H. B. K. Nov. Gen. & Sp. 7: 31. 1824.

Bursera jorullensis Engl. in DC. Monogr. Phan. 4: 57. 1883.

Bursera palmeri glabrescens S. Wats. Proc. Amer. Acad. 25: 145. 1890.

Bursera glabrescens Rose, Contr. U. S. Nat. Herb. 3: 313. 1895.

Durango to Puebla and Guerrero; type from Jorullo, Michoacán.

Shrub or tree, sometimes 7.5 meters high, with brown bark; leaflets 2 to 4 cm. long, densely pubescent, strongly rugose. "Copal" (Morelos, *Urbina*); "copal blanco," "copal de penca" (Morelos, *Ramírez*); "copal santo" (Morelos, Michoacán, *Ramírez*); "ngedni," "ngidi" (Otomí); "copalli," "goma de limón," "elemí de México" (*Nueva Farmacopea Mexicana*); copalquahuitl" (Nahuatl).

The copal or resin of this tree is reddish and burns readily. It is usually gathered in September and October from incisions in the trunk, the juice being collected on maguey leaves, hence the name of "copal de penca." Dissolved in turpentine the resin gives a transparent and very glossy varnish. The copal is used in Mexico as a substitute for gum elemi. It is employed in treating uterine diseases and in making ointments, and smoke from it is inhaled as a remedy for headache.

This may be the species figured by Hernández and described¹ in a chapter headed "De Copalliquahuitl Patlahoac, seu Arbore Copalli latifolia, Copallifera II."

33. *Elaphrium schiedeana* (Engl.) Rose, N. Amer. Fl. 25: 256. 1911.

Bursera schiedeana Engl. in DC. Monogr. Phan. 4: 57. 1885.

Known only from the type locality, Cuautla, Morelos; not seen by the writer.

Leaflets 7 or 9, pubescent on both surfaces.

34. *Elaphrium cuneatum* Schlecht. Linnaea 17: 629. 1843.

Bursera cuneata Engl. in DC. Monogr. Phan. 4: 56. 1883.

Guanajuato, Mexico, and Guerrero; type from Tlaxiahuaca, Guerrero.

Leaflets 7 or 9, oblong or lance-oblong, very rugose, densely pubescent beneath.

35. *Elaphrium submoniliforme* (Engl.) Marchand; Rose, N. Amer. Fl. 25: 255. 1911.

Bursera submoniliformis Engl. in DC. Monogr. Phan. 4: 55. 1883.

Oaxaca; type from Río Vueltas.

Leaflets 7 to 13, oblong or oval, 1 to 3 cm. long, densely pubescent.

36. *Elaphrium filicifolium* (T. S. Brandeg.) Rose, N. Amer. Fl. 25: 254. 1911.

Bursera filicifolia T. S. Brandeg. Zoe 5: 248. 1908.

Sonora and Baja California; type from Rancho Colorado, Baja California.

Small tree with brownish branches; leaflets usually 1 cm. long or shorter, bright green.

37. *Elaphrium aloexylon* Schiede, Linnaea 17: 252. 1843.

Bursera aloexylon Engl. in DC. Monogr. Phan. 4: 52. 1883.

Bursera nelsoni Rose, Contr. U. S. Nat. Herb. 3: 314. 1895.

Morelos, Puebla and Oaxaca; type from Real de Cuautla, Morelos.

Shrub or small tree; leaflets usually 7 or 9, 1 to 2 cm. long or sometimes larger, pubescent when young but often glabrate in age. The following vernacular names are reported, but it is uncertain whether they belong exclusively, or at all, to this species: "Linaloé," "inanué," "linalué," "xochicopal"; "cua-jote colorado" (Oaxaca, *Villada*).

By distillation there is obtained from the wood or fruit an oil which is used in the manufacture of perfumes. The wood, which is yellow and very fragrant, is said to have been exported to England.

¹Thesaurus 46. 1651.

This is probably the species figured by Hernández and described¹ in a chapter entitled "De Copalli Quahuitl, seu Arbore Gummífera Copallífera I."

E. glabrifolium H. B. K.² described from Michoacán, may be the same species.

38. *Elaphrium longipedunculatum* Rose, N. Amer. Fl. 25: 254. 1911.

Puebla and Oaxaca; type from Almoloyas, Oaxaca.

Tree with reddish branches; leaflets 5 or 7, densely pubescent or glabrate, 1.5 to 4 cm. long.

39. *Elaphrium sessiliflorum* (Engl.) Rose, N. Amer. Fl. 25: 254. 1911.

Bursera sessiliflora Engl. in DC. Monogr. Phan. 4: 55. 1883.

Bursera asplenifolia T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 382. 1909.

Puebla and Oaxaca.

Leaflets 15 to 21, 3 to 7 cm. long, densely pubescent.

40. *Elaphrium excelsum* H. B. K. Nov. Gen. & Sp. 7: 30. 1824.

Bursera excelsa Engl. in DC. Monogr. Phan. 4: 57. 1883.

Bursera palmeri S. Wats. Proc. Amer. Acad. 22: 402. 1887.

Durango and Sinaloa to Chiapas; type collected between Acapulco and El Exido, Guerrero. Guatemala.

Shrub or tree, 3 to 6 meters high, with reddish bark; leaflets 5 to 9, 2.5 to 5 cm. long, coarsely crenate, densely pubescent. "Sisiote" (Guanajuato); "copalquín" (Durango); "copal" (Guerrero, Oaxaca, Guatemala).

41. *Elaphrium queretarens* Rose, N. Amer. Fl. 25: 254. 1911.

Querétaro; type collected near the city of Querétaro.

Tree, 4 to 5 meters high; leaflets 7 to 9, 1 to 3 cm. long, densely pubescent.

Probably only a form of *E. excelsum*.

42. *Elaphrium rhoifolium* Benth. Bot. Voy. Sulph. 10. 1844.

Elaphrium hindsianum Benth. Bot. Voy. Sulph. 11. 1844.

Terebinthus macdougalii Rose, Torreya 6: 170. 1906.

Elephrium epinnatum Rose, N. Amer. Fl. 25: 243. 1911.

Elaphrium goldmani Rose, N. Amer. Fl. 25: 256. 1911.

Baja California, the type from Magdalena Bay; a closely related plant, perhaps of the same species, occurs in Puebla.

Shrub or small tree, 7.5 meters high or less, with reddish brown branches; leaves simple or pinnately 3 or 5-foliolate, copiously pubescent. "Copal."

The bark is used locally for tanning.

DOUBTFUL SPECIES.

BURSERA DELPECHIANA Poisson; Engl. in DC. Monogr. Phan. 4: 53. 1883. Type from Mexico.

BURSERA MEXICANA Engl. in DC. Monogr. Phan. 4: 51. 1883. Type from San Luis Potosí.

ELAPHRIUM ARIENSE H. B. K. Nov. Gen. & Sp. 7: 31. 1824. Type from Michoacán.

ELAPHRIUM COPALLIFERUM DC. Prodr. 1: 724. 1824. Type from Mexico.

ICIOA SERRATA DC. Prodr. 2: 77. 1825. Type from Mexico.

¹ Thesaurus 45. 1651.

² Nov. Gen. & Sp. 7: 28. 1824.

73. MELIACEAE. Chinaberry Family.

(Contributed by S. F. Blake.)

Trees or shrubs; leaves alternate, estipulate, usually pinnate; flowers regular, hermaphrodite (in ours); calyx 4 or 5-lobed or parted; petals 4 or 5, free or adnate to the disk; stamens 5, 8, or 10, usually united into a tube (free in *Cedrela*); disk annular or stipitiform, sometimes elongate; ovary free, 2 to 5-celled; ovules usually 2, sometimes 1 or 12; style simple; stigma disk-shaped or pyramidal; fruit capsular, rarely drupaceous.

Filaments united at least to middle.

Leaves bipinnate; fruit drupaceous-----1. **MELIA.**

Leaves once pinnate; fruit a capsule.

Anthers borne on apex of the staminal tube or of its lobes.

2. **TRICHILIA.**

Anthers borne inside the apex of the staminal tube.

Ovules 1 or 2 in each cell; seeds not winged-----3. **GUAREA.**

Ovules 12 in each cell; seeds winged-----4. **SWIETENIA.**

Filaments free-----5. **CEDRELA.**

1. **MELIA** L. Sp. Pl. 384. 1753.

REFERENCE: C. De Candolle in DC. Monogr. Phan. 1: 450-459. 1878.

1. **Melia azedarach** L. Sp. Pl. 384. 1753.

Melia azedarach a glabrior C. DC. in DC. Monogr. Phan. 1: 452. 1878.

Escaped from cultivation throughout Mexico. Native of the Old World; escaped from cultivation from the southwestern United States southward.

Tree, up to 15 meters high; leaves bipinnate, the leaflets toothed; flowers paniced, pink or lilac, sweet-scented; sepals 5; petals 5; filaments united into a tube, this 20-toothed at apex; anthers 10, sessile inside the apex of the tube; fruit a 4-seeded translucent drupe. "Paraíso" (Michoacán, Yucatán, Veracruz, San Luis Potosí, Oaxaca, Costa Rica, Argentina, Uruguay, Philippines, Colombia, Cuba, Guatemala); "piocha" (Oaxaca); "canelo" (Nuevo León, San Luis Potosí); "paraíso morado" (*Herrera*); "lila" (Chihuahua, Santo Domingo); "paraguas chino" (Chihuahua); "lila de las Indias," "lila de China" (*Nuevo Farm. Mex.*); "jacinto" (Panama); "lilalla," "pasilla" (Porto Rico); "árbol de quitasol" (Cuba).

The chinaberry (known also as china-tree, pride of India, and umbrella-tree) is much planted in Mexican parks and gardens. It grows very rapidly, but the trees do not last long and the branches are easily broken off. Both flowers and fruit are borne in great profusion, and the yellowish fruits hang on the tree a long time. The wood is soft and weak. The large seeds are sometimes used as beads, and oil has been extracted from them.

The bark contains a bitter principle, mangrovin. The roots have a bitter, nauseous taste; they have been widely used as an anthelmintic but their efficacy is doubtful. The leaves are reported to have emetic properties, and they have been employed as a febrifuge and as a remedy for hysteria. The fruit is eaten by cattle, but it is generally reputed to be poisonous to human beings. The bark is said to be used in some regions for stupefying fish. In the southern United States there is a belief that if horses eat the fruits they will be protected against attacks of bots. It is said also that the berries packed with dried fruit will prevent the attacks of insects and that if laid among clothes they will keep away moths. A decoction of the fruits sprinkled over growing plants is reported to guard them from injury by cutworms and other insects.

The specific name *azedarach* is of Arabic origin. For an illustration of the chinaberry see Contr. U. S. Nat. Herb. 8: pl. 45.

2. **TRICHILIA** L. Syst. Nat. ed. 10. 1020. 1759.

REFERENCE: C. De Candolle in DC. Monogr. Phan. 1: 646-713. 1878.

Leaves abruptly pinnate, rarely odd-pinnate; panicles axillary, rarely terminal; calyx 4 or 5-toothed or lobed, rarely 5-sepaled; petals 4 or 5, rarely 3; filaments connate below or to apex into a tube, the anthers borne at apex of the tube or of the lobes; ovary 2 to 4-celled, the ovules 1 or 2, superposed or collateral; capsule usually 3-valved and 3-seeded; seeds arillate.

Filaments connate nearly or quite to apex into a denticulate tube.

Ovary glabrous.....1. *T. havanensis*.

Ovary pubescent.....2. *T. oligantha*.

Filaments connate for two-thirds their length or less.

Leaflets 3.....3. *T. parvifolia*.

Leaflets more than 3.

Anthers pubescent.

Petals densely puberulous or tomentose outside; leaflets very densely and softly fulvescent-pilosulous beneath along nerves or over whole surface.....4. *T. cuneata*.

Petals sparsely puberulous or glabrous; leaflets sparsely puberulous to pilose chiefly along the veins beneath.

Leaflets 8, oval or obovate-oval, the larger 14 cm. long, 5.7 cm. wide; petals sparsely puberulous.....5. *T. oaxacana*.

Leaflets 11 to 21, lanceolate to elliptic, the larger 5 to 8 cm. long, 1 to 3 cm. wide; petals glabrous or sparsely pubescent above.

Disk about equaling the ovary.....6. *T. karwinskyana*.

Disk much shorter than ovary.....7. *T. hirta*.

Anthers glabrous.

Petals densely tomentose-puberulous outside; panicles terminal, corymbed.
8. *T. arborea*.

Petals glabrous outside; panicles axillary.

Petals 5 to 6 mm. long.

Panicle half to two-thirds as long as the leaves; free portion of filaments sparsely pilose within.....9. *T. pringlei*.

Panicle equaling the leaves; free portion of filaments densely hirsute within.....10. *T. pavoniana*.

Petals 4 mm. long.

Calyx teeth obtuse or rounded; ovules 2, superposed.....11. *T. colimana*.

Calyx teeth acute; ovules 2, collateral.....12. *T. wawrana*.

1. *Trichilia havanensis* Jacq. Enum. Pl. Carib. 20. 1760.

Trichilia havanensis β *lanceolata* C. DC. in DC. Monogr. Phan. 1: 677. 1878.

Trichilia havanensis var. *spathulata* Rose, Contr. U. S. Nat. Herb. 1: 314. 1895.

Tamaulipas to Sinaloa and Oaxaca. Central America and West Indies; type from Cuba.

Shrub or small tree; leaflets 3 to 9, obovate or cuneate-obovate, 3.5 to 15 cm. long, essentially glabrous, usually subcoriaceous; panicles umbelliform, dense, usually about 1.5 cm. long; petals glabrous, 3 mm. long; anthers, ovary, and style glabrous. "Limoncillo" (Oaxaca, Honduras); "cucharillo," "estribillo" (Tamaulipas); "uruca" (Costa Rica); "garrapatilla" (Colima); "cauache" (Sinaloa); "barre-horno" (El Salvador); "siguaraya" (Cuba).

The wood is used in Mexico for making spoons and other small articles. The cream-colored sweet-scented flowers are much visited by bees. In Costa Rica the branches are employed for decorating the interiors of houses and churches. The leaves and fruit are reputed to be poisonous.

2. *Trichilia oligantha* C. DC. in DC. Monogr. Phan. 1: 693. 1878.

Mexico, without locality.

Branchlets villosulous; leaflets 9, the blades lance-oblong, the larger 10 cm. long, 3 cm. wide, short-cuspidate, glabrous above except on costa, beneath softly pubescent; panicles branched, few-flowered, densely hirtellous; calyx teeth 4, acute; petals glabrous, 2 mm. long; anthers glabrous.

3. *Trichilia parvifolia* C. DC. Ann. Cons. Jard. Genève 10: 159. 1907.

Sinaloa to Guerrero and Veracruz; type from Mexico, without definite locality. Nicaragua.

Shrub, up to 4 meters high; leaflets obovate or cuneate-obovate, 2 to 4.5 cm. long, emarginate, usually thick, sparsely hairy on the veins and in the axils beneath, or subglabrous; panicles axillary, 1 cm. long or less; petals 5, glabrous, 3 mm. long; anthers glabrous; ovary and style hirsute; capsule about 6 mm. thick, pubescent, 3-seeded; seeds 4 mm. long.

This species is closely related to *T. trifolia* L., of Venezuela, and may not be distinct.

4. *Trichilia cuneata* Radlk. Sitzungsab. Math. Phys. Akad. München 9: 642. 1879.

Trichilia heydeana C. DC. Bot. Gaz. 19: 3. 1894.

Chiapas. Guatemala and El Salvador; type from Guatemala.

Middle-sized tree; leaflets 7 to 11, obovate or elliptic-oblong, 5 to 15 cm. long, obtuse to short-pointed; panicles dense, 7 to 20 cm. long, densely fulvescent-pilosulous; calyx deeply 5-toothed, the teeth acute; petals 3.2 mm. long.

5. *Trichilia oaxacana* Blake, Contr. Gray Herb. n. ser. 53: 58. 1918.

Known only from the type locality, Cafetal Concordia, Department Pochutla, Oaxaca.

Leaflets 8, oval or obovate-oval, the larger 14 cm. long, 5.7 cm. wide, obtusely acuminate, sparsely puberulous on the veins beneath; panicle 16 cm. long, on a peduncle 11 cm. long; calyx 1 mm. long, the 5 teeth acute; petals 3.5 mm. long; anthers pilose on margin; style sparsely pilose.

6. *Trichilia karwinskyana* C. DC. in DC. Monogr. Phan. 1: 663. 1878.

Known only from the type locality, Papantla, Veracruz.

Leaflets 13 to 15, the blades lanceolate, 7 cm. long, 2.5 cm. wide, membranaceous, long-cuspidate, appressed-pilosulous on costa above and on nerves beneath; panicles exceeding the petioles, densely hirtellous, the flowers crowded; petals glabrous, acute, 4 mm. long.

7. *Trichilia hirta* L. Syst. Nat. ed. 10. 1020. 1759.

Trichilia spondioides Jacq. Enum. Pl. Carib. 20. 1760.

Trichilia schiedeana var. *purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 274. 1912.

General nearly throughout Mexico. Central and South America; West Indies; type from Jamaica.

Shrub or small tree, 3 to 20 meters high; leaflets 11 to 21, the blades lance-ovate or elliptic, 2.5 to 8 cm. long, pilose along the veins, especially beneath, or glabrescent; panicles 3 to 13 cm. long; petals 4 mm. long, sparsely pubescent dorsally or subglabrous; capsules essentially glabrous, about 15 mm. thick; seeds 3, subglobose, 6 mm. thick. "Garbancillo" (Sonora); "xkulinsis" (Yucatán); "cabo de hacha" (Oaxaca, Cuba, Porto Rico); "mata-piojo" (Nicaragua); "jubabán," "guabán" (Cuba); "guaita," "jobillo," "molinillo," "palo de Anastasio," "retamo" (Porto Rico).

The compact, yellowish or brownish wood is used for carpentry and for making canoes, carts, and other articles. The root is said to have strong purgative properties.

8. *Trichilia arborea* C. DC. Bull. Herb. Boiss. II. 5: 426. 1905.

Yucatán. Costa Rica and Nicaragua; type from Nicoya, Costa Rica.

Tree, 15 to 20 meters high; leaflets 11, ovate to oblong, 3.5 to 6 cm. long, glabrate or puberulous above, short-pubescent on veins and surface beneath; panicles several, short, corymbed at apex of branches; petals 4.8 mm. long; style pubescent. "Choben-ché" (Yucatán, Maya).

This has been reported from Yucatán as *T. terminalis* Jacq. The bark is used there as a remedy for fevers.

9. *Trichilia pringlei* Rose, Contr. U. S. Nat. Herb. 8: 50. 1903.

Known only from the type locality, Cuernavaca, Morelos.

Shrub or tree, 4 to 9 meters high; leaflets 15, elliptic or elliptic-ovate, 5 to 7 cm. long, sparsely appressed-pubescent on both sides at maturity, obtusely acuminate; panicles (including peduncle) 15 to 20 cm. long, much shorter than leaves; petals glabrous, 5 to 5.8 mm. long; style glabrous; capsule densely fulvescent-pubescent, about 17 mm. thick.

10. *Trichilia pavoniana* C. DC. Ann. Cons. Jard. Genève 10: 154. 1907.

Mexico, without locality.

Leaflets 13, elliptic, 2 to 5 cm. long, obtusely short-acuminate, appressed-hirtellous above, densely so beneath; panicles about equaling the leaves; calyx teeth 5, rounded, ciliolate; petals glabrous, 6 mm. long; style glabrous.

11. *Trichilia colimana* C. DC. Bot. Gaz. 19: 40. 1894.

*Trichilia langlassei*¹ C. DC. Ann. Cons. Jard. Genève 10: 160. 1907.

Sinaloa to Guerrero; type from Colima.

Shrub or tree; leaflets 9 to 13, lanceolate to ovate or obovate-oval, the larger 5 to 12 cm. long, 2 to 4.5 cm. wide, sparsely or rather densely pilosulous or pilose on both sides, acuminate; panicles much shorter than leaves or equaling them, sparsely pilosulous; calyx ciliolate; petals 4 or 5; capsules 1 to 1.5 cm. thick, pubescent with short whitish hairs; seeds subglobose, 6 mm. thick.

12. *Trichilia wawrana* C. DC. in DC. Monogr. Phan. 1: 666. 1878.

Known only from the type locality, "Passo-Majo," Mexico.

Leaflets 13 to 15, lanceolate, the larger 3.5 cm. long, 1.5 cm. wide, obtusely cuspidate, appressed-pilose on both sides chiefly on the veins, ciliate; panicles half as long as the leaves; calyx puberulous; style glabrous above.

DOUBTFUL SPECIES.

TRICHILIA PALLIDA Swartz. Prodr. Veg. Ind. Occ. 67. 1788. This West Indian species is listed by Hemsley² from Mexico on the authority of Grisebach, but the record is very doubtful.

TRICHILIA PALMERI C. DC. Bot. Gaz. 19: 39. 1894.

Known only from the type locality, Armeria, Colima.

Petioles 1 to 2 cm. long; leaflets 3, narrowly obovate or elliptic, 2.8 to 6 cm. long, 1.5 to 2.5 cm. wide, petiolulate, obtusely acuminate or short-pointed,

¹ Named for Eugène Langlassé, who made a large collection of plants in 1898 and 1899 in the states of Michoacán and Guerrero. A set of the plants is in the U. S. National Herbarium.

² Biol. Centr. Amer. Bot. 1: 183. 1879.

glabrous above, densely spreading-pilosulous on the veins beneath and sparsely so on surface; flowers unknown; capsule glabrous, about 6 mm. thick; seeds 4 mm. long.

Distinguished from *Trichilia parvifolia* C. DC., the only other Mexican species with 3-foliolate leaves, by the shape and pubescence of the leaflets.

TRICHILIA SCHIEDEANA C. DC. in DC. Monogr. Phan. 1: 664. 1878. Closely allied to *Trichilia karwinskyana* C. DC. and *T. hirta* L. No specimens have been examined, and the status of the species is uncertain. Type from Veracruz.

3. GUAREA Allem.; L. Mant. Pl. 2: 150. 1771.

REFERENCE: C. De Candolle in DC. Monogr. Phan. 1: 542-579. 1878.

Leaves abruptly pinnate; panicles axillary, sometimes borne on the older wood; calyx 4 or 5-toothed, rarely 5-sepaled; petals 4 or 5; filaments connate into a denticulate tube, the sessile anthers borne inside the tube at apex; ovary 4 or 5-celled; seeds usually large, pseudo-arillate by the separable inner pericarp.

Guarea trichilioides L., a West Indian species which has been reported incorrectly from Mexico, is said to have poisonous juice, which acts as a violent emetic and purgative. The following names have been reported from Mexico for plants of the genus whose specific identity is doubtful: "Guaraguo"; "cedrillo cimarrón" (Tabasco); "trementino" (Tabasco).

Ovary more or less pubescent.

Leaflets 1 to 3 pairs; petals 4, 6 mm. long or less; ovary 4-celled, the ovules solitary.

Panicles about equaling the leaves-----1. *G. rovirosae*.

Panicles much shorter than the leaves.

Ovary densely strigose throughout; style sparsely strigose, longer than ovary-----2. *G. chiapensis*.

Ovary sparsely strigose near apex; style glabrous, equaling ovary or shorter-----11a. *G. excelsa dubia*.

Leaflets 5 pairs or more; petals 5, 10 mm. long; ovary 5-celled, the cells 2-ovulate-----3. *G. chichon*.

Ovary glabrous.

Panicles about equaling the leaves or longer.

Panicles, calyx, and petals glabrous-----4. *G. filiformis*.

Panicles, calyx, and petals more or less densely strigillose.

Petals 6 mm. long; style about 2.5 mm. long, slender, distinctly longer than the ovary-----5. *G. tuerckheimi*.

Petals 3.8 to 4 mm. long; style 1 mm. long or less, equaling or shorter than the ovary.

Panicles nearly glabrous; leaflets of the larger leaves lance-elliptic, acuminate to an obtuse apex, 4 times as long as wide or more.

6. *G. polyantha*.

Panicles rather densely strigillose; leaflets of the larger leaves oblong-obovate, obtusely short-pointed, less than 3 times as long as wide.

7. *G. heterophylla*.

Panicles much shorter than the leaves.

Petals glabrous; petioles 6 cm. long-----8. *G. brachystachya*.

Petals puberulous or ciliolate; petioles 1.8 to 4.3 cm. long.

Petals 8.5 mm. long-----9. *G. obtusata*.

Petals 3 to 4.7 mm. long.

Petals merely ciliolate-----10. *G. makrini*.

Petals strigillose or pilosulous outside.

Gynophore glabrous-----11. *G. excelsa*.

Gynophore puberulous-----12. *G. virescens*.

1. *Guarea rovirosae* C. DC. Ann. Cons. Jard. Genève 10:145. 1907.
Known only from the type locality, near Atasta, Tabasco.
Leaflets lance-elliptic, 11 cm. long, acuminate; ovary sparsely pilosulous, 4-celled, the cells 1-ovulate; petals 4, pilosulous, 6 mm. long; style glabrous.
2. *Guarea chiapensis* Blake, Proc. Biol. Soc. Washington 34: 116. 1921.
Known only from the type locality, Finca Irlanda, Chiapas.
Leaflets 2 or 3 pairs, elliptic or obovate-elliptic, 10 to 16 cm. long, short-pointed, sparsely strigillose on the veins beneath, not tufted in the axils; panicles 5 cm. long; petals densely strigillose, 5.8 mm. long.
3. *Guarea chichon* C. DC. Ann. Cons. Jard. Genève 10:147. 1907.
Known only from the type locality, near Atasta, Tabasco.
Leaflets oblong-elliptic, up to 23 cm. long, very short-attenuate; panicles about equaling the leaves; ovary and style densely hirsute. "Chichón de montaña."
4. *Guarea filiformis* C. DC. in DC. Monogr. Phan. 1:566. 1878.
Guarea filiformis β *pallida* C. DC. in DC. Monogr. Phan. 1:566. 1878.
Guarea filiformis γ *cinerascens* C. DC. in DC. Monogr. Phan. 1: 567. 1878.
Morelos and Oaxaca. Nicaragua and Peru; type from Peru.
Leaflets 3 pairs, oblong-elliptic or ovate-elliptic, 13.5 cm. long, 5 cm. wide, obtusely cuspidate, glabrous; calyx teeth obtuse; petals 4 mm. long.
5. *Guarea tuerckheimi* C. DC.; Donn. Smith, Bot. Gaz. 33: 250. 1902.
Veracruz. Guatemala; type from Cubilquitz.
Leaflets 2 to 8 pairs, obovate-oblong or oval-oblong, the larger 15 cm. long, short-acuminate with obtuse apex; panicles loose, broad, 9.5 to 25 cm. long; petals sparsely strigillose above.
6. *Guarea polyantha* Blake, Proc. Biol. Soc. Washington 34: 117. 1921.
Known only from the type locality, Acapulco, Guerrero.
Large shrub; leaflets 2 to 5 pairs, those of the larger leaves 12.5 to 19 cm. long, 3 to 4.7 cm. wide, acuminate to an obtuse apex; panicles much branched, 10 to 24 cm. long; petals nearly glabrous, 3.8 mm. long; flowers with odor of honey. "Cedrillo."
7. *Guarea heterophylla* Blake, Proc. Biol. Soc. Washington 34: 116. 1921.
Known only from the type locality, Pinotepa, Oaxaca.
Leaflets 1 to 5 pairs, those of the larger leaves 9 to 12.5 cm. long, 3.8 to 5 cm. wide, obscurely and obtusely short-pointed; panicles remotely branched, 7.5 to 14 cm. long; petals strigillose above, 4 mm. long.
8. *Guarea brachystachya* DC. Prodr. 1: 624. 1824.
Mexico (?).
Leaflets ovate, subacuminate, 9 cm. long or less; panicles spiciform, about 6 cm. long; calyx teeth 4, obtuse; petals 4.
9. *Guarea obtusata* Blake, Proc. Biol. Soc. Washington 33: 118. 1920.
Known only from the type locality, Cafetal Concordia, Cerro Espino, Oaxaca.
Leaflets 2 to 4 pairs, elliptic-oblong or obovate-oblong, 9 to 17 cm. long, broadly rounded at apex, barbate beneath in the axils; panicles about 4 cm. long; flowers very fragrant; petals 4 or 5, papillose-puberulous outside; ovary 4-celled, the ovules solitary; fruit subglobose, 2.7 cm. long; seeds 1.5 cm. long.
10. *Guarea makrinii* Blake, Contr. Gray Herb. n. ser. 53: 57. 1918.
Known only from the type locality, Cafetal Concordia, Cerro Espino, Oaxaca.
Leaflets 2 or 3 pairs, oval or obovate-oval, the larger 9 to 10.5 cm. long, obtuse, barbate in the axils beneath; panicles 2.5 to 3.5 cm. long; petals 4 mm. long. "Ocotillo blanco."

11. *Guarea excelsa* H. B. K. Nov. Gen. & Sp. 7: 227. 1825.

Tepic to Guerrero; type collected near La Venta de Acaguisotla, between Acapulco and Zumpango, Guerrero.

Tall tree; leaflets 2 to 4 pairs, elliptic-oblong to oblong, 8 to 16 cm. long, obtuse to short-pointed; panicles 6.5 cm. long or less, narrow; petals sparsely strigillose, 4 mm. long; capsules subglobose, 1.5 cm. thick, 4-seeded.

Wrongly referred by Casimir De Candolle to *Guarea humilis* Bert., a West Indian species.

11a. *Guarea excelsa dubia* Blake, Proc. Biol. Soc. Washington 34: 116. 1921.

Known only from the type locality, María Madre Island, Tepic.

Ovary sparsely strigose; capsule strigillose.

12. *Guarea virescens* C. DC. Ann. Cons. Jard. Genève 10: 140. 1907.

Known only from the type locality, banks of the Río Coyaquilla, Michoacán or Guerrero.

Tree, 15 meters high; leaflets 2 or 3 pairs, elliptic to obovate-oblong, short-acuminate, 11 to 21 cm. long, 6 to 8.5 cm. wide; petals 4, acute, appressed-pilosulous; staminal tube appressed-pilosulous above; gynophore puberulous; ovary 4-celled, the cells 1-ovulate.

DOUBTFUL AND EXCLUDED SPECIES.

GUAREA GLABRESCENS (Hook. & Arn.) Blake.

Sapindus glabrescens Hook. & Arn. Bot. Beechey Voy. 281. 1836-1840.

Guarea fulva β *mexicana* C. DC. in DC. Monogr. Phan. 1: 575. 1878.

Mexico.

Leaflets 2 to 4 pairs, oblong-lanceolate, about 11 cm. long, beneath subvillous over whole surface when young, in age only along the veins; inflorescence paniculate; capsule subtrigonous, scarcely lobed, about 1 cm. long, often by abortion 2-celled.

GUAREA HIRSUTA C. DC. in DC. Monogr. Phan. 1: 578. 1878.

Described by De Candolle from "New Spain" and listed by Hemsley, but a later collection shows it to be a South American species.¹

GUAREA PALMERI Rose; C. DC. Bot. Gaz. 19: 39. 1894.

Colima; type from Manzanillo. Guatemala; El Salvador.

Tree, 5 meters high; leaflets 2 to 6 pairs, oblong or obovate-lanceolate, 12 cm. long, 4 cm. wide, pilose in the axils beneath; panicles racemiform; sepals 4, obtuse; ovary glabrous; capsule subglobose, 4-celled, 2 cm. long.

4. SWIETENIA Jacq. Enum. Pl. Carib. 4. 1760.

REFERENCES: Rolfe, Kew Bull. 1919: 201-207. 1919; Blake, Journ. Washington Acad. Sci. 10: 286-297. f. 1, 2. 1920.

Trees with hard and heavy, red wood; leaves abruptly pinnate or rarely odd-pinnate; flowers paniculate; calyx 5-lobed, the lobes semicircular or deltoid; petals 5, oval; staminal tube 10-toothed, the anthers borne inside the tube at apex; disk crenulate; ovary 5-celled; fruit a capsule, the seeds about 12 in each cell, with a terminal wing.

The trees of this genus are well known under the name of mahogany, and they are highly valued for their handsome, hard, heavy wood, which is much used for making fine furniture and the interior finish of houses. It should be noted, however, that not all the mahogany of commerce is derived from species of *Swietenia*; indeed, some of it is obtained from trees which have no relationship with the family Meliaceae.

¹ See C. DC. Ann. Cons. Jard. Genève 10: 150. 1907.

The first species of the genus to be described was *Swietenia mahagoni* Jacq., a West Indian plant which is not known to occur in Mexico, although it has often been reported from the region. All the species are closely related and presumably have similar properties.

A large amount of mahogany wood is exported from Mexico, especially from Yucatán and other coastal states (that from Yucatán is probably *S. macrophylla*). The trees grow rapidly and sometimes form extensive pure stands. The wood is used locally for furniture, for canoes, and for various other purposes.

A gum frequently exudes from the trunk. The bark is said to be bitter and to have astringent, tonic, and febrifuge properties. The juice of the young shoots has been employed in Cuba to heal wounds and to stop hemorrhages. The oil from the seeds ("pepitos de zopilote") was used by the Aztecs as a cosmetic, and is now sometimes used in making toilet soaps.

The following names are or have been in use in Mexico for species of the genus: "Caoba," "caobo" (Guerrero, Tabasco, Yucatán, Oaxaca; the word probably of Carib origin); "cóbano" (Colima, Guerrero); "zopilo-zontecomacuahuitl" (Nahuatl, "buzzard-head-tree," in allusion to the fact that the fruits with their curved stalks, when hanging on the trees resemble buzzard heads, as viewed from a short distance); "zopilote"; "tzopilotl"; "zopilocuahuitl"; "zopilotl"; "rosadillo" (Guerrero, Tabasco, Yucatán); "palo zopilote" (Oaxaca, *Conzatti*).

One of the species of *Swietenia* is described by Hernández¹ in a chapter headed "De Tzopilotlizonte Comatl, seu Capite Auræ."

Leaflets subsessile; seeds light brown.

Leaflets 5 to 9 cm. long, 0.8 to 3 cm. wide.....1. *S. humilis*.

Leaflets 8.5 to 14 cm. long, 3 to 5 cm. wide.....2. *S. cirrhata*.

Leaflets distinctly petioluled; seeds dark chestnut-brown...3. *S. macrophylla*.

1. *Swietenia humilis* Zucc. Abh. Akad. Muench. 2: 355. pl. 7. 1835-36.

Michoacán to Chiapas; type collected near Tehuantepec, Oaxaca. Guatemala.

Tree, up to 10 meters high; leaflets 2 to 5 pairs, elliptic-lanceolate to elliptic-ovate, glabrous; petals white, 5 mm. long; capsule 15 to 20 cm. long, 10 to 12 cm. thick, umbonate at apex; seeds 6 to 9 cm. long. "Cóbano" (Guerrero, Michoacán, Oaxaca); "flor de venadillo" (Tepic); "caoba" (Chiapas); "gateado" (Oaxaca).

The seeds are said to be very poisonous. The seeds of a *Swietenia* supposed to belong to this species are sold by Indian peddlers in Tepic and used to make a tea which is taken for pains in the chest. The wood of this species is not known to be exported in any quantity.

2. *Swietenia cirrhata* Blake, Journ. Washington Acad. Sci. 10: 292. f. 2, b. 1920.

Sinaloa to Oaxaca, less coastal than the preceding species; type from La Salada, Michoacán. El Salvador.

Tree, up to 15 meters high; leaflets 3 to 6 pairs, usually with a long filiform twisted cusp at apex. "Venadillo," "caoba" (Sinaloa).

The wood is much used in carpentry (Sinaloa).

3. *Swietenia macrophylla* King in Hook. Icon. Pl. 16: pl. 1550. 1886.

Tabasco and Chiapas. Honduras and Guatemala, and perhaps farther south; type supposed to be from Honduras.

Tree; leaflets 3 to 5 pairs, on petiolules 1.5 to 7 mm. long, the blades elliptic to oblong, 6 to 18 cm. long, 2 to 7 cm. wide; petals 4 mm. long; capsule ovoid, 15 cm. long, 7.5 cm. thick, subacutely umbonate; seeds 7.5 to 10 cm. long.

"Caoba" (Guatemala, Honduras).

¹Thesaurus 94. 1651.

This species, the "Honduras mahogany," is the most important in the genus commercially at the present time.

5. **CEDRELA** L. Syst. Nat. ed. 10. 940. 1759.

REFERENCES: C. De Candolle in DC. Monogr. Phan. 1: 735-747. 1878; Rose, Contr. U. S. Nat. Herb. 5: 189-191. 1899; C. De Candolle, Ann. Cons. Jard. Genève 10: 168. 1907.

Leaves abruptly pinnate, the leaflets entire; flowers panicle; calyx teeth 5; petals 5, connate below with the disk; ovary and stamens borne on a columnar disk longer than the ovary; stamens 5, the filaments free; ovary 5-celled, the cells 8 to 12-ovuled; fruit a 5-valved capsule; seeds with a terminal wing.

The species of Spanish cedar are widely distributed in Mexico. They are large trees with light coarse soft wood, which is widely employed for making cigar boxes. The wood is distinctive in appearance and has a characteristic odor. Large amounts of it are exported from Mexico, chiefly for making cigar boxes, and it has been employed locally for canoes, shingles, interior finish of houses, doors, sugar casks, rafters, and other purposes. The trees grow rapidly and sometimes form pure stands. The root bark is very bitter and has been employed for treating fevers and epilepsy. A decoction of the leaves is held in the mouth to relieve toothache. A resin which exudes from the trunk is used for affections of the chest. The seeds are reputed to have vermifuge properties.

The usual name for these trees in Mexico is "cedro." The following additional names are reported, but it is impossible to decide to what species they belong: "Kuché," "kulché" (Yucatán, Maya); "cedro colorado" (Oaxaca, Veracruz); "cedro chino"; "cedro liso"; "cedro macho" (Oaxaca); "cedro de la Habana"; "calicedra"; "cedro fino" (Veracruz, Oaxaca); "cedro oloroso" (Oaxaca); "cobano" (Oaxaca); "cedro hembra."

Cedrela odorata L., a West Indian species, has been reported frequently from Mexico, but is not known to occur in the region. It is to this species that Oviedo (Lib. IX, Cap. VII) refers, in what is probably the first account of Spanish cedar: "In Hispaniola and other islands and on the mainland there are certain trees which, because they have a pleasant odor, the Christians call *cedro*; in truth I do not believe they are cedars, but because the wood has a better odor than that of other trees, our carpenters have given it this name. It is an easily worked wood, good for making chests and door and window trimmings and for other purposes, and it is a wood not much attacked by worms; for this reason some say that it is never attacked by worms, but they are much mistaken, for it has often been proved that it does suffer in this respect like other woods; although to the tongue it seems more bitter than other woods, the taste of a worm and that of a man are not the same thing."

Leaflets broadly oval to suborbicular, broadly rounded or obtuse at apex, nearly as broad as long-----1. *C. rotunda*.

Leaflets lanceolate to oblong, acuminate or acute, much longer than broad.

Petiolules 4 mm. long or less.

Leaflets very densely and finely canescent-pilosulous beneath, glabrous above; corolla 8 to 9 mm. long; anthers not apiculate-----2. *C. discolor*.

Leaflets sparsely or rather densely cinereous-pilosulous or green beneath, at least the costa puberulous above; corollas 5 to 6 mm. long; anthers minutely apiculate.

Leaves sparsely pilosulous beneath, chiefly on the primary and secondary veins; capsule 2.2 to 2.5 cm. long-----3. *C. saxatilis*.

Leaves rather densely pilosulous beneath, on the surface as well as the veins; capsule 3.5 to 4 cm. long-----4. *C. oaxacensis*.

Petiolules 5 to 15 mm. long.

Sepals obtuse; rachis and both sides of leaflets glabrous.

5. *C. angustifolia*.

Sepals acute or acutish; rachis and lower surface of leaflets usually puberulous or pilosulous.

Leaflets conspicuously ciliolate.

Capsule 2.5 cm. long; leaflets acute at base-----6. *C. dugesii*.

Capsule 4 to 4.8 cm. long; leaflets mostly broadly rounded or subcordate at base-----7. *C. ciliolata*.

Leaflets obscurely or not at all ciliolate.

Anthers apiculate. Petals 8 mm. long-----8. *C. mexicana*.

Anthers not apiculate.

Petals 6 mm. long; filaments glabrous-----9. *C. occidentalis*.

Petals 8 to 9 mm. long; filaments sparsely pilose--10. *C. yucatana*.

1. *Cedrela rotunda* Blake, Proc. Biol. Soc. Washington 33: 109. 1920.

Known only from the type locality, vicinity of Villa Unión, Sinaloa.

Leaflets 2 to 4 pairs, 4 to 11 cm. long, 4.5 to 9 cm. wide, papery, glabrescent above, densely and softly griseous-pilosulous beneath; petiolules 3 to 4 mm. long; capsules 2.2 to 2.5 cm. long.

2. *Cedrela discolor* Blake, Proc. Biol. Soc. Washington 33: 108. 1920.

Known only from the type locality, San Ramón, Durango.

Leaflets 8 pairs, ovate to oblong or elliptic-oblong, the larger 13 to 17 cm. long, 3.5 to 4.3 cm. wide, shining above; panicles large, densely flowered, the flowers subsessile rufidulous-pilosulous.

3. *Cedrela saxatilis* Rose, Contr. U. S. Nat. Herb. 8: 314. 1905.

Morelos and Oaxaca; type collected near Cuernavaca, Morelos.

Tree, 7 meters high; leaflets 5 to 8 pairs, oblong or ovate-oblong, the larger 15 cm. long, 5 to 6.3 cm. wide; panicles large, with spreading or deflexed branches.

4. *Cedrela oaxacensis* C. DC. & Rose, Contr. U. S. Nat. Herb. 5: 190. 1899.

Cedrela montana var. *mexicana* C. DC. in DC. Monogr. Phan. 1: 741, 1878.

Oaxaca.

Small tree; leaflets 6 or 7 pairs, oblong, 5 to 11 cm. long, 3 to 4.3 cm. wide; panicles large, with spreading or deflexed branches; capsules 3.5 to 4 cm. long.

5. *Cedrela angustifolia* DC. Prodr. 1: 624. 1824.

Mexico, without definite locality. Reported also from Peru, but this record is very doubtful.

Leaflets 8 to 10 pairs, long-petiolulate, narrowly ovate-oblong, 11.5 cm. long, 2.8 cm. wide, glabrous on both sides, acute at base; panicles large; flowers subsessile; calyx teeth obtuse.

6. *Cedrela dugesii* S. Wats. Proc. Amer. Acad. 18: 190. 1883.

Guanajuato; type from Guanajuato.

Large tree; leaflets 3 to 5 pairs, ovate or lance-ovate, the larger 9 to 13.5 cm. long, 2.5 to 4.8 cm. wide, caudate-attenuate, sparsely pilosulous or glabrescent and gland-dotted beneath; petiolules 7 to 15 mm. long; panicles dense; corolla 7 mm. long. "Nogal cimarrón," "cedro."

7. *Cedrela ciliolata* Blake, Proc. Biol. Soc. Washington 34: 115. 1921.

Known only from the type locality, Rincón, near Morelia, Michoacán.

Leaflets 3 to 5 pairs, ovate or oblong-ovate, the larger 9 to 12.5 cm. long, 3.3 to 5 cm. wide, caudate-acuminate, pilosulous on the veins beneath or glabrescent; petiolules 9 to 15 mm. long. "Nogal corriente."

8. *Cedrela mexicana* M. Roemer, Fam. Nat. Syn. 1: 137. 1846.*Cedrela glaziovii* C. DC. in Mart. Fl. Bras. 11¹: 224. pl. 65. f. 1. 1878.

Puebla and Tepic; type from Papantla, Veracruz. Ranging southward to Brazil.

Tree; leaflets about 8 pairs, ovate-oblong or oblong, 8 to 11 cm. long, 3 to 3.5 cm. wide, somewhat puberulent beneath or glabrate; petiolules 5 to 11 mm. long; flowers 8 mm. long; capsules 2.5 to 4 cm. long. "Cedro" (Veracruz).

9. *Cedrela occidentalis* C. DC. & Rose, Contr. U. S. Nat. Herb 5: 190. 1899.

Sinaloa to Oaxaca; type from Acaponeta, Tepic.

Tree, up to 20 meters high; leaflets 6 to 20 pairs, oblong, the larger 9 to 17 cm. long, 4 to 5 cm. wide, densely puberulous or glabrate beneath; petioles mostly 7 to 10 mm. long; capsule 2.5 to 4 cm. long. "Cedro" (Sinaloa).

10. *Cedrela yucatana* Blake, Proc. Biol. Soc. Washington 33: 110. 1920.

Veracruz to Yucatán; type from Mérida, Yucatán.

Tree, about 12 meters high; leaflets usually 6 to 8 pairs, ovate to lance-oblong, the larger 6.5 to 13 cm. long, 2 to 4 cm. wide, incurved-puberulous beneath on whole surface or only on the veins; petiolules 5 to 10 mm. long; capsule 3.5 cm. long.

DOUBTFUL SPECIES.

CEDRELA ALTERNIFOLIA (Mill.) Steud. Nom. Bot. ed. 1. 170. 1821. *Cedrus alternifolia* Mill. Gard. Dict. ed. 8. *Cedrus* no. 3. 1768. Said to have simple cordate leaves, and probably not a member of the family. Described from Campeche.**74. MALPIGHIACEAE. Malpighia Family.**

REFERENCE: Small, N. Amer. Fl. 25: 117-171. 1910.

Shrubs or trees, often scandent; leaves usually opposite, stipulate, entire, dentate, or lobate, often with glands on the margin or lower surface; flowers usually perfect and showy, variously arranged, cleistogamous flowers often present; sepals 5, usually glanduliferous; petals 5, clawed; stamens 5 or 10; fruit drupaceous, nutlike, capsular, or of 1 to 3 samaras.

Fruit a capsule or drupe, never bristly; receptacle flat or depressed.

Fruit dry, separating into 3 carpels.....4. **THRYALLIS.**

Fruit a fleshy drupe, not separating.

Styles with slender acute tips.....1. **BYRSONIMA.**

Styles with thickened, obtuse or truncate tips.

Styles distinct.....2. **MALPIGHIA.**Styles united.....3. **BUNCHOSIA.**

Fruit of winged samaras or nutlike, or densely bristly; receptacle usually pyramidal.

Fruit densely bristly.

Filaments glabrous; stigma bilobate.....5. **LASIOCARPUS.**Filaments pubescent; stigma entire.....6. **ECHINOPTERYS.**

Fruit not bristly, usually of samaras, sometimes nutlike.

Samaras with lateral wings, these distinct or united.

Anther-bearing stamens 3 or 5.

Normal flowers with 5 fertile stamens and styles.....7. **ROSANTHUS.**Normal flowers with 5 fertile stamens and 1 style, or with 3 fertile stamens and 2 or 3 styles.....8. **GAUDICHAUDIA.**

Anther-bearing stamens 10.

Lateral samara wings lobed to the base.....9. **TETRAPTERIS.**

Lateral wings not lobed.

Stipules borne on the petiole above the base.....10. **HIRAEA.**Stipules borne at the base of the petiole.....11. **MASCAGNIA.**

Samaras with a single dorsal wing, this sometimes reduced to a keel or beak.

Style 1; stamens 5 or 6.

Samaras winged-----12. JANUSIA.

Samaras merely keeled, nutlike-----13. ASPICARPA.

Styles 3; stamens 10.

Stigmas clavate or truncate-----14. BANISTERIOPSIS.

Stigmas borne on the dilated thin style tips.

Samara wings thickened along the dorsal (outer) edge

15. BANISTERIA.

Samara wings thickened along the ventral (inner) edge.

16. STIGMAPHYLLON.

1. **BYRSONIMA** L. Rich.; Juss. Ann. Mus. Paris 18: 481. 1811.

Byrsonima spicata (Cav.) DC. is reported from Mexico by Small, but the writer has seen no specimens referable to it.

1. *Byrsonima crassifolia* (L.) DC. Prodr. 1: 579. 1824.

Malpighia crassifolia L. Sp. Pl. 126. 1753.

Byrsonima cotinifolia H. B. K. Nov. Gen. & Sp. 5: 152. pl. 447. 1822.

Byrsonima oaxacana Juss. Ann. Sci. Nat. II. 13: 332. 1840.

Byrsonima karwinskiana Juss. Ann. Sci. Nat. II 13: 333. 1840.

Sinaloa to Chiapas and Veracruz. Central America, West Indies, and northern South America.

Erect shrub or tree, 2 to 9 meters high; leaves oblong to ovate or rounded-elliptic, mostly 4 to 15 cm. long, short-petiolate, acute to rounded at apex, densely tomentose when young with reddish or whitish hairs, often glabrate in age; flowers yellow or reddish; fruit a yellow drupe, about 1 cm. in diameter. Most generally known as "nance," "nanche," or "nanchi"; "chi" (Yucatán, Maya); "nananche" (*Alcocer*); "nanche de perro," "nanzinquahuatl" (*Ramírez*); "changugo" (Michoacán, Guerrero); "nantzinxocotl" (*Urbina*); "nance agrio" (Guerrero, Tabasco); "nancite" (Costa Rica, El Salvador, Nicaragua); "nance verde" (El Salvador); "yuco," "nanci," "chaparro," "peralejo" (Columbia).

Small recognized *B. oaxacana* and *B. karwinskiana* as distinct species, but the characters by which they are supposed to be distinguishable seem not to hold in the material examined by the writer.

The plant is much cultivated in Mexico and Central America for its acid edible fruit. This is usually eaten raw, but is sometimes cooked, and is used also for preparing a beverage similar to lemonade. In some localities it has been fermented to produce an alcoholic drink. The wood, which is said to be reddish and to have a specific gravity of about 0.67, is employed in various ways. The bark is used for tanning and dyeing, and is said, in addition, to yield a strong fiber. The plant is astringent, and various parts have been used in domestic medicine for fevers, colds, and snake bites.

2. **MALPIGHIA** L. Sp. Pl. 425. 1753.

Erect shrubs or small trees; leaves opposite, entire in the Mexican species, flowers in short axillary cymes; calyx with 6 to 10 glands; petals variously dentate; fruit a drupe, usually red.

Malpighia urens L., a West Indian species, has been reported from Mexico, probably erroneously. The following vernacular names are reported for it, but it is not certain that they apply even to a plant of this genus: "Ahualt-zocotl," "ahualzocotlque," "palo bronco."

Leaves and branchlets tomentose, at least when young.

Leaves cordate at base.....1. *M. cordata*.

Leaves rounded to acute at base.

Cymes pedunculate; leaves conspicuously petiolate.....2. *M. mexicana*.

Cymes and leaves sessile or nearly so.....3. *M. subglabrata*.

Leaves and branchlets sericeous, strigose, or glabrous.

Styles unequal, the 2 posterior ones longer and thicker than the anterior one.

Leaves acute or acuminate; stamens opposite the lateral petals much stouter than the others and longer than those opposite the sepals.

4. *M. incana*.

Leaves rounded or obtuse at apex; stamens opposite the lateral petals not longer than those opposite the sepals.

Fruit 5 to 6 mm. wide.....5. *M. umbellata*.

Fruit 10 to 12 mm. wide.....6. *M. puniceifolia*.

Styles nearly equal, or the anterior one slightly longer than the posterior ones.

Leaves, at least most of them, obtuse or rounded at apex.

Styles unequal, the anterior one longer than the posterior one; anterior petals longer than the posterior one.....7. *M. heterophylla*.

Styles subequal; anterior petals smaller than the posterior one.

Larger petals 6 to 7 mm. long.....8. *M. galeottiana*.

Larger petals 9 to 10 mm. long.....9. *M. diversifolia*.

Leaves acute or acuminate.

Sepals barbate; calyx with 10 glands.....10. *M. ovata*.

Sepals not barbate; calyx with 6 to 8 glands.....11. *M. glabra*.

1. *Malpighia cordata* Small, N. Amer. Fl. 25: 154. 1910.

Jalisco and Morelos; type from Zacoalco, Jalisco.

Shrub, densely tomentose; leaves rounded-ovate, 3 to 6 cm. long, obtuse or acute; larger petals 9 to 11 mm. long; fruit about 1 cm. in diameter.

2. *Malpighia mexicana* Juss. Ann. Sci. Nat. II. 13: 337. 1840.

Bunchosia guadalajarensis S. Wats. Proc. Amer. Acad. 22: 401. 1887.

Malpighia oaxacana Niedenzu; Loesener, Bull. Herb. Boiss. 2: 544. 1894.

Durango to Oaxaca and Morelos.

Erect shrub, 2 to 4.5 meters high; leaves oval to ovate, 3 to 10 cm. long, obtuse or acute, usually densely tomentose beneath; flowers purple or purplish, 1.5 to 2 cm. wide; fruit red, about 1 cm. in diameter. "Nanche" (Oaxaca); "manzanito" (Jalisco).

3. *Malpighia subglabrata* (Niedenzu) Small, N. Amer. Fl. 25: 154. 1910.

Malpighia mexicana subglabrata Niedenzu, Gen. Malp. 4. 1889

Known only from the type locality, San Agustín.

Leaves ovate, 2.5 to 7 cm. long, obtuse, glabrate; fruit red, 1 cm. long.

4. *Malpighia incana* Mill. Gard. Dict. ed. 8. *Malpighia* no. 3. 1768.

Malpighia campechiensis Lam. Encycl. 4: 333. 1797.

Yucatán and Campeche; type from Campeche. Cuba.

Leaves oblong or lanceolate, 3 to 6 cm. long, pubescent, especially beneath, short-petiolate; flowers purple, 1.5 cm. wide; fruit 8 mm. in diameter.

5. *Malpighia umbellata* Rose, Contr. U. S. Nat. Herb. 1: 310. 1895.

Sonora and Sinaloa; type from Agiabampo, Sonora.

Much-branched shrub, 2.5 meters high; leaves oblong or obovate, 1.5 to 3.5 cm. long, glabrate; fruit red, edible. "Mora de campo."

6. *Malpighia puniceifolia* L. Sp. Pl. ed. 2. 609. 1762.

Yucatán. West Indies and northern South America.

Leaves oblong to oval, 1.5 to 7 cm. long, glabrous in age, short-petiolate; flowers pink or violet, 1.5 to 2 cm. broad; fruit red. "Cerezo," "cerezero" (Cuba).

The fruit is edible and has an agreeable flavor. In the West Indies it is much eaten, and is used for jellies and tarts. The bark is reported to yield a red dye.

7. *Malpighia heterophylla* Griseb. Linnaea 22: 2. 1849.

Described from Mexico, the locality not known but probably in Veracruz.

Leaves ovate-lanceolate, 4 to 10 cm. long, glabrate; corolla 1.5 cm. wide.

8. *Malpighia galeottiana* Juss. Arch. Mus. Hist. Nat. (Paris) 3: 261. 1844.

Puebla and Oaxaca; reported from San Luis Potosí; type from mountains of Oaxaca.

Shrub or tree, 1 to 6 meters high; leaves oval, oblong, or ovate, 1 to 3 cm. long, short-petiolate, bright green, glabrate; flowers pink or white, 1.5 cm. wide; fruit red, 1 cm. in diameter.

9. *Malpighia diversifolia* T. S. Brandeg. Zoe 5: 104. 1901.

Southern Baja California; type from San José del Cabo.

Shrub, 2 to 2.5 meters high; leaves suborbicular to ovate or obovate, 2 to 4 cm. long, glabrate in age; flowers pink, 2 cm. wide; fruit red, 1 cm. in diameter, edible. "Manzana," "manzanita."

10. *Malpighia ovata* Rose, Contr. U. S. Nat. Herb. 1: 310. 1895.

Bunchosia parvifolia S. Wats. Proc. Amer. Acad. 24: 42. 1889. Not *Malpighia parvifolia* Juss. 1844.

Malpighia watsoni Rose, Contr. U. S. Nat. Herb. 1: 310. 1895.

Sonora to Oaxaca; type from Guaymas, Sonora.

Shrub, 2 to 4 meters high; leaves ovate or broadly ovate, 1 to 6 cm. long, glabrate; flowers pink, 1 to 1.3 cm. wide; fruit red, 8 to 9 mm. long.

11. *Malpighia glabra* L. Sp. Pl. 425. 1753.

Nuevo León and Tamaulipas to Tabasco and Yucatán. Southern Texas, Central America, West Indies, and northern South America; type from Jamaica.

Shrub, 1 to 3 meters high; leaves mostly ovate, 2.5 to 9 cm. long, glabrous or nearly so, bright green; flowers pink, 1.5 cm. wide; fruit red. "Escobillo" (Tabasco); "manzanita" (Tamaulipas); "cereza" (*Sessé & Mocino*); "chi" (Yucatán, *Dondé*); "cerezo," "cerezo de Jamaica," "palo de gallina" (Cuba); "Júpiter" (Costa Rica); "cerezo de Castilla" (Panama); "arrayancito" (Colombia); "xocot," "xochtotl" (Nicaragua).

The fruit is edible, and the plant is sometimes cultivated. The bark is said to be astringent and to have been used as a remedy for fevers.

3. **BUNCHOSIA** L. Rich.; Juss. Ann. Mus. Hist. Nat. 18: 481 1811.

Erect shrubs or trees; leaves opposite, entire, usually short-petiolate; flowers mostly yellow, in narrow panicles; calyx with 8 or 10 glands; petals undulate or dentate; fruit a drupe.

Ovary and young fruit glabrous or practically so.

Leaves acute at base, glabrous; fruit 9 to 13 mm. in diameter.

1. **B. glandulosa.**

Leaves rounded or obtuse at base, pubescent beneath, at least when young; fruit 15 to 20 mm. in diameter.

2. **B. palmeri.**

Ovary and young fruit copiously pubescent.

Corolla large, 18 mm. broad or larger.

Inner petal cordate, similar to the other petals-----3. *B. strigosa*.

Inner petal spatulate-----4. *B. sonorensis*.

Corolla small, usually 12 to 15 mm. broad.

Anther connective purple or brown-----5. *B. lindeniana*.

Anther connective yellow.

Leaves densely pubescent beneath when mature.

Leaves soon glabrate on the upper surface-----6. *B. biocellata*.

Leaves permanently and densely pubescent on the upper surface.

7. *B. montana*.

Leaves nearly or quite glabrous when mature.

Innermost petal with a broad suborbicular blade----8. *B. lanceolata*.

Innermost petal with a spatulate blade-----9. *B. gracilis*.

1. *Bunchosia glandulosa* (Cav.) DC. Prodr. 581. 1824.

Malpighia glandulosa Cav. Monad. Diss. 411. 1789.

Yucatán. West Indies.

Shrub or small tree, 2 to 6 meters high; leaves oblong, elliptic, or ovate, 3 to 10 cm. long, usually acute, glabrous, bright green; flowers yellow; fruit bilobate, 9 to 13 mm. in diameter, red or orange. "Sipché" (Yucatán, Maya); "cabra hedionda" (Santo Domingo).

2. *Bunchosia palmeri* S. Wats. Proc. Amer. Acad 22: 401. 1887.

Sinaloa to Guerrero and Morelos; type from Tequila, Jalisco.

Shrub or small tree; leaves mostly oval, 8 to 17 cm. long, obtuse or rounded and short-acuminate, pale green. "Garbancillo" (Sinaloa).

3. *Bunchosia strigosa* Schlecht. Linnaea 10: 242. 1836.

Type from Tehuantepec, Oaxaca; no material seen by the writer.

Leaves ovate-oblong or elliptic-oblong, 5 to 10 cm. long, obtuse or acute, glabrate beneath.

4. *Bunchosia sonorensis* Rose, Contr. U. S. Nat. Herb. 1: 94. 1891.

Dry hillsides, Sonora and Sinaloa; type from Alamos, Sonora.

Shrub, 1 to 2.5 meters high; leaves oval to oblong, 2 to 7 cm. long, obtuse or rounded at apex, copiously pubescent; flowers yellow; fruit bilobate, red, 1.5 to 2 cm. broad.

5. *Bunchosia lindeniana* Juss. Arch. Mus. Hist. Nat. (Paris) 3: 335. 1844.

Veracruz.

Leaves oblong to ovate, 8 to 15 cm. long, short-acuminate, bright green, short-petiolate; fruit 2 or 3-lobate, 1 to 1.5 cm. in diameter.

6. *Bunchosia biocellata* Schlecht. Linnaea 10: 241. 1836.

Bunchosia discolor Turcz. Bull. Soc. Nat. Moscou 32¹: 266. 1859.

Tamaulipas and Veracruz; type from Jalapa, Veracruz. Guatemala.

Shrub or small tree, 2 to 3.5 meters high; leaves mostly oval or elliptic, 5 to 13 cm. long, obtuse or acute, thin, bright green; flowers yellow.

7. *Bunchosia montana* Juss. Arch. Mus. Hist. Nat. (Paris) 3: 340. 1844.

Oaxaca; type collected near the city of Oaxaca.

Shrub, 1.5 to 3 meters high; leaves mostly oblong or ovate, 3 to 7 cm. long, rounded or obtuse at apex, thick, densely pubescent; fruit bilobate, 1 to 1.5 cm. in diameter, yellow.

8. *Bunchosia lanceolata* Turcz. Bull. Soc. Nat. Moscou 36¹: 582. 1863.

Bunchosia pringlei S. Wats. Proc. Amer. Acad. 26: 133. 1891.

Colima (?) to Oaxaca, Veracruz, and San Luis Potosí; type from Orizaba.

Slender shrub, 2 to 3 meters high, with long, often subscandent branches; leaves mostly ovate to oblong, 5 to 15 cm. long, bright green, acute or acuminate, often lustrous; flowers yellow; fruit bilobate, 1.5 to 2 cm. broad. "Capulincillo," "ciruelillo," "zapotito de San Juan" (Veracruz, according to various authors); "zapotillo de San Juan" (Oaxaca, *Reko*).

Some of the specimens referred here have no flowers, and may belong elsewhere.

9. *Bunchosia gracilis* Niedenzu, *Bunchos.* 5. 1898.

Described from Mexico. Central America.

Leaves elliptic or oblong, 6 to 15 cm. long, bright green, acute or acuminate.

DOUBTFUL SPECIES.

BUNCHOSIA CANESCENS (Ait.) DC. Prodr. 1: 582. 1824. *Malpighia canescens* Ait. Hort. Kew. 2: 105. 1789. Described from cultivated plants. Reported from Mexico by Small.

BUNCHOSIA SESSILIFOLIA DC. Prodr. 1: 582. 1824. Described from Mexico. Probably not of this genus.

4. *THRYALLIS* L. Sp. Pl. ed. 2. 554. 1762.

Erect shrubs; leaves opposite, sessile or petiolate, entire; flowers usually yellow, racemose; calyx glandless or with very small glands; petals entire or dentate, persistent; fruit a small 3-lobate capsule.

Ovary glabrous.

Leaves sessile-----1. *T. sessilifolia*.

Leaves petiolate-----2. *T. glauca*.

Ovary pubescent.

Sepals and leaves densely silky-strigose-----3. *T. vestita*.

Sepals and leaves glabrous or nearly so.

Anthers about as broad as long; corolla about 1 cm. wide.

4. *T. angustifolia*.

Anthers twice as long as broad or longer; corolla about 2 cm. wide.

Calyx with glands outside at base.

Glands at base of the leaf blade sessile-----5. *T. palmeri*.

Glands of the leaf blade long-stipitate-----6. *T. humilis*.

Calyx without glands.

Branches glabrous; leaf glands sessile-----7. *T. dasycarpa*.

Branches pubescent; leaf glands stipitate-----8. *T. tuberculata*.

1. *Thryallis sessilifolia* Rose, Contr. U. S. Nat. Herb. 12: 281. 1909.

Galphimia sessilifolia Rose, Contr. U. S. Nat. Herb. 3: 313. 1895.

Oaxaca; type from hills of Las Sedas, altitude 1,800 meters.

Shrub, 0.3 to 1 meter high; leaves ovate to rounded-ovate, 1.5 to 3.5 cm. long, glabrous, glaucescent; flowers yellow, tinged with red, petals about 1 cm. long.

2. *Thryallis glauca* (Cav.) Kuntze, Rev. Gen. Pl. 1: 89. 1891.

Galphimia glauca Cav. Icon. Pl. 5: pl. 489. 1799.

Galphimia gracilis Bartl. Linnaea 13: 552. 1839.

Galphimia latifolia Bartl. Linnaea 13: 553. 1839.

Galphimia grandiflora Bartl. Linnaea 13: 554. 1839.

Galphimia paniculata Bartl. Linnaea 13: 556. 1839.

Galphimia humboldtiana Bartl. Linnaea 13: 559. 1839.

? *Galphimia multicaulis* Juss. Ann. Sci. Nat. II. 13: 327. 1840.

Sonora to San Luis Potosí, Morelos, and Chiapas; type from Acámbaro, Guanajuato. Central America; naturalized in the West Indies.

Slender shrub, 0.5 to 4.5 meters high, glabrous or nearly so; leaves oblong, ovate, or oval, 1 to 6 cm. long, usually obtuse or rounded at apex, more or less glaucous; flowers yellow, large, in showy racemes. "Huachácata," "nachácata," "vachácata" (Michoacán); "calderona amarilla," "flor de diciembre" (Michoacán, Guerrero); "ramo de oro" (Jalisco); "palo del muerto" (Jalisco, Mexico, *Urbina*); "hierba del piojo" (San Luis Potosí); "consulita," "lluvia de oro" (Porto Rico); "hierba del venado," "palo de San Vicente" (Sinaloa); "consulitas" (Santo Domingo).

A handsome shrub, sometimes cultivated. Small recognized *T. multicaulis* (Juss.) Kuntze as a valid species, said to differ from *T. glauca* by its low habit and branched inflorescence. All the material examined by the writer appears to be conspecific. The leaves are used for healing wounds in Sinaloa.

3. *Thryallis vestita* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 12: 281. 1909.

Galphimia vestita S. Wats. Proc. Amer. Acad. 21: 421. 1886.

Known only from the type locality, Hacienda San Miguel, southwestern Chihuahua.

Slender shrub, about 30 cm. high; leaves linear or linear-lanceolate, 1 to 3.5 cm. long; flowers yellow.

4. *Thryallis angustifolia* (Benth.) Kuntze, Rev. Gen. Pl. 1: 89. 1891.

Galphimia angustifolia Benth. Bot. Voy. Sulph. 9. 1844.

Galphimia unifolia A. Gray, Gen. Fl. Amer. 2: 196. 1849.

Baja California and Sonora to Tamaulipas; type from Cape San Lucas, Baja California. Western Texas.

Low slender shrub; leaves linear to oval, 1 to 4 cm. long, acute or obtuse; flowers yellow, becoming reddish.

5. *Thryallis palmeri* Rose, Contr. U. S. Nat. Herb. 12: 281. 1909.

Galphimia glandulosa Rose, Contr. U. S. Nat. Herb. 5: 137. 1897. Not

G. glandulosa Cav. 1799.

Known only from the type locality, Acapulco, Guerrero.

Shrub; leaves oblong to ovate, 2.5 to 6 cm. long, obtuse or acute; flowers yellow.

6. *Thryallis humilis* Rose, Contr. U. S. Nat. Herb. 12: 280. 1909.

Tepic; type collected between Concepción and Acaponeta.

Low shrub; leaves ovate or elliptic, 4 to 7 cm. long, obtuse or acute, glaucous beneath; flowers yellow.

7. *Thryallis dasycarpa* Small, N. Amer. Fl. 25: 151. 1910.

Dry hillsides, Sinaloa to Michoacán; type from Rosario, Sinaloa.

Shrub, sometimes 3 meters high; leaves oblong or ovate, 1 to 9.5 cm. long; flowers yellow, becoming reddish, in long racemes.

8. *Thryallis tuberculata* Rose, Contr. U. S. Nat. Herb. 12: 281. 1909.

Known only from the type locality, between Rosario and Colomas, Sinaloa.

Leaves oblong to lanceolate, 2.5 to 5 cm. long, obtuse or acute, short-petiolate; flowers yellow.

5. **LASIOCARPUS** Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 90. 1854.

1. *Lasiocarpus salicifolius* Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 91. 1854.

Puebla and Oaxaca; type from Río de las Vueltas, Oaxaca.

Shrub, 1 to 2 meters high; leaves opposite, linear-oblong to oval-oblong, 2 to 6 cm. long, sericeous, especially beneath; flowers small, white, short-racemose; fruit densely covered with very long slender purplish bristles.

6. ECHINOPTERYYS Juss. Arch. Mus. Hist. Nat. (Paris) 3: 342. 1844

Erect or scandent shrubs; leaves alternate, entire; flowers racemose, the petals dentate; fruit 3-lobate, densely birstly.

Leaves petiolate, mostly ovate, 1 to 3 cm. long; bristles of the fruit slender, densely pubescent-----1. *E. eglandulosa*.

Leaves sessile or subsessile, linear-oblong, mostly less than 1 cm. long; bristles stout, glabrate-----2. *E. setosa*.

1. *Echinopterys eglandulosa* (Juss.) Small, N. Amer. Fl. 25: 148. 1910.

Bunchosia eglandulosa Juss. Ann. Sci. Nat. II. 13: 325. 1840.

Echinopterys lappula Juss. Arch. Mus. Hist. Nat. (Paris) 3: 342. 1844.

Sonora to Zacatecas, Morelos, and Oaxaca.

Slender scandent shrub; leaves lanceolate to broadly ovate, 1 to 3 cm. long; flowers yellow, the petals 6 to 10 mm. long; fruit densely bristly, purplish.

2. *Echinopterys setosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 182. 1911.

Known only from the type locality, Sierra de la Paila, Coahuila.

Densely branched shrub with white-strigose branchlets; leaves linear-oblong, 1 cm. long or shorter.

7. ROSANTHUS Small, N. Amer. Fl. 25: 131. 1910.

1. *Rosanthus subverticillatus* (Rose) Small, N. Amer. Fl. 25: 131. 1910.

? *Banisteria brevipes* Moc. & Sessé; DC. Prodr. 1: 591. 1824.

Gaudichaudia subverticillata Rose, Contr. U. S. Nat. Herb. 8: 49. 1903.

Durango and Jalisco; type collected between Huejuquilla and Mexquitic, Jalisco.

Erect shrub, 50 to 80 cm. high, copiously pubescent; leaves opposite or ternate, oblong, 4 to 10 cm. long, obtuse and mucronate, entire; flowers yellow, the petals 7 to 11 mm. long, denticulate; fruit of 3 samaras, these 11 to 13 mm. long.

8. GAUDICHAUDIA H. B. K. Nov. Gen. & Sp. 5: 156. 1822.

Scandent or trailing shrubs; leaves opposite, entire, petiolate; calyx with 8 or 10 glands; petals yellow, dentate; fruit of usually 3 samaras.

Samaras V-shaped, the wings distinct at apex.

Anther-bearing stamens 5-----1. *G. karwinskiana*.

Anther-bearing stamens 3.

Flower clusters loose; sepal glands oval-----2. *G. schiedeana*.

Flower clusters dense; sepal glands linear-----3. *G. confertiflora*.

Samaras orbicular or obovate, the wings extending all around the body.

Anther-bearing stamens 5.

Sepals less than 5 mm. long; corolla less than 2 cm. broad_4. *G. pentandra*.

Sepals over 5 mm. long; corolla more than 2 cm. broad._5. *G. arnottiana*.

Anther-bearing stamens 3.

Leaves sessile or nearly so, narrowed to the base_____6. *G. cynanchoides*.

Leaves conspicuously petiolate, more or less cordate at base.

Samaras mucronate at base-----7. *G. mucronata*.

Samaras long-caudate at base-----8. *G. webbiana*.

1. *Gaudichaudia karwinskiana* Juss. Ann. Sci. Nat. II. 13: 252. 1840.

Described from Mexico, the locality not known; specimens from Jalisco may belong here.

Leaves oblong-ovate or obovate, about 2.5 cm. long, pubescent on both surfaces.

2. *Gaudichaudia schiedeana* Juss. Arch. Mus. Hist. Nat. (Paris) 3: 591. 1844.
 ? *Gaudichaudia albida* Schlecht. & Cham. Linnaea 5: 217. 1830.
Triopteris sericea Schlecht. Linnaea 10: 243. 1836.
Gaudichaudia palmeri S. Wats. Proc. Amer. Acad. 21: 421. 1885.
Janusia mexicana T. S. Brandeg. Zoe 5: 203. 1905.
 Sonora to Oaxaca and Veracruz; type from Malpais de Naolinco, Veracruz.
 Central America.
 Slender sericeous shrub; leaves oblong to ovate or oval, 2 to 5 cm. long, obtuse or rounded at base; petals 9 to 12 mm. long; samaras 1.5 to 2 cm. long.
3. *Gaudichaudia confertiflora* Juss. Ann. Sci. Nat. II. 13: 252. 1840.
Gaudichaudia congestiflora Juss. Arch. Mus. Hist. Nat. (Paris) 3: 590. 1844.
 Reported from Aguascalientes, and probably occurring elsewhere.
 Leaves 2 to 5 cm. long; petals 6 to 7 mm. long; samaras 1 to 1.4 cm. long.
4. *Gaudichaudia pentandra* Juss. Ann. Sci. Nat. II. 13: 252. 1840
 Jalisco to Hidalgo and Puebla; type from Sultepec, Mexico.
 Leaves lanceolate to ovate-oblong, 3 to 6 cm. long, densely pubescent; petals 6.5 to 7.5 mm. long; samaras 8 to 10 mm. long.
5. *Gaudichaudia arnottiana* Juss. Ann. Sci. Nat. II. 13: 252. 1840.
 Sinaloa to Jalisco and Morelos; type from Jalisco.
 Leaves oblong to oval, 2 to 7 cm. long; petals 1.5 to 1.8 cm. long; samaras 1.4 to 1.8 cm. long.
6. *Gaudichaudia cynanchoides* H. B. K. Nov. Gen. & Sp. 5: 158. pl. 445. 1822.
 Type from Morelia, Michoacán.
 Leaves oblong, 2 to 5 cm. long; petals 6 to 7 mm. long.
 The following vernacular names have been reported, but they probably refer to other species: "Hierba del zorro," "xunequiltzio," "xunequiltl."
7. *Gaudichaudia mucronata* (Moc. & Sessé) Juss. Ann. Sci. Nat. II. 13: 253. 1840.
Hiraea mucronata Moc. & Sessé; DC. Prodr. 1: 586. 1824.
 ? *Hiraea oxyota* Moc. & Sessé; DC. Prodr. 1: 586. 1824.
 ? *Hiraea podocarpa* Moc. & Sessé; DC. Prodr. 1: 586. 1824.
 ? *Hiraea acuminata* Moc. & Sessé; DC. Prodr. 1: 586. 1824.
Gaudichaudia filipendula Juss. Ann. Sci. Nat. II. 13: 252. 1840.
 Sonora and Chihuahua to San Luis Potosí, Veracruz, and Oaxaca; reported from Yucatán. Central America.
 Leaves oblong or ovate, 3 to 8 cm. long, often auriculate at base; petals 6 to 8 mm. long; samaras 8 to 10 mm. long. "Chilillo-ak" (Yucatán).
8. *Gaudichaudia webbiana* Juss. Ann. Sci. Nat. II. 13: 152. 1840.
 Described from Mexico, the locality not known.
 Leaves oblong-ovate, 2.5 to 4.5 cm. long; petals 6 to 8 mm. long; samaras 10 to 12 mm. long.

DOUBTFUL SPECIES.

- GAUDICHAUDIA MOLLIS* Benth. Pl. Hartw. 6. 1839. Type from Aguascalientes.
GAUDICHAUDIA ENRICO-MARTINEZII Bárcena, Méx. Minist. Fom. Anal. 3: 149. 1878.

9. *TETRAPTERIS* Cav. Monad. Diss. 433. 1790.

Scandent or reclining shrubs; leaves opposite, entire; calyx with 8 glands; petals yellow, entire or dentate; fruit of 3 samaras, each of these 4-winged.

Glands much shorter than the sepals, usually about half as long.

Leaves conspicuously petiolate, rounded to acute at base-----1. *T. mexicana*.

Leaves mostly subsessile, cordate at base-----2. *T. nelsoni*.

Glands nearly or quite as long as the sepals.

Lower wings of the samara much smaller than the upper ones.

3. *T. acapulcensis*.

Lower wings almost as large as the upper ones-----4. *T. schiedeana*.

1. *Tetrapteris mexicana* Hook. & Arn. Bot. Beechey Voy. 281. 1836.

Sinaloa to Guerrero and Morelos; type from Jalisco.

Shrub, scandent to a height of 6 to 8 meters; leaves ovate or elliptic, 4 to 10 cm. long, acute or short-acuminate, glabrate; petals 9 to 11 mm. long.

2. *Tetrapteris nelsoni* Rose, Contr. U. S. Nat. Herb. 5: 143. 1897.

Known only from the type locally, between Nopala and Mixistepec, Oaxaca.

Leaves ovate or rounded-ovate, 1 to 3.5 cm. long, acute, glabrate.

3. *Tetrapteris acapulcensis* H. B. K. Nov. Gen. & Sp. 5: 168. 1822.

Type from Acapulco, Guerrero. Central America and Colombia.

Leaves oblong, ovate, or oval, 3 to 6 cm. long, obtuse or acutish; petals 7 to 8 mm. long.

4. *Tetrapteris schiedeana* Schlecht. & Cham. Linnaea 5: 218. 1830.

Heteropteris yucatanensis Millsp. Field Mus. Bot. 1: 369. 1898.

Tepec to Veracruz, Yucatán, and Chiapas; type from Jalapa, Veracruz. Central America.

Scandent to a height of 6 meters or more; leaves lanceolate to elliptic or ovate, 3 to 9 cm. long, acute or acuminate; petals 5 to 8 mm. long.

DOUBTFUL SPECIES.

TETRAPTERIS COTONEASTER (H. B. K.) Juss. Ann. Sci. Nat. II. 13: 264. 1840.
Galphimia mollis H. B. K. Nov. Gen. & Sp. 5: 173. 1822. Type from Tepcoacuilco, Guerrero.

10. *HIRAEA* Jacq. Enum. Pl. Carib. 4. 1760.

Erect or scandent shrubs or small trees; leaves opposite, entire, thick, short-petiolate; stipules very small, borne on the petioles; petals usually yellow, undulate or dentate; fruit of 3 samaras, with large wings.

Anthers oblong; leaves acute at base-----1. *H. dipholiphylla*.

Anthers subglobose; leaves truncate or subcordate at base.

Petals merely undulate; leaves nearly glabrous beneath-----2. *H. borealis*.

Petals denticulate; leaves usually copiously pubescent beneath. 3. *H. velutina*.

1. *Hiraea dipholiphylla* Small, N. Amer. Fl. 25: 122. 1910.

Morelos and Oaxaca; type from Cuernavaca, Morelos.

Leaves oblong to elliptic, 5 to 10 cm. long, acute or acuminate, bright green, sericeous when young but soon glabrate; petals yellow, 6 to 9 mm. long; samaras 2.5 to 3.5 cm. wide.

2. *Hiraea borealis* Niedenzu, Hiraea 5. 1906.

Cozumel Island, Yucatán. Type from Ruatán Island, Honduras.

Leaves oblong-obovate, oval, or oblong, 4 to 11 cm. long, rounded at apex; petals yellow, 8 to 9 mm. long.

3. *Hiraea velutina* Niedenzu, Hiraea 6. 1906.

Sinaloa to Veracruz and Oaxaca; type from Pinotepa, Oaxaca. Southward to Colombia.

Leaves mostly obovate, 5 to 11.5 cm. long, rounded or short-pointed at apex, coriaceous, sometimes glabrate in age; petals yellow, about 9 mm. long.

11. **MASCAGNIA** Bertero; Colla, Hort. Ripul. 86. 1824.

Scandent, trailing, or suberect shrubs; leaves opposite, entire; calyx with usually 8 glands; petals entire, denticulate, or rarely lobate; fruit of 3 samaras with large wings.

Styles pubescent; petals yellow.

Flowering peduncles 3 mm. long or longer; anthers ovoid—1. *M. macroptera*.

Flowering peduncles 1 mm. long or less; anthers subglobose—2. *M. mexicana*.

Styles glabrous; petals not yellow.

Filaments very unequal.

Leaves broadly ovate to lanceolate, usually acute—3. *M. lilacina*.

Leaves obovate or broadly obovate, usually rounded at apex.

4. *M. vacciniifolia*.

Filaments equal or nearly so.

Flowers mostly axillary, never in terminal panicles.

Leaves mostly oblong or ovate-oblong, 1.5 cm. long or shorter.

5. *M. cana*.

Leaves broadly ovate to suborbicular, mostly 2 to 6 cm. long.

6. *M. seleriana*.

Flowers in terminal panicles.

Petals undulate; glands much shorter than the sepals; leaves glabrous or nearly so—7. *M. gouania*.

Petals denticulate; glands nearly as long as the sepals; leaves soft-pubescent on both sides—8. *M. polybotrya*.

1. *Mascagnia macroptera* (Moc. & Sessé) Niedenzu, Mascagn. 27. 1908.

Hiraea macroptera Moc. & Sessé; DC. Prodr. 1: 586. 1824.

Hiraea septentrionalis Juss. Ann. Sci. Nat. II. 13: 259. 1840.

Hiraea greggii S. Wats. Proc. Amer. Acad. 17: 333. 1882.

Hiraea mexicana Rose, Contr. U. S. Nat. Herb. 1: 312. 1895.

Baja California and Sonora to Tamaulipas, Hidalgo, and Sinaloa.

Scandent or sometimes erect shrub; leaves lanceolate to oval, 3 to 8 cm. long, rounded to acute at apex, glabrate, short-petiolate; petals 6.5 to 12 mm. long; samaras 4.5 to 5.5 cm. wide, the wings erose-denticulate or undulate. "Gallinita" (Sonora, Baja California); "matanene" (Baja California, Sinaloa); "bejuco prieto" (Sinaloa).

Leaves sometimes used as poultices for bruises and sores.

2. *Mascagnia mexicana* Niedenzu, Mascagn. 29. 1908.

Veracruz; type collected near Orizaba.

Leaves ovate or oval, 10 cm. long or less, pubescent beneath; petals yellow, 10 to 12 mm. long; samaras 3.5 to 4.5 cm. wide.

3. *Mascagnia lilacina* (S. Wats.) Niedenzu in Engl. & Prantl, Pflanzenfam. 3⁴: 56. 1890.

Hiraea lilacina S. Wats. Proc. Amer. Acad. 17: 333. 1882.

Coahuila; type from Caracol Mountains, south of Monclova.

Scandent to a height of 4.5 meters; leaves 2.5 to 4 cm. long, rounded or cordate at base; petals blue or lilac, 8 to 10 mm. long; samaras 2 to 2.5 cm. wide.

4. *Mascagnia vacciniifolia* Niedenzu, Mascagn. 11. 1908.

Mascagnia rupicola T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 501. 1919.

Veracruz and perhaps elsewhere.

Scandent on rocks to a height of 15 meters; leaves 2 to 3 cm. long, obtuse or acute at base; petals rose-colored, 5 to 6 mm. long; samaras 2.5 cm. wide.

5. *Mascagnia cana* Small, N. Amer. Fl. 25: 120. 1910.

Hiraea sericea Engelm.; A. Gray, Pl. Wright. 1: 37. 1852. Not *H. sericea* Juss. 1832.

Mascagnia sericea Niedenzu, Mascagn. 29. 1908.

Sonora to Durango and Coahuila; type from Cadena, Durango.

Apparently an erect shrub; leaves copiously sericeous, short-petiolate or sessile; petals purplish, 5 to 6 mm. long; samaras 1.5 to 1.8 cm. wide, often purplish.

6. *Mascagnia seleriana* Loes. Bull. Herb. Boiss. 2: 543. 1894.

Hiraea parviflora Rose, Contr. U. S. Nat. Herb. 5: 139. 1897.

Mascagnia pringlei Niedenzu, Mascagn. 9. 1908.

Veracruz, Puebla, and Oaxaca; type from Mitla, Oaxaca.

Erect or scandent shrub; leaves densely pubescent, rounded or subcordate at base, short-petiolate; petals violet, 5 to 8 mm. long; samaras 1.3 to 2 cm. wide. "Maxocotl," "maxocotl" (Oaxaca).

7. *Mascagnia gouania* Small, N. Amer. Fl. 25: 120. 1910.

Morelos; type from Jojutla.

Scandent shrub; leaves ovate to rounded-ovate, 4 to 7 cm. long, acute or abruptly acuminate, long-petiolate; petals purplish, 5 to 6.5 cm. long; samaras 2.5 to 3 cm. wide.

8. *Mascagnia polybotrya* (Juss.) Niedenzu in Engl. & Prantl, Pflanzenfam. 3⁴: 56. 1890.

Hiraea polybotrya Juss. Ann. Sci. Nat. II. 13: 260. 1840.

?*Hiraea spicigera* Turcz. Bull. Soc. Nat. Moscou 36¹: 584. 1863.

Puebla and Oaxaca.

Leaves 2.5 to 5 cm. long, rounded or subcordate at base, short-petiolate; petals blue.

No material seen by the writer; perhaps the same as *M. gouania*.

12. *JANUSIA* Juss. Ann. Sci. Nat. II. 13: 250. 1840.

Slender scandent shrubs; leaves small, opposite, short-petiolate, entire; flowers small, yellow, solitary or in axillary clusters, the petals undulate; fruit of 2 or 3 samaras.

Leaves linear or narrowly lanceolate-----1. *J. gracilis*.
Leaves ovate or oval-----2. *J. californica*.

1. *Janusia gracilis* A. Gray, Pl. Wright. 1: 37. 1852.

Dry hillsides, Baja California to Coahuila. Western Texas to southern Arizona; type collected near El Paso, Texas.

Leaves 1 to 3 cm. long, strigose, especially beneath; larger petals 4 to 5 mm. long; samaras 9 to 12 mm. long.

2. *Janusia californica* Benth. Bot. Voy. Sulph. 8. 1844.

Dry hillsides, Baja California, Sonora, and Sinaloa; type from Magdalena Bay, Baja California.

Leaves 1.5 to 4 cm. long, rounded or obtuse at apex, thinly strigose, often subcordate at base; samaras 9 to 12 mm. long, often tinged with red.

13. *ASPICARPA* Rich. Mém. Mus. Hist. Nat. 2: 396. 1815.

Slender shrubs with erect or reclining stems; leaves opposite, entire, sessile or short-petiolate; flowers of two kinds, the petaliferous in mostly terminal clusters, with fimbriate petals, the cleistogamous sessile in the lower axils or on long axillary peduncles; fruit of 2 crested nutlets.

- Pubescence of the stems of spreading hairs-----1. *A. hirtella*.
 Pubescence of the stems of appressed hairs.
 Cleistogamous flowers sessile in the axils-----2. *A. hyssopifolia*.
 Cleistogamous flowers pedunculate.
 Peduncles of the cleistogamous flowers nearly or quite as long as the leaves.
 3. *A. longipes*.
 Peduncles of the cleistogamous flowers much shorter than the leaves.
 Leaves 4 to 8 mm. wide, thinly strigose or glabrate beneath.
 4. *A. humilis*.
 Leaves 10 to 30 mm. wide, densely sericeous beneath-----5. *A. lanata*.

1. *Aspicarpa hirtella* Rich. Mém. Mus. Hist. Nat. 2: 399. 1815.

Aspicarpa urens Lag. Gen. & Sp. Nov. 1. 1816.

Acasmus pruriens Desv.; Desf. Cat. Pl. Paris. ed. 3. 233. 1829.

Zacatecas and Jalisco to Mexico.

Stems scandent or reclining, hirsute with stinging hairs; leaves oval-ovate, 1.5 to 3.5 cm. long, rounded to acutish at apex, cordate or subcordate at base; larger petals about 1 cm. long.

2. *Aspicarpa hyssopifolia* A. Gray, Bost. Journ. Nat. Hist. 6: 167. 1850.

Western Texas, along the Rio Grande, and doubtless also in Coahuila or Nuevo León.

Stems 10 to 30 cm. high; leaves mostly linear or lanceolate, 1 to 2.5 cm. long, acute; larger petals 5 to 7 mm. long.

3. *Aspicarpa longipes* A. Gray, Pl. Wright. 1: 37. 1852.

Sonora to San Luis Potosí and Querétaro. Western Texas and southern Arizona; type from Texas.

Stems 1 meter long or less, sometimes scandent; leaves ovate or oval, 1 to 4.5 cm. long, cordate or subcordate at base.

4. *Aspicarpa humilis* (Benth.) Juss. Arch. Mus. Hist. Nat. (Paris) 3: 597. 1844.

Gaudichaudia humilis Benth. Pl. Hartw. 6. 1839.

Aspicarpa hartwegiana Juss. Ann. Sci. Nat. II. 13: 253. 1840.

Chihuahua and Durango to San Luis Potosí; type from Aguascalientes.

Low ascending shrub; leaves ovate to oblong-lanceolate, 1 to 3 cm. long.

5. *Aspicarpa lanata* Rose, Contr. U. S. Nat. Herb. 8: 49. 1903.

Durango, Jalisco, and Zacatecas; type from Guadalajara, Jalisco.

Densely pubescent shrub, 20 to 70 cm. high; leaves often whorled, oblong to oval, 3 to 6.5 cm. long, acute to rounded at apex; petals yellow, 6 to 9 mm. long.

14. *BANISTERIOPSIS* C. B. Robinson; Small, N. Amer. Fl. 25: 131. 1910.

Scandent shrubs; leaves opposite, entire, petiolate; flowers large, paniculate, the calyx with 8 or 10 glands, or glandless; petals dentate or lacerate; fruit of 3 or fewer samaras.

Leaves lanceolate or oblong-lanceolate, glabrous-----1. *B. acapulcensis*.

Leaves oval or broadly ovate, sericeous-----2. *B. argentea*.

1. *Banisteriopsis acapulcensis* (Rose) Small, N. Amer. Fl. 25: 132. 1910.

Heteropteris acapulcensis Rose, Contr. U. S. Nat. Herb. 5: 139. 1897.

Known only from the type locality, Acapulco, Guerrero.

Leaves 7 to 15 cm. long; larger petals 5 to 5.5 mm. long; samaras 2.5 to 3 cm. long.

2. *Banisteriopsis argentea* (H. B. K.) C. B. Robinson; Small, N. Amer. Fl. 25: 133. 1910.

Heteropteris argentea H. B. K. Nov. Gen. & Sp. 5: 164. 1822.

Chiapas. Central America and northern South America; type from Colombia.

Leaves 3 to 12 cm. long, rounded to acute at apex; petals pink, the larger ones 7 to 8 mm. long; samaras 2.5 to 3 cm. long.

15. **BANISTERIA** L. Sp. Pl. 427. 1753.

Erect or scandent shrubs or trees; leaves opposite, entire; flowers large, in paniculate cymes; calyx glandless or with 8 glands; petals entire or denticulate; fruit of 2 or 3 samaras.

Sepal tips recurved. Inflorescence densely reddish-pubescent—1. *B. laurifolia*.
Sepal tips erect.

Leaves with 2 to 6 sessile glands near the base of the blade underneath.

2. *B. beecheyana*.

Leaves with 2 stipitate glands underneath.

Glands remote from the base of the blade.

Body of the samara with a thin crown on the side—3. *B. cotinifolia*.

Body of the samara not crowned.

Leaves acute or acuminate—4. *B. arborescens*.

Leaves rounded or obtuse at apex—5. *B. pallida*.

Glands borne at the extreme base of the leaf blade.

Samaras 2 to 2.5 cm. long—6. *B. palmeri*.

Samaras 3 to 4 cm. long.

Body with 2 or 3 crowns—7. *B. gayana*.

Body with a single crown, or merely tuberculate—8. *B. portillana*.

1. *Banisteria laurifolia* L. Sp. Pl. ed. 2. 611. 1762.

Malpighia dubia Cav. Monad. Diss. 413. 1789.

Heteropteris longifolia H. B. K. Nov. Gen. & Sp. 5: 166. 1822.

Heteropteris floribunda H. B. K. Nov. Gen. & Sp. 5: 166. 1822.

Byrsonima stigmatophora Schlecht. Linnaea 10: 241. 1836.

Sinaloa to Veracruz, Tabasco, and Oaxaca. Central America and West Indies; type from Jamaica.

Large scandent shrub, or sometimes a tree, up to 12 meters high; leaves lance-oblong to elliptic or ovate, 5 to 16 cm. long, obtuse to acuminate, coriaceous, lustrous, glabrous in age; flowers yellow, the petals 5 to 7 mm. long; samaras 3.5 to 4 cm. long. "Pinsanillo" (Michoacán, Guerrero); "escobillo" (Tabasco); "bejuco de caballo" (*Sessé & Mocino*); "coral" (Costa Rica); "cointura" (Panama); "bejuco de buey" (Porto Rico); "vergajo de toro" (Cuba).

2. *Banisteria beecheyana*¹ (Juss.) C. B. Robinson; Small, N. Amer. Fl. 25: 134. 1910.

¹ With the hope of finding in Bering Strait the expeditions under Parry and Franklin, the British Government in 1825 dispatched H. M. S. *Blossom* under the command of Capt. F. W. Beechey. This ship anchored at San Blas in Tepic in December, 1827, and remained there until February, 1828. During this time the naturalist, Lay, explored Tepic and adjoining regions, and made a collection of plants. Some of these came from Jalisco, and on the labels that name was written "Talisco," a circumstance which has caused a derivative of the latter incorrect name to be used as a specific name for some of the new species described from the collections. Plants were collected also at Acapulco and Mazatlán. Some of the naval officers, particularly Alexander Collie, assisted Lay in making the collections. The plants were reported upon by Hooker and Arnott.

Banisteria tomentosa Schlecht. *Linnaea* 10: 244. 1833. Not *B. tomentosa* Desf. 1804

Heteropteris beecheyana Juss. *Ann. Sci. Nat.* II. 13: 278. 1840.

Banisteria simulans Small, *N. Amer. Fl.* 25: 136. 1910.

Tepic to Tamualipas, Yucatàn, and Chiapas. Central America and Colombia.

Erect or scandent shrub; leaves oblong to rounded-oval, 4 to 7 cm. long, copiously pubescent beneath; petals 4.5 to 6 mm. long; samaras 3 to 4 cm. long.

3. *Banisteria cotinifolia* (Juss.) C. B. Robinson; Small, *N. Amer. Fl.* 25: 134. 1910.

Heteropteris cotinifolia Juss. *Ann. Sci. Nat.* II. 13: 274. 1840.

Veracruz and Oaxaca.

Leaves broadly ovate or rounded, 4 to 7 cm. long, obtuse, glabrate; samaras 2.5 to 3 cm. long.

4. *Banisteria arborescens* (T. S. Brandeg.) Small, *N. Amer. Fl.* 25: 135. 1910.

Heteropteris arborescens T. S. Brandeg. *Zoe* 5: 203. 1905.

Known only from the type locality, Cerro Colorado, Sinaloa.

Leaves ovate to oblong-lanceolate, 4 to 8 cm. long, glabrate; samaras 2.5 to 3 cm. long.

5. *Banisteria pallida* (T. S. Brandeg.) Standl.

Heteropteris pallida T. S. Brandeg. *Univ. Calif. Publ. Bot.* 6: 182. 1915.

Guerrero and Oaxaca; type from San Gerónimo, Oaxaca.

Leaves ovate to broadly oval, 3 to 11 cm. long, in age glabrous; samaras 2.5 to 3 cm. long.

Perhaps not distinct from *B. arborescens*.

6. *Banisteria palmeri* (Rose) C. B. Robinson; Small, *N. Amer. Fl.* 25: 135. 1910.

Heteropteris palmeri Rose, *Contr. U. S. Nat. Herb.* 1: 311. 1895.

Sonora and Sinaloa; type from Alamos, Sonora.

Leaves ovate or lanceolate, 3 to 7 cm. long, glabrate; larger petals 5 to 6 mm. long. "Bejuco huesillo" (Sinaloa).

The stems are used as cordage. They are sometimes 20 to 25 meters long.

7. *Banisteria gayana* (Juss.) C. B. Robinson; Small, *N. Amer. Fl.* 25: 135. 1910.

Heteropteris gayana Juss. *Ann. Sci. Nat.* II. 13: 274. 1840.

Colima to Oaxaca.

Large scandent shrub; leaves 2.5 to 7 cm. long, glabrate; samaras often tinged with red.

8. *Banisteria portillana* (S. Wats.) C. B. Robinson; Small, *N. Amer. Fl.* 25: 135. 1910.

Heteropteris portillana S. Wats. *Proc. Amer. Acad.* 22: 402. 1887.

Jalisco; type collected near Guadalajara.

Scandent shrub; leaves 6 to 11 cm. long, glabrous in age; petals 7 to 8 mm. long, salmon-colored outside, red inside.

16. **STIGMAPHYLLON** Juss.; *St. Hil. Fl. Bras. Merid.* 3: 48. 1833.

Scandent shrubs; leaves opposite, entire, dentate, or lobate, petiolate; flowers large, yellow, in axillary pedunculate umbel-like corymbs, the petals dentate; fruit of 2 or 3 samaras.

Leaves copiously pubescent beneath, even in age-----1. *S. lindenianum*.

Leaves glabrous beneath or nearly so.

Leaves deltoid-cordate or ovate-cordate, deeply cordate at base.

2. *S. selerianum*.

Leaves oval, elliptic, or ovate, rounded or subcordate at base.

3. *S. mucronatum*.

1. *Stigmaphyllon lindenianum* Juss. Arch. Mus. Hist. Nat. (Paris) 3: 362. 1844.

Stigmaphyllon lupulus S. Wats. Proc. Amer. Acad. 21: 461. 1885.

San Luis Potosí to Yucatán and Chiapas; type from Teapa, Tabasco. Central America.

Coarse scandent shrub; leaves entire, undulate, or deeply lobate, rounded to acuminate at apex, truncate or cordate at base; larger petals 9 to 11 mm. long; samaras 2 to 2.5 cm. long. "Chinaca" (Veracruz).

2. *Stigmaphyllon selerianum* Niedenzu, Stigmatoph. 2: 7. 1900.

Oaxaca and Chiapas; type from Almoloyas, Oaxaca.

Leaves 2 to 9 cm. long, entire or undulate, deeply cordate, with rounded sinuses, long-petiolate; petals 1.3 to 1.5 cm. long.

3. *Stigmaphyllon mucronatum* (DC.) Juss. Arch. Mus. Hist. Nat. (Paris) 3: 377. 1844.

Banisteria mucronata DC. Prodr. 1: 589. 1824.

Banisteria ternata Moc. & Sessé; DC. Prodr. 1: 591. 1824.

Veracruz and Oaxaca. Central America and northern South America; type from Ecuador.

Slender scandent shrub; leaves 3 to 9 cm. long, rounded to acute at apex, pale beneath; larger petals 1.3 to 1.8 cm. long; samaras 2 to 2.5 cm. long. "Bejuco de ratón" (Guatemala, Honduras).

75. POLYGALACEAE. Milkwort Family.

(Contributed by S. F. Blake.)

Herbs, shrubs, or trees, sometimes scandent, with alternate (in all the following species) or sometimes opposite or whorled, entire leaves, without stipules or with small stipular glands; flowers perfect, zygomorphic, racemed, the racemes sometimes paniculate; sepals 5, free or the two lower united, one dorsal, two ventral, two lateral and interior, the latter (wings) usually much larger than the others and petaloid; petals 3, rarely 5, hypogynous, the ventral one (keel) boat-shaped, often with a terminal beak or crest, the two upper usually ligulate or oblong, the two lateral rarely present, always very small; stamens 8 (in all the following species), the filaments united for most of their length into a sheath split on the upper side, united at base to the upper petals or the keel or both; anthers 1-celled, opening by terminal pores; disk usually represented by a gland at base of ovary; ovary 1 or 2-celled; style 1; stigma often 2-lobed; ovules solitary, pendulous; fruit a capsule, drupe, or samara; seeds usually pubescent and arillate.

Ovary and fruit 2-celled; fruit a dehiscent capsule-----1. **POLYGALA**.

Ovary and fruit 1-celled; fruit indehiscent.

Keel with a plicate crest; fruit a samara, with a large wing on the lower side-----2. **SECURIDACA**.

Keel not crested; fruit drupelike, not winged-----3. **MONNINA**.

1. *POLYGALA* L. Sp. Pl. 701. 1753.

Herbs, shrubs, or trees, with alternate estipulate leaves and racemose flowers; sepals free or the two lower united; wings petaloid; keel crested, beaked, or unappendaged; stamens 8 or rarely 6; fruit a 2-celled 2-seeded thin-walled capsule; seeds usually pubescent and arillate.

The species are of little economic importance but some are used in medicine, diaphoretic, expectorant, and emetic properties being ascribed to them. Others are used locally as remedies for snake bites, and some are said to have poisonous properties.

Keel blunt, without crest or beak.

Sepals all free.

Sepals and wings at least in part deciduous.

Sepals all herbaceous, deciduous like the wings, or with them rarely subpersistent; aril pubescent at least at apex.

Capsule and leaves not obviously glandular.

Leaves small, mostly 6 to 20 mm. long, usually distinctly dimorphous, the lower shorter, oval or oblong-oval, the upper oblong to linear or rarely uniform, but then smaller than in the next group ----- **I. MICROTHRIX.**

Leaves comparatively large, mostly 2 to 6 cm. long, 1 to 3 cm. wide, ovate, gradually reduced upward, not noticeably dimorphous.

II. HEBANTHA.

Capsule and leaves bearing large glands ----- **III. ADENOPHORA.**

Sepals not all herbaceous, the lower ones petaloid, deciduous like the wings, the upper one herbaceous, persistent; aril glabrous.

IV. BILOBA.

Sepals and wings persistent, the sepals herbaceous ----- **V. HUATECA.**

Sepals not all free, the two lower ones connate. Wings and sepals persistent.

VI. HEBECLADA.

Keel with a beak or crest.

Keel with a conic or cylindric beak, not crested.

Sepals (except usually the upper) and wings deciduous.

VII. EURHINOTROPIS.

Sepals and wings persistent ----- **VIII. PANTOMONE.**

Keel with a fimbriate crest ----- **IX. MONNINOPSIS.**

I. MICROTHRIX.

Leaves nearly uniform, oval or ovate.

Plant densely pubescent with spreading hairs.

Capsule merely ciliate; wings shorter than keel ----- 1. *P. ovatifolia*.

Capsule puberulous on the sides; wings longer than keel --- 2. *P. buxifolia*.

Plant puberulous with incurved or appressed hairs.

Wings subpersistent ----- 3. *P. myrtilloides*.

Wings deciduous.

Leaves oval or elliptic, obtuse or rounded ----- 4. *P. xanti*.

Leaves ovate, acuminate ----- 5. *P. serpens*.

Leaves more or less dimorphous, the lower oval or oblong, the upper longer, linear to oblong, elliptic, or ovate.

Wings glabrous; capsule merely ciliate ----- 6. *P. pavoni*.

Wings pubescent, at least at base, or if rarely glabrous, then capsule pubescent on the sides.

Aril small, the depth of the entire or merely denticulate-lobulate scarious margin less than the height of the corneous umbo.

Hairs of stem all incurved or appressed.

Capsule more or less pubescent on sides.

Flowers 4 to 5 mm. long-----7. *P. magdalenae*.

Flowers 6 to 7 mm. long.

Stems hirsute-tomentose above_____8. *P. leptosperma*.

Stems barely puberulous above-----27. *P. oaxacana*.

Capsule merely ciliate at maturity.

Middle and upper leaves strongly reduced, 5 to 14 mm. long, linear or lance-linear.

Aril with more or less distinct dorsal lobe, subpedicellate by the pointed base of seed-----9. *P. barbeyana*.

Aril without distinct dorsal lobe, sessile.

Aril with subglabrous umbo-----10. *P. zacatecana*.

Aril with densely pilose umbo-----11. *P. intricata*.

Middle and upper leaves not reduced, 15 to 31 mm. long.

Middle and upper leaves obovate-oblong, 4.5 to 7 mm. wide.

12. *P. palmeri*.

Middle and upper leaves linear, 1.5 to 3 mm. wide.

13. *P. racemosa*.

Hairs of stem (at least in part) wide-spreading.

Hairs of stem all short and wide-spreading; leaves not reticulate.

14. P. rectipilis.

Hairs of stem partly long and spreading, partly short and incurved;
leaves reticulate.

Middle and upper leaves linear or linear-lanceolate, 1.8 to 4 mm. wide.

21. *P. retifolia*.

Middle and upper leaves oblong-lanceolate or oval, 4.5 to 16 mm. wide.

22. P. amphothrix.

Aril larger, the depth of the lobed or lobulate scarious margin equaling or exceeding the height of the corneous umbo.

Capsule merely ciliate at maturity; aril not veil-like.

Upper leaves linear to narrowly lanceolate.

Stems incurved-puberulous.

Upper leaves strongly reduced, 5 to 14 (23) mm. long.

15. *P. reducta*.

Upper leaves not reduced, 17 to 36 mm. long-----16. **P. longa.**

Stems sparsely spreading-pubescent, glabrate----17. *P. neurocarpa*.

Upper leaves ovate to elliptic-oblong.

Wings 6 to 6.5 mm. long-----18. *P. oophylla*.

Wings 4 to 5 mm. long.

Scarious border of aril barely as deep as height of umbo; keel
purplish-----19. *P. brachyanthema*.

Scarious border of aril distinctly deeper than height of umbo;
keel yellowish green-----20. *P. brandegeana*.

Capsule pubescent on sides at maturity or, if merely ciliate, then aril veil-like.

Hairs of stem (at least in part) wide-spreading.

Middle and upper leaves linear or linear-lanceolate, 1.8 to 4 mm. wide-----21. *P. retifolia*.

Middle and upper leaves oblong-lanceolate or oval, 4.5 to 16 mm wide-----**22. *P. amphothrix*.**

Hairs of stem all incurved or appressed.

Aril veil-like, with broad scarious lobulate margin, covering one-third to three-fifths of seed, the dorsal margin vertically descending, the lower margin nearly or quite horizontal.

Sepals and wings quickly deciduous.....23. *P. obscura*.

Sepals and wings subpersistent.....24. *P. lozani*.

Aril not veil-like.

Upper leaves ovate to elliptic or lance-oblong.

Lobes of aril oblong to deltoid; wings 5 to 5.8 mm. long.

25. *P. parrasana*.

Lobes of aril linear or lance-linear; wings 3.5 to 5 mm. long.

26. *P. compacta*.

Upper leaves linear.....27. *P. oaxacana*.

II. HEBANTHA.

Capsule merely ciliate at maturity.

Hairs of stem all incurved or appressed.

Stem subterete; wings 5.5 to 6.6 mm. long.

Stem and leaves sparsely strigillose; leaves narrowly lanceolate.

28. *P. longipes*.

Stem and leaves densely strigillose or incurved-puberulous; leaves ovate to rhombic-lanceolate.....29. *P. velata*.

Stem strongly angled; wings 4.5 mm. long.....30. *P. polyedra*.

Hairs of stem (at least in part) wide-spreading.

Leaves lanceolate; wings ciliate.....31. *P. galeottii*.

Leaves ovate; wings not ciliate.....32. *P. rivinaefolia*.

Capsule pubescent on sides at maturity.

Keel 3.2 to 3.5 mm. long; wings 3.8 mm. long.....33. *P. brachytropis*.

Keel 4.2 to 6.8 mm. long; wings 4.5 to 7 mm. long.

Wings rather densely pubescent over whole outer surface.

Sepals 4 to 4.5 mm. long; capsule reticulate.....34. *P. americana*.

Sepals 2.5 to 3 mm. long; capsule scarcely reticulate.....35. *P. pedicellata*.

Wings sparsely pubescent or puberulous chiefly at apex and base and along costa, or subglabrous.

Wings 6.5 to 9 mm. long.

Hairs of stem partly short and incurved, partly long and spreading.

41. *P. biformipilis*.

Hairs of stem all similar, appressed or incurved-spreading.

Capsule spreading-pilosulous; aril with minute umbo.

36. *P. cuspidulata*.

Capsule incurved-puberulous; umbo medium-sized.

37. *P. appressipilis*.

Wings 4.5 to 5.8 mm. long.

Wings suborbicular, glabrous except for the ciliolate margin and the finely puberulous costa; sepals 1 to 2 mm. long.

38. *P. brachysepala*.

Wings oval, pubescent at least along costa; sepals 2 to 3.8 mm. long.

Dorsal margin of aril strongly descending; umbo medium or large.

39. *P. microtricha*.

Dorsal margin of aril horizontal or erectish; umbo minute.

40. *P. chiapensis*.

III. ADENOPHORA.

Leaves obovate.

Leaves incurved-pubescent-----42. *P. glandulosa*.Leaves nearly glabrous-----43. *P. phoenicistes*.Leaves linear to oblong-lanceolate-----44. *P. macradenia*.

IV. BILOBA.

Lower sepals glabrous; flowers purple; racemes many-flowered.

Bracts deciduous, equaling the pedicels; stems canescent-pilosulous.

45. *P. purpusil*.Bracts persistent, shorter than the pedicels; stems incurved-pubescent but green-----46. *P. konzattii*.Lower sepals ciliate; flowers greenish; racemes 1 to 4-flowered--47. *P. parryi*.

V. HUATECA.

A single species-----48. *P. tehuacana*.

VI. HEBECLADA.

Wings densely ciliate; seed pilose-tomentose; aril large----49. *P. floribunda*.

Wings very minutely glandular-ciliolate; seed pilosulous; aril minute.

50. *P. apopetala*.

VII. EURHINOTROPIS.

Flowers 8.5 mm. long, purplish and yellowish-----51. *P. fishiae*.

Flowers 4 to 5.5 mm. long, white or rosy.

Leaves oval, glabrous or sparsely incurved-puberulous.

Leaves 1 to 2 cm. long, 4 to 12.5 mm. wide-----52. *P. nitida*.Leaves 4 to 9 mm. long, 2 to 6.5 mm. wide-----53. *P. eucosma*.

Leaves squamiform to lanceolate or, when broader, densely pubescent.

Leaves not squamiform.

Leaves, at least the lower ones, oval to suborbicular, like the stem densely spreading or incurved-spreading-pubescent.

54. *P. lindheimeri*.Leaves mostly linear to lanceolate, merely incurved-puberulous like the stem-----55. *P. tweedyi*.Leaves squamiform, 1 to 4.5 mm. long-----56. *P. minutifolia*.

VIII. PANTOMONE.

A single species-----57. *P. desertorum*.

IX. MONNINOPSIS.

Capsule more than twice as long as wings-----58. *P. semialata*.

Capsule less than one and one-half times as long as wings.

Stem glabrous-----59. *P. hemipterocarpa*.

Stem strigillose or puberulous.

Wings 5 mm. long-----60. *P. watsoni*.

Wings 2.5 to 3.5 mm. long.

Leaves linear or acicular; stem strigillose or incurved-puberulous.

Capsule oblong, about twice as long as wide.

Leaves strongly 2-sulcate beneath-----61. *P. scoparioides*.

Leaves not 2-sulcate beneath.

Capsule 2 mm. long; aril 1 mm. long-----62. *P. dolichocarpa*.Capsule 2.7 to 3 mm. long; aril 1.5 mm. long-----63. *P. scoparia*.

Capsule suborbicular or oval, not twice as long as wide.

64. *P. michoacana*.Leaves obovate-spatulate; stems spreading-puberulous---65. *P. viridis*.

1. *Polygala ovatifolia* A. Gray, Pl. Wright. 1: 39. 1852.

Chihuahua to Nuevo León. Texas and New Mexico; type from western Texas.

Suffrutescent, erect, 30 cm. high or less, densely spreading-pilose; leaves ovate, 1.2 to 3 cm. long, 0.6 to 1.3 cm. wide, acutish, spreading-pilose on both sides; racemes 2 to 6.5 cm. long; flowers greenish yellow; wings 4 to 5 mm. long; aril with rather broad, lobed and lobulate, scarious margin.

2. *Polygala buxifolia* H. B. K. Nov. Gen. & Sp. 5: 407. 1821.

Polygala ovalifolia DC. Prodr. 1: 331. 1824.

San Luis Potosí and Querétaro; type from Santa Rosa, Querétaro.

Suffrutescent, ascending, about 28 cm. long, spreading-pubescent; leaves elliptic or ovate, about 2 cm. long, obtuse or rounded; wings 5.5 mm. long; aril with broad scarious margin and distinct short lateral and spreading dorsal lobes.

3. *Polygala myrtilloides* Willd. Sp. Pl. 3: 889. 1803.

San Luis Potosí and Hidalgo.

Fruticulose below, densely appressed-puberulous; leaves elliptic to oval-ovate, mostly obtuse, 1.5 to 2 cm. long, subcoriaceous, subappressed-pubescent; racemes 4 to 8-flowered; wings 5.5 to 6.5 mm. long; capsule puberulous and ciliate; aril broadly scarious-margined, 3-lobed, the dorsal lobe short and horizontal.

4. *Polygala xanti*¹ A. Gray, Proc. Amer. Acad. 5: 153. 1861.

Southern Baja California; type from Cape San Lucas.

Suffrutescent below, procumbent or erectish, densely incurved-pubescent; leaves oval, 6 to 16 mm. long, rounded at apex, densely incurved-pubescent; racemes short; flowers white, tinged with yellow and purple; wings 5.3 to 5.8 mm. long; capsule densely pubescent; scarious margin of aril narrow, equaling the umbo, shortly upturned at dorsal apex.

5. *Polygala serpens* Blake, Contr. Gray Herb. n. ser. 47: 21. 1916.

Known only from the type locality, Acapulco, Guerrero.

Suffruticulose, procumbent, incurved-puberulous, 30 cm. long or less; leaves ovate, 1.5 to 2.8 cm. long, acuminate, thin, incurved-spreading-pubescent; racemes loose, 2 cm. long; flowers apparently ochroleucous; wings 5.5 to 7 mm. long; aril minute, capitelliform, with obsolete scarious margin.

6. *Polygala pavoni*² Chod. Mém. Soc. Phys. Hist. Nat. Genève 31¹: 14. 1893.

Mexico, without definite locality.

Undershrub, puberulous, about 20 cm. long; leaves elliptic or elliptic-ovate, varied, 2 cm. long, puberulous, obtuse; racemes few-flowered; flowers 5 to 6 mm. long; ovary ciliate; fruit unknown.

A species of doubtful relationship.

7. *Polygala magdalenae* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 182. 1911.

Southern Baja California; type from Magdalena Island.

Prostrate, 30 cm. long, incurved-griseous-puberulous; lowest leaves oval-oblong, 7 mm. long, the others oblong to linear, 1.2 to 2 cm. long, incurved-

¹ L. J. Xantus, while employed by the U. S. Coast Survey, made a collection of about 120 species of plants in Baja California, chiefly about Cape San Lucas. Many new species were published by Gray in his report upon the collection (Proc. Amer. Acad. 5: 153-173. 1861). A set of the plants is in the U. S. National Herbarium.

² In honor of José Pavón, a member of the Spanish scientific commission sent to Peru and Chile in 1777. He was an associate of Ruiz, with whom he published several classic works dealing with South American plants.

puberulous; racemes loose, 4 to 10.5 cm. long; flowers apparently ochroleucous; wings narrowly obovate-oval, 4.5 mm. long; aril minute, 0.7 mm. high, with very narrow scarious margin.

8. *Polygala leptosperma* Chod. Mém. Soc. Phys. Hist. Nat. Genève 31²: 17. 1893.

Oaxaca.

Suffrutescent below, 12 cm. long, hirsute-tomentose above; leaves lanceolate to lance-linear, 1.5 to 2.2 cm. long, subtomentose-velutinous; flowers 6 to 7 mm. long; wings elliptic-lanceolate, long-ciliate; capsule ovate-cuneate, hispid; aril small, capitelliform, the very narrow scarious margin with very short upturned dorsal lobe and no lateral lobes.

9. *Polygala barbeyana* Chod. Mém. Soc. Phys. Hist. Nat. Genève 31²: 16. 1893.

Coahuila to San Luis Potosí; type from San Luis Potosí. Arizona.

Several-stemmed, suffruticulose below, up to 40 cm. high, densely incurved-pubescent or at length subglabrate; leaves reduced, the lowest oblong, the middle and upper subsquamiform, linear or linear-lanceolate, 5 to 10 mm. long; racemes 1.7 to 11 cm. long; wings obovate-oval or suborbicular-oval, 3.5 to 4.5 mm. long; aril small, 0.7 mm. high, cap-shaped, subpedicellate by the pointed base of seed, with narrow unlobed scarious margin and short upturned dorsal lobe.

10. *Polygala zacatecana* Blake, Contr. Gray Herb. n. ser. 47: 26. 1916.

Known only from the type locality, near Concepción del Oro, Zacatecas.

Several-stemmed, suffruticulose below, about 12 cm. high, incurved-puberulous; leaves reduced, the lower oblong or oval, 4 to 5 mm. long, the others linear-lanceolate, 4.5 to 10 mm. long, 1 mm. wide, involute; racemes 2 to 5 cm. long; wings oval-obovate, 4 mm. long; aril tiny, very sparsely pubescent, with subglabrous umbo, the scarious margin entire, very narrow.

11. *Polygala intricata* Blake, Contr. Gray Herb. n. ser. 47: 26. 1916.

Known only from the type locality, Saltillo, Coahuila.

Stems about 10 cm. long, flexuous, ascending, densely incurved-puberulous; lowest leaves oblong, 3 mm. long, the others linear or linear-lanceolate, 11 to 14 mm. long, 1.5 to 2.5 mm. wide; racemes flexuous; wings obovate, 3.5 to 4 mm. long; aril 0.8 mm. high, the umbo densely spreading-pilose, the narrower margin subentire.

12. *Polygala palmeri* S. Wats. Proc. Amer. Acad. 17: 325. 1882.

Coahuila; type from Juárez. Western Texas.

Several-stemmed, subcanescently pubescent, about 15 cm. high; lower leaves oval, the others oblong or ovate-oblong, the middle and upper 16 mm. long, 4.5 to 7 mm. wide, obtuse or truncate, thick; racemes 4.5 cm. long; flowers greenish yellow and purplish; wings obovate, 5.7 to 6 mm. long; aril 1.5 mm. high, with narrow subentire scarious margin extended into short subhorizontal anterior and dorsal lobes.

13. *Polygala racemosa* Blake, Contr. Gray Herb. n. ser. 47: 28. 1916.

Chihuahua; type from Santa Eulalia Mountains. Southern Arizona.

Several-stemmed, fruticulose below, about 30 cm. high, densely incurved-puberulous but green; lower leaves strongly reduced, the others linear, 15 to 31 mm. long, 1.5 to 3 mm. wide, acute; racemes 7 to 13 cm. long; flowers apparently greenish; wings oval-obovate, 4.5 to 4.8 mm. long; aril 0.7 to 1 mm. high, the scarious margin lobulate, narrower than the umbo, the dorsal lobe very short, the lateral obsolete.

14. *Polygala rectipilis* Blake, Contr. Gray Herb. n. ser. 47: 27. 1916.

Coahuila. Type from Hillsboro, Sierra County, New Mexico.

Several-stemmed, fruticulose below, about 20 cm. high, densely spreading-pilose with short hairs; lower leaves oblong or oval, 8 to 14 mm. long, the others linear, 12 to 22 mm. long, 1.7 to 2.5 mm. wide; racemes 4 to 10 cm. long; flowers purplish; wings obovate-oval, 4.5 mm. long; aril 1 mm. high, the scarious, scarcely lobed margin narrower than the umbo.

15. *Polygala reducta* Blake, Contr. Gray Herb. n. ser. 47: 25. 1916.

Polygala scopulorum T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 364. 1917.

Coahuila to San Luis Potosí; type from San Luis Potosí.

Several-stemmed, suffruticulose below, 17 cm. high or less, incurved-puberulous; lower leaves oval-oblong, 5 to 9 mm. long, the others linear-lanceolate or linear, 5 to 23 mm. long, 0.5 to 2 mm. wide, involute; racemes very loose, 6 to 9 cm. long; wings elliptic-obovate, 4.5 to 5 mm. long; aril 1 mm. high, the dorsal lobe spreading, 1.5 mm. long, the lateral lobes short, subentire, slightly deeper than the umbo.

16. *Polygala longa* Blake, Contr. Gray Herb. n. ser. 47: 29. 1916.

Chihuahua. Texas and Arizona; type from the Pecos River, Texas.

Several-stemmed, suffruticulose below, 13 to 45 cm. high, densely incurved-griseous-puberulous; lowest leaves oblong or oval-oblong, 8 to 17 mm. long, the others oblong-lanceolate or oblong-linear, 17 to 36 mm. long, 1.5 to 4 mm. wide, usually acute, griseous-puberulous; racemes 2 to 10.5 cm. long; flowers purplish; wings oval or suborbicular, 3.8 to 5.5 mm. long; aril 1 mm. high, the dorsal margin 1.5 mm. long, the umbo 0.4 mm. high, the broader scarious margin strongly lobulate, with distinct or subdistinct dorsal and shorter lateral lobes.

17. *Polygala neurocarpa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 364. 1917.

Known only from the type locality, Ixmiquilpan, Hidalgo.

Several-stemmed, suffrutescent below, about 30 cm. long, at first sparsely spreading-pubescent with short straight hairs, in age glabrate except in the axils; leaves linear to linear-oblong, 9 to 25 mm. long, 1 to 4 mm. wide, thickish, soon glabrate; racemes 3.5 to 7.5 cm. long; peduncles and pedicels glabrous; wings oval, 5.2 mm. long; aril 1 to 1.2 mm. high, 1.4 mm. long dorsally, the scarious margin repand or lobulate, descending, slightly wider than the umbo.

18. *Polygala oophylla* Blake, Contr. Gray Herb. n. ser. 47: 33. 1916.

Known only from the type locality, Tlacuilotepec, Puebla.

Few-stemmed, suffruticulose below, about 20 cm. high, densely incurved-spreading-pubescent; lowest leaves elliptic, 4 mm. long, the others ovate, 11 to 22 mm. long, 3.5 to 10 mm. wide, acute or subacute; racemes 4 to 7 cm. long; flowers purplish; wings orbicular-oval, 6 to 6.5 mm. long; aril 1.6 mm. high, 2 mm. long, the broad scarious margin irregularly lobulate.

19. *Polygala brachyanthema* Blake, Contr. Gray Herb. n. ser. 47: 33. 1916.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Several-stemmed, fruticulose below, 17 to 33 cm. high, green, incurved-pubescent; lowest leaves obovate, 3 to 7 mm. long, the others oblong-elliptic, 10 to 15 mm. long, 3 to 4.8 mm. wide, subobtuse, mucronate, sparsely incurved-pubescent; flowers purplish and greenish; wings oval, 4.5 to 5 mm. long; aril 1 mm. high, 1.6 mm. long dorsally, the scarious margin irregularly crenulate-lobulate, produced into a short horizontal lobe, deeper than the umbo.

20. *Polygala brandegeana* Chod. Bot. Jahrb. Engler 52: Beibl. 115: 72. 1914.

Hidalgo and Puebla; type from El Riego, Tehuacán, Puebla.

Many-stemmed, erectish, 7 to 9 cm. high, pubescent; lower leaves obovate, 3 mm. long, the others oblong to oval or oblong-linear, 6 to 10 mm. long, 1.5 to

4.5 mm. wide, thickish, sparsely pubescent beneath; racemes very short, 1 to 3-flowered; flowers greenish and purplish; wings oval, 5.5 mm. long; aril 1.5 mm. deep, 2.3 mm. long, the broad scarious margin irregularly lobulate, with indistinct lateral and distinct dorsal lobe descending at an angle of about 45°.

21. *Polygala retifolia* Blake, Contr. Gray Herb. n. ser. 47: 29. 1916.

Known only from the type locality, Río Blanco, Jalisco.

Stems few, fruticulose below, about 40 cm. high, densely pubescent with short incurved and long straight spreading hairs; lowest leaves 4 to 11 mm. long, the others linear or linear-lanceolate, 2.5 to 4 cm. long, 1.8 to 4 mm. wide, thick, acuminate, reticulate-venose; racemes 8 to 14 cm. long; wings obovate-oval, 5 to 6 mm. long; ovary densely pilose; fruit unknown.

22. *Polygala amphothrix* Blake, Contr. Gray Herb. n. ser. 47: 39. 1916.

Durango and Tepic; type from Otinapa, Durango.

Stems few, 10 to 15 cm. high, densely pubescent with short incurved and long straight wide-spreading hairs; lowest leaves oval, 3.5 to 11.5 mm. long, the others oblong-lanceolate or oval, 15 to 36 mm. long, 4.5 to 16 mm. wide, obtuse or subacute, reticulate; flowers purplish; wings oval, 5 to 5.5 mm. long; ovary densely pilosulous; fruit unknown.

23. *Polygala obscura* Benth. Pl. Hartw. 58. 1840.

Polygala puberula A. Gray, Pl. Wright. 1: 40. 1852.

Polygala laeta T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 365. 1917.

Polygala vagans T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 366. 1917.

Chihuahua to Oaxaca; type from Hacienda del Carmen, Oaxaca. Texas to Arizona.

Many-stemmed, suffruticulose below, 12 to 38 cm. high, grayish-puberulous; lower leaves oblong or oval-oblong, 12 to 28 mm. long, the middle and upper oblong to lanceolate or linear, 18 to 42 mm. long, 1.5 to 12 mm. wide, puberulous; racemes 3.3 to 9 cm. long; flowers purplish; wings oval-obovate or elliptic, 4.5 to 5.8 mm. long, 2 to 3.5 mm. wide; keel 4.8 to 5 mm. long; capsule puberulous or merely ciliate; aril 1.3 to 3 mm. high, veil-like, appressed, with very broad, irregularly lobulate, scarious margin.

23a. *Polygala obscura euryptera* Blake, Contr. Gray Herb. n. ser. 47: 31. 1916. Oaxaca.

Wings 6 to 6.5 mm. long, 4 to 4.5 mm. wide; keel 6 to 6.5 mm. long.

24. *Polygala lozani* Rose, Contr. U. S. Nat. Herb. 13: 307. 1911.

Polygala calcicola Rose, Contr. U. S. Nat. Herb. 10: 122. pl. 37. 1906. Not *P. calcicola* Chod. 1893.

Known only from the type locality, La Cañada, near Tehuacán, Puebla.

Several-stemmed, suffruticulose below, about 10 cm. high, subcanescent-pubescent; lower leaves oval, 11 mm. long, the others oblong or linear-oblong, 10 to 13 mm. long, 1.8 to 3.5 mm. wide, acutish, incurved-pubescent; flowers yellowish green; wings oval, 5 to 5.5 mm. long, subpersistent; aril 1.7 mm. high, the appressed scarious margin irregularly lobulate, deeper than the umbo, the dorsal lobe barely indicated.

25. *Polygala parrasana* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 365. 1917.

Known only from the type locality, Sierra de Parrás, Coahuila.

Stems several, fruticulose below, procumbent, 4 to 10 cm. long, densely ascending-pubescent; leaves oval or elliptic-oblong, 3 to 9 mm. long, 2.5 to 4 mm. wide, apiculate to obtuse, thickish, pubescent both sides; racemes 1.3 cm. long, few-flowered; wings oval, 5.2 mm. long; keel 5.8 mm. long; aril 1.3 mm. high, 1.7 mm. long on the dorsal margin, the umbo 0.4 mm. high, the scarious mar-

gin 3-lobed, the lateral lobes ovate, vertical, appressed, the dorsal subequal, descending.

26. *Polygala compacta* Rose, Contr. U. S. Nat. Herb. 8: 315. 1905.

Polygala pubescens A. Gray; Chod. Mém. Soc. Phys. Hist. Nat. Genève 31¹: 21. 1893. Not. *P. pubescens* Mart. 1815.

Jalisco and San Luis Potosí to Puebla; type from the Valley of Mexico.

Many-stemmed, ascending or erect, 10 to 20 cm. high, incurved-griseous-puberulous, very leafy; lower leaves obovate or oval, 5 to 17 mm. long, the others oblong or lance-oblong, 11 to 19 mm. long, 3 to 5 mm. wide, obtuse to acutish, incurved-puberulous; racemes rather dense, 1.5 to 4 cm. long; flowers apparently ochroleucous; wings oval or obovate-oval, 3.5 to 5 mm. long; aril 1 to 2 mm. high, strongly 3-lobed, the lobes scarious, linear-lanceolate or linear, descending or the dorsal more or less spreading, subequal or the dorsal somewhat the longer.

27. *Polygala oaxacana* Chod. Bot. Jahrb. Engler 52: Beibl. 115: 73. 1914.

Known only from the type locality, San Juan del Estado, Etla, Oaxaca.

Stems few, suffruticulose below, barely puberulous above, about 20 cm. long; leaves linear, the larger 26 to 35 mm. long, 3 mm. wide, acute, glabrescent; racemes 3 to 5-flowered, 3 cm. long; flowers 6 to 7 mm. long; wings oval; ovary densely pilose; fruit unknown.

28. *Polygala longipes* Blake, Contr. Gray Herb. n. ser. 47: 40. 1916.

Oaxaca.

Stem slender, finely strigillose, 30 cm. high or more; leaves lanceolate, 5.5 to 6.5 cm. long, 9 to 14 mm. wide, thin, long-acuminate, sparsely and finely strigillose; racemes 14.5 cm. long or less; pedicels 5 to 8 mm. long; wings oblong-oval, 6.6 mm. long, 3.3 mm. wide; seed unknown.

29. *Polygala velata* Blake, Contr. Gray Herb. n. ser. 47: 41. 1916.

Chiapas.

Erect, 35 cm. high and more, rather densely incurved-puberulous; leaves ovate to rhombic-lanceolate, 3.7 to 5.2 cm. long, 1.2 to 2.2 cm. wide, acuminate, sparsely incurved-puberulous; racemes 6.5 to 10.5 cm. long; wings oval, 5.5 mm. long, 3.5 mm. wide; aril 3 mm. high, cloaklike, the broad scarious margin sparsely pilose, appressed, slightly lobulate, the umbo medium-sized.

30. *Polygala polyedra* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 364. 1917.

Known only from the type locality, Mazatlán, Sinaloa.

Stem stoutish, strongly angled, 35 cm. long and more, grayish green, densely strigillose; leaves unknown; racemes 5 cm. long or less, rather dense; wings oval, 4.5 mm. long, 3.5 mm. wide; aril 1.8 to 2 mm. high, 1.6 to 1.8 mm. long dorsally, the umbo pilose, 0.4 mm. deep, the repand-lobulate scarious margin sparsely pilose, the dorsal margin horizontal or slightly upturned.

31. *Polygala galeottii* Chod. Mém. Soc. Phys. Hist. Nat. Genève 31¹: 28. 1893.

Known only from the type locality, Rancho de Haupa, between Jalapa and Córdoba, Veracruz.

Simple or sparsely branched, slightly hirsute; leaves lanceolate, 2.8 to 4 cm. long, 1 to 1.4 cm. wide, attenuate at each end, ciliate and slightly pubescent; racemes elongate, loose; flowers 6 mm. long; wings elliptic-obovate; capsule hirsute-ciliate; aril 2 mm. high, 2.8 mm. long on the dorsal margin, papery, crenate or undulate, scarcely lobed.

32. *Polygala rivinaefolia* H. B. K. Nov. Gen. & Sp. 5: 409. 1821.

Polygala albowiana Chod. Bull. Herb. Boiss. 3: 123. 1895.

Polygala jaliscana Blake, Contr. Gray Herb. n. ser. 47: 44. 1916.

Jalisco to Morelos; type collected near Ario, Michoacán.

Suffruticlose, several-stemmed, about 40 cm. high, rather densely pubescent with short incurved hairs and plentiful long spreading ones; leaves ovate or oblong-ovate, 2.5 to 5.5 cm. long, 1.5 to 3 cm. wide, acute to acuminate, thin, bright green above, rather densely pubescent on both sides; racemes 1.5 to 15 cm. long; flowers purplish; wings oval, 5 to 6 mm. long, 3 to 4 mm. wide; capsule suborbicular, pale, reticulate, about 1 cm. long; aril 1.5 to 2 mm. high, with lobulate or slightly lobed ventral margin, the umbo small, the dorsal margin subhorizontal or curved-ascending to nearly vertically descending.

33. *Polygala brachytropis* Blake, Contr. Gray Herb. n. ser. 47: 46. 1916.

Known only from the type locality, Zimapán, Hidalgo.

Suffruticlose below, 25 cm. high and more, densely pubescent with short incurved and long wide-spreading hairs; leaves ovate, 2.5 to 3.8 cm. long, 1.2 to 1.4 cm. wide, acute, firm, rather sparsely pubescent; racemes about 3 cm. long; wings elliptic, 3.8 mm. long, 2.5 mm. wide; seed unknown.

34. *Polygala americana* Mill. Gard. Dict. ed. 8. *Polygala* no. 7. 1768.
Veracruz.

Several-stemmed, erect, fruticlose, 12 cm. high, densely pubescent with incurved-spreading, rather short, equal hairs; leaves ovate to obovate, 1.4 to 2.3 cm. long, 8 to 11 mm. wide, acute, firm but rather thin, rather densely pubescent on both sides; flowers purplish; racemes 1.2 to 4 cm. long; wings oval, 5 to 7 mm. long, 3 to 4 mm. wide; capsule densely spreading-pubescent, reticulate; seed unknown.

35. *Polygala pedicellata* Blake, Contr. Gray Herb. n. ser. 47: 45. 1916.

Veracruz and Oaxaca; type from Zacuapan, Veracruz.

Stems few, fruticlose below, suberect, branched, about 40 cm. high, rather densely incurved-puberulous; leaves ovate, 2.3 to 3.4 cm. long, 9 to 16 mm. wide, subacuminate, incurved-pubescent; racemes 3.5 to 7 cm. long; flowers purplish; wings oval, 5 to 6.5 mm. long, 3.5 to 4.5 mm. wide; capsule spreading-pubescent; aril 1.5 to 1.8 mm. high, the umbo large, the subequal scarious margin with obscure lateral lobes and distinct, descending or upcurved dorsal lobe.

36. *Polygala cuspidulata* Blake, Contr. Gray Herb. n. ser. 47: 45. 1916.

Puebla and Oaxaca; type from Cerro de Santa Lucía, near San Luis Tultitlanapa, Puebla.

Stems few, erect, densely incurved or incurved-spreading-pubescent, 15 to 40 cm. high; leaves ovate, 2 to 3 cm. long, 1.1 to 1.6 cm. wide, cuspidulate, rather densely incurved-pubescent; racemes 5 to 11 cm. long; flowers purplish; wings oval, 7 to 8.3 mm. long, 5 to 5.5 mm. wide; capsule spreading-pilosulous and ciliolate; aril 2.2 to 2.5 mm. high, with tiny pilose umbo, the undulate scarious margin sparsely pilose, the dorsal margin horizontal or slightly curved-ascending or descending at an angle of about 45°.

37. *Polygala appressipilis* Blake, Contr. Gray Herb. n. ser. 47: 41. 1916.

Tepic to Puebla and Oaxaca; type from Cuernavaca, Morelos.

Stems several, erect, about 35 cm. high, griseous-puberulous; leaves ovate or oval, 1.5 to 3 cm. long, 8 to 13 mm. wide, acute or obtuse, appressed-puberulous; wings oval or broadly elliptic, 6.5 to 9 mm. long, 4.5 to 5.8 mm. wide; mature seed unknown.

38. *Polygala brachysepala* Blake, Contr. Gray Herb. n. ser. 47: 44. 1916.

San Luis Potosí, Guerrero, and Morelos; type from Las Canoas, San Luis Potosí.

Stems several, fruticulose below, rather densely incurved-puberulous with a few long spreading hairs intermixed, 20 to 35 cm. high; leaves ovate, 2.8 to 4.5 cm. long, 1.2 to 2 cm. wide, acuminate, sparsely pubescent; racemes 5 to 7 cm. long; wings suborbicular, 5.5 mm. long, 4.8 mm. wide; aril cloaklike, appressed, 3.5 mm. high, with deep subentire scarious margin.

39. *Polygala microtricha* Blake, Contr. Gray Herb. n. ser. 47: 46. 1916.

Hidalgo and Oaxaca; type from Zimapán, Hidalgo.

Suffruticulose below, branched, 25 cm. high and more, densely incurved-puberulous; leaves ovate, 2.7 to 3.8 cm. long, 1 to 1.2 cm. wide, acute to acuminate, firm, rather densely puberulous; racemes 3.5 to 7.5 cm. long; wings oval, 5.5 mm. long, 4 mm. wide; aril 3 mm. high, cloaklike, the large umbo pilose, the much broader scarious margin lobulate, the dorsal and lateral lobes barely indicated, subappressed.

40. *Polygala chiapensis* Blake, Contr. Gray Herb. n. ser. 47: 40. 1916.

Chiapas.

Stems erect, about 24 cm. high, pubescent with short incurved and sometimes a few longer incurved-spreading hairs; lower leaves oval or obovate, the middle and upper lanceolate, 2 to 4.2 cm. long, 5 to 8 mm. wide, acuminate, sparsely incurved-pubescent, reticulate; racemes 6 to 10 cm. long; wings oval, 5.5 mm. long, 3.5 mm. wide; aril 1.5 mm. high, papery, irregularly lobulate, the horizontal dorsal margin 2.2 mm. long.

41. *Polygala biformipilis* Blake, Contr. Gray Herb. n. ser. 47: 52. 1916.

Veracruz; type from Zacuapan.

Stems several, suffruticulose below, erect, 35 to 60 cm. high, densely and softly pubescent with short incurved and long straight spreading hairs; leaves ovate or oblong-ovate, 3 to 5 cm. long, 1 to 2 cm. wide, acuminate, pubescent like the stem; racemes dense, 3.5 to 7 cm. long; flowers purplish; wings oblong-oval, 8.7 mm. long, 4.7 mm. wide; aril 2.5 mm. high, the small umbo densely pilose, the broad scarious margin lobulate, the dorsal margin ascending, the anterior vertical.

42. *Polygala glandulosa* H. B. K. Nov. Gen. Sp. 5: 404. 1821.

Viola punctata Humb. & Bonpl.; Roem. & Schult. Syst. Veg. 5: 391. 1819.

Not *Polygala punctata* A. W. Benn. 1879.

Polygala greggii S. Wats. Proc. Amer. Acad. 17: 325. 1882.

Nuevo León and San Luis Potosí; type from Puente de la Madre de Dios.

Stems very numerous, suffruticulose, diffuse, 10 to 20 cm. long, densely leafy; leaves obovate to suborbicular-oval, 4.5 to 10 mm. long, 1.5 to 6 mm. wide, rounded, mucronate, cuneate at base, thick, incurved-puberulous or short-pilosulous, densely translucent-glandular-dotted; racemes axillary, 1 or 2-flowered; flowers purple; wings spatulate-obovate, 7.5 mm. long; capsule elliptic; aril galeiform, equitant.

43. *Polygala phoenicistes* Blake, Contr. Gray Herb. n. ser. 47: 55. 1916.

Known only from the type locality, Sierra de Guascama, Minas de San Rafael, San Luis Potosí.

Stems several, fruticulose, diffuse or suberect, 6 to 15 cm. long; leaves cuneate-obovate, 5.5 to 7 mm. long, 2.5 to 4.5 mm. wide, densely glandular-punctate, very sparsely incurved-puberulous along costa beneath; racemes 1-flowered; flowers purple; wings spatulate-obovate, 6 mm. long; capsule oblong-elliptic; aril corneous, 3-lobed.

44. *Polygala macradenia* A. Gray, Pl. Wright. 1: 39. 1852.

Coahuila. Texas to Arizona; type from hills at the head of the San Felipe, Texas.

Stems very numerous, 3.5 to 21 cm. long, fruticulose below, erectish or ascending, densely leafy, canescently puberulous; leaves linear-oblong or oblong-lanceolate, 2 to 6 mm. long, 0.6 to 1.3 mm. wide, thick, flattened above, gland-dotted, canescent-puberulous; racemes 1 or 2-flowered; flowers purple; wings obovate, 5 to 5.5 mm. long; capsule oblong; aril shortly 3-lobed.

- 44a. *Polygala macradenia glanduloso-pilosa* (Chod.) Blake, Contr. Gray Herb. n. ser. 47: 56. 1916.

Polygala glanduloso-pilosa Chod. Bot. Jahrb. Engler 52: Beibl. 115: 72. 1914. San Luis Potosí.

Less pubescent; leaves linear or linear-lanceolate, 1.2 to 3 mm. long, 0.3 to 0.5 mm. wide, concave or sulcate above, sparsely incurved-puberulous.

45. *Polygala purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 88. 1910.

Known only from the type locality, Acatitlán, Puebla.

Fruticulose, several-stemmed, erect, 25 cm. high, densely canescent-pilosulous on the younger parts; leaves oval to oblong-oval, rarely orbicular, 9 to 14 mm. long, 4 to 11 mm. wide; racemes terminal, 4.5 cm. long; wings obovate-oval, 4.7 mm. long; keel whitish with yellowish tip; capsule suborbicular, 3 mm. long; aril 1.2 mm. deep, the 2 lobes oval, appressed.

46. *Polygala konzattii* Rose. Contr. U. S. Nat. Herb. 13: 307. 1911.

Known only from the type locality, Cerro San Antonio, Oaxaca.

Stems 40 cm. long, slender, green, incurved-pubescent; leaves ovate-oval or obovate, 15 mm. long, cuspidate at the truncate-rounded apex or retuse; racemes very loose, 1.8 to 20 cm. long; wings obovate, 4.5 mm. long; capsule quadrate-orbicular, 3.5 mm. long; aril 1.4 mm. long, with large corneous umbo, the 2 lateral lobes oblong, appressed.

47. *Polygala parryi* A. W. Benn. Journ. Bot. Brit. & For. 17: 140. 1879.

San Luis Potosí.

Suffruticulose, procumbent below, 9 cm. long or less, several-stemmed, incurved-puberulous; leaves oval to orbicular, 6 to 11 mm. long, rounded to obtuse at each end; wings obovate, 3.5 mm. long; capsule orbicular, venose, plump, 3.5 mm. long; aril 1.5 mm. deep, with small corneous umbo and 2 oblong appressed lobes.

48. *Polygala tehuacana* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 273. 1912.

Known only from the vicinity of the type locality, mountains north of Tehuacán, Puebla.

Suffruticulose, many-stemmed, erect, about 15 cm. high, canescent-puberulent; leaves oblong, 5 to 10 mm. long, 1.5 to 2.5 mm. wide, obtusish, puberulous; racemes mostly 1-flowered; flowers purplish-yellowish; wings oval-obovate, 6 mm. long; capsule oval, ciliate, 4.8 mm. long; seed silky-pilose; aril with small umbo and 2 oblong lateral lobes.

49. *Polygala floribunda* Benth. Pl. Hartw. 58. 1840.

Polygala americana floribunda Kuntze, Rev. Gen. Pl. 1: 48. 1891.

Chiapas; type from Zonagula. Guatemala.

Frutescent, erect, about 1.5 meters high, incurved-pubescent or strigillose; leaves ovate, 3.5 to 9 cm. long, 1.2 to 3.8 cm. wide, acute, finely reticulate, strigillose or glabrate; racemes loose, up to 23 cm. long, rarely branched; flowers violet-purple; wings suborbicular, 8 to 11 mm. long and wide, venose; capsule transversely broad oblong, obcordate, 8 mm. long; seed globose, 3 mm. thick; aril 2 mm. high, fleshy-coriaceous, not lobed.

50. *Polygala apopetala* T. S. Brandeg. Proc. Calif. Acad. II. 2: 130. pl. 3. 1889.
Southern Baja California; type from Comondú.

Shrub or small tree, 5 meters high or less, the branches strigillose; leaves ovate, 2.5 to 5 cm. long, 1.7 to 2.2 cm. wide, sparsely strigillose; racemes terminal, loose, 5 to 19 cm. long; flowers pinkish purple; wings suborbicular, 12 to 15 mm. long and wide, reticulate; capsule quadrate-orbicular, emarginate, 1.5 to 1.9 cm. long; seed ellipsoid, 9 mm. long; aril corneous, 0.5 mm. long.

51. *Polygala fishiae* Parry, Proc. Davenport Acad. 4: 39. 1884.

Northern Baja California; type collected near Sauzal, Todos Santos Bay. Southern California.

Frutescent, about 1.5 meters high, glabrous or very sparsely strigillose; leaves oblong or oblong-lanceolate, 1.7 to 5 cm. long, 4 to 14 mm. wide, rounded or retuse, glabrous; racemes 2.5 to 20 cm. long; flowers purplish, whitish, and yellowish, 8.5 mm. long; wings obovate, ciliolate; capsule suborbicular, 7.5 mm. long; seed pilose, 5 mm. long.

52. *Polygala nitida* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 272. 1912.

Known only from the type locality, Bagre, Minas de San Rafael, San Luis Potosí.

Frutescent, decumbent, finely incurved-puberulous, about 20 cm. long; lower leaves elliptic to oval, 1 to 2 cm. long, 7.5 to 12.5 mm. wide, rounded, cuspidate, reticulate, shining, glabrous or sparsely puberulous beneath along costa, the upper more oblong; racemes 3 to 9-flowered, 1.5 to 3.5 cm. long; flowers rose-colored; wings oblong-obovate, 5.5 mm. long; keel yellowish; capsule 4 mm. long, oval, subreticulate-striate.

53. *Polygala eucosma* Blake, Contr. Gray Herb. n. ser. 47: 72. 1916.

Coahuila to Hidalgo; type from the Sierra Madre south of Saltillo, Coahuila. Southern New Mexico.

Fruticulose, many-stemmed, procumbent, 4.5 to 20 cm. long or more, minutely incurved-puberulous; leaves oval or elliptic, 4 to 9 mm. long, 2 to 6.5 mm. wide, acute or obtuse, coriaceous, scarcely reticulate, glabrous or very sparsely incurved-puberulous; racemes 2 or 3-flowered; flowers rosy; wings obovate, 4 to 4.5 mm. long, 1.8 to 2.8 mm. wide.

54. *Polygala lindheimeri* A. Gray, Bost. Journ. Nat. Hist. 7: 150. 1850.

Polygala emoryi Blake, Contr. Gray Herb. n. ser. 47: 72. 1916.

Nuevo León. Texas and New Mexico; type from the upper Guadalupe and Pierdenales rivers, Texas.

Stems several, fruticulose below, erect to decumbent, densely spreading-pilose or pilosulous or rarely incurved-spreading-pubescent, about 18 cm. long; lower or all the leaves elliptic or oval, rarely orbicular, 5 to 13 mm. long, 3 to 12 mm. wide, coriaceous, spreading-pilosulous or incurved-spreading-puberulous, reticulate, the middle and upper usually oblong or lance-oblong and acute; racemes 2 to 8-flowered, geniculate; wings oblong-obovate, 4.5 to 5 mm. long; capsule oblong, striate.

55. *Polygala tweedyi* Britton; Wheelock, Mem. Torrey Club 2: 143. 1891.

Polygala lindheimeri parvifolia Wheelock, Mem. Torrey Club 2: 143. 1891.

Polygala arizonae Chod. Mém. Soc. Hist. Nat. Genève 31²: 108. 1893.

Polygala arizonae tenuifolia Chod. Mém. Soc. Phys. Hist. Nat. Genève 31²: 109. 1893.

Polygala texensis Robinson in A. Gray, Syn. Fl. 1¹: 451. 1897.

Polygala parvifolia Woot. & Standl. Contr. U. S. Nat. Herb. 19: 392. 1915.

Polygala blepharotropis Blake, Contr. Gray Herb. n. ser. 47: 73. 1916.

Polygala lithophila Blake, Contr. Gray Herb. n. ser. 47: 74. 1916.

Polygala pycnophylla T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 366. 1917.

Sonora, Coahuila, and San Luis Potosí. Oklahoma and western Texas to Arizona; type from Tom Green County, Texas.

Suffruticulose, many-stemmed, spreading to erect, incurved-puberulous, 7 to 28 cm. high; leaves dimorphous or uniform, linear to lanceolate, elliptic, or ovate-lanceolate, 4 to 26 mm. long, 1 to 6 mm. wide, the lowest broader than the others, coriaceous, reticulate, incurved-puberulous; racemes 3 to 22-flowered, geniculate; flowers rosy or whitish; wings obovate, 4 to 5.3 mm. long; capsule oval to oblong.

56. *Polygala minutifolia* Rose, Contr. U. S. Nat. Herb. 13: 307. 1911.

Polygala nudata T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 183. 1911.

Coahuila and Nuevo León; type collected near Monterrey, Nuevo León.

Stems very numerous, fruticulose, erect, about 15 cm. high, strigillose or subglabrous; leaves squamiform, linear-lanceolate, 1 to 4.5 mm. long, 0.5 mm. wide, acuminate; racemes straight, 4 to 6-flowered; flowers white; wings oval-obovate, 4 mm. long; capsule oblong, 2.8 mm. long.

57. *Polygala desertorum* T. S. Brandeg. Proc. Calif. Acad. II. 2: 130. 1889.

Southern Baja California; type from Agua Dulce.

Frutescent, several or many-stemmed, erect, strigillose, 25 cm. high; leaves linear or linear-lanceolate, 9 to 18 mm. long, 1 to 1.5 mm. wide, acute, firm; racemes loose, 5 to 9 cm. long; flowers purple and yellow; wings oblong-obovate, glabrous, 8 mm. long, appearing apiculate; capsule oval-oblong, glabrous, 5.5 mm. long; seed subsericeous, 3.5 mm. long.

58. *Polygala semialata* S. Wats. Proc. Amer. Acad. 17: 326. 1882.

Coahuila, Nuevo León, and Zacatecas; type from Monterrey, Nuevo León.

Stems numerous from a fruticulose base, erect or lax, almost filiform, minutely puberulous, 8 to 21 cm. long; leaves linear, 5 to 8.5 mm. long, 0.5 to 1 mm. wide; racemes 3 to 12.5 cm. long; flowers whitish; wings oval-obovate, 1.4 mm. long; capsule narrowly oblong, curved, 3.6 mm. long, 1.3 mm. wide, the upper cell larger and distinctly winged; seeds cylindric, curved, 2.5 mm. long.

59. *Polygala hemipterocarpa* A. Gray, Pl. Wright. 2: 31. 1853.

Chihuahua to Hidalgo; type collected near "Deserted Rancho," on the border of Sonora. Texas to Arizona.

Stems several, erect, fruticulose below, glabrous, slightly glaucous, 12 to 56 cm. high; leaves linear, 6 to 23 mm. long, 0.6 to 1 mm. wide, acute; racemes 3 to 21 cm. long; flowers white; wings obovate, 3.5 to 4 mm. long; capsule oblong, 5 mm. long, the upper cell broadly scarious-winged; seed 2.7 mm. long.

60. *Polygala watsoni* Chod. Mém. Soc. Phys. Hist. Nat. Genève 31²: 285. 1893.

Polygala acicularis S. Wats. Proc. Acad. Amer. Acad. 21: 445. 1886. Not

P. acicularis Oliver, 1868.

Known only from the type locality, Santa Eulalia Mountains, Chihuahua.

Stems numerous, ascending from a woody base, 35 cm. long or less, finely incurved-puberulous; leaves linear-acicular, 4 to 11 mm. long, 0.4 to 0.6 mm. wide, acuminate, 2-sulcate beneath; racemes 6 to 11 mm. long, about 10-flowered; flowers white; wings obovate, 5 mm. long; capsule elliptic, narrow-margined on both cells, 3 mm. long; seed 2.6 mm. long.

61. *Polygala scoparioides* Chod. Mém. Soc. Phys. Hist. Nat. Genève 31¹: 284. 1893.

Polygala scoparia multicaulis A. Gray, Pl. Wright. 1: 38. 1852.

Polygala wrightii A. Gray; A. W. Benn. Journ. Bot. Brit. & For. 17: 205. 1879, as synonym.

Sonora to Coahuila and San Luis Potosí. Texas to Arizona.

Stems numerous, angled, finely incurved-puberulous, 9 to 30 cm. high; leaves linear-acicular, 7 to 14 mm. long, 0.6 to 1.3 mm. wide, acute to acuminate, strongly 2-sulcate beneath; racemes 1.5 to 7.8 cm. long; flowers white; wings spatulate-obovate, 2.6 to 3 mm. long, appearing acute by inflexion; capsule oblong-elliptic, 3 to 3.5 mm. long, 1.6 mm. wide; seed 2.5 to 3 mm. long; aril 1 to 1.9 mm. long.

62. *Polygala dolichocarpa* Blake, Contr. Gray Herb. n. ser. 47: 107. 1916.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Stems several, suffruticulose below, 10 to 35 cm. high, sulcate, sparsely incurved-puberulous, soon becoming nearly leafless; leaves linear, 3 to 4.5 mm. long, 0.3 mm. wide, acuminate, thickish, convex and veinless beneath; racemes loose, 5 to 10 cm. long; flowers white; wings spatulate-obovate, 2.7 to 3.2 mm. long; capsule oblong, 2 mm. long, 1 mm. wide, the upper cell very narrowly margined; seed 1.5 mm. long, cylindric; aril 1 mm. long.

63. *Polygala scoparia* H. B. K. Nov. Gen. & Sp. 5: 399. 1821.

? *Polygala mexicana* Moc.; DC. Prodr. 1: 333. 1824.

Polygala flagellaria Pavón; Chod. Mém. Soc. Phys. Hist. Nat. Genève 31²: 282. 1893, as synonym.

Polygala filiformis Pavón; Chod. Mém. Soc. Phys. Hist. Nat. Genève 31²: 282. 1893, as synonym.

Mexico and Veracruz; type collected near the City of Mexico.

Stems numerous, fruticulose below, slender, striate, finely incurved-puberulous, 7.5 to 13 cm. long; leaves rather crowded, linear-acicular, 5 to 9 mm. long, 0.4 to 1 mm. wide, acuminate, cuspidate, thickish, 1-nerved but not sulcate beneath; racemes dense or loose below, 0.5 to 2.3 cm. long; flowers white; wings obovate, 2.9 mm. long; capsule oval-oblong, 2.7 to 3 mm. long, 1.5 mm. wide, the upper cell narrowly winged; seed cylindric, 2.2 to 2.5 mm. long; aril 1.5 mm. long.

64. *Polygala michoacana* Robins. & Seat. Proc. Amer. Acad. 28: 103. 1893.

San Luis Potosí to Puebla and Michoacán; type from Pátzcuaro, Michoacán.

Habit and general characters of *P. scoparia*; leaves up to 1.5 mm. wide; racemes 0.7 to 4.2 cm. long; wings cuneate-obovate, 2.5 mm. long, 1 mm. wide; capsule suborbicular, 2 to 2.5 mm. long, 1.5 to 1.8 mm. wide; seed 1.7 to 2 mm. long; aril 1.2 to 1.8 mm. long.

65. *Polygala viridis* S. Wats. Proc. Amer. Acad. 17: 325. 1882.

Known only from the type locally, Caracol Mountains, Coahuila.

Several-stemmed, suffruticulose, spreading, densely spreading-puberulous, 5.5 to 11 cm. long; leaves obovate-spatulate, 5 to 11 mm. long, 1.5 to 3.6 mm. wide, coriaceous, spreading-puberulous; racemes loose, 1 to 2.5 cm. long; flowers green with narrow white margin; wings obovate, 2.6 mm. long; capsule oval-oblong, narrowly winged above, 2.8 mm. long, 1.5 mm. wide; seed 2 mm. long; aril 1.2 mm. long.

2. SECURIDACA L. Sp. Pl. 707. 1753.

Shrubs or trees, usually scandent; leaves alternate, entire, with peiziform stipular glands; flowers medium or large, in terminal and axillary, often paniced racemes; outer sepals free or the 2 lower united; wings large, petaloid; keel with a fimbriate crest; stamens 8; fruit a 1-celled samara, with a large wing on the lower side.

One species of the genus, known as "contraveneno" and "palomita morada," is said to be used in Nicaragua as a remedy for snake bites.

Leaves strigillose to sparsely pubescent beneath; pedicels strigillose or pubescent with incurved hairs-----1. *S. diversifolia*.

Leaves densely and softly pilosulous or pilose beneath; pedicels densely and softly spreading or ascending-puberulous-----2. *S. sylvestris*.

1. *Securidaca diversifolia* (L.) Blake.

Polygala diversifolia L. Sp. Pl. 703. 1753.

Securidaca acuminata Schlecht. Linnaea 14: 382. 1840. Not *S. acuminata* St. Hil. 1829.

Securidaca schlechtendaliana Walp. Repert. Bot. 1: 236. 1842.

Elsota schlechtendaliana Kuntze, Rev. Gen. Pl. 1: 46. 1891.

? *Securidaca myrtifolia* Chod. Bull. Herb. Boiss. 3: 546. 1895.

Tamaulipas to Michoacán (or Guerrero) and southward. Central America to Ecuador; West Indies.

Trailing or high-climbing shrub, strigillose or ascending-puberulous; leaves elliptic-oblong to ovate or oval, 3.8 to 12 cm. long, 2.2 to 5.7 cm. wide, thick, above somewhat shining, prominulous-reticulate and paler beneath; racemes usually 6 to 14 cm. long; flowers pink to purplish, the keel with yellow tip; wings suborbicular to oval-ovate, 8.5 to 11.8 mm. long, 6 to 8 mm. wide; samara puberulous, 4 to 6 cm. long; fruiting cell wing-margined on upper side, the margin prolonged beyond the cell and connate with the proper wing. "Flor de arrayán" (Oaxaca).

2. *Securidaca sylvestris* Schlecht. Linnaea 14: 381. 1840.

Elsota sylvestris Kuntze, Rev. Gen. Pl. 1: 46. 1891.

Veracruz to Tepic and southward; type from Jalapa, Veracruz. Central America.

Shrub, climbing to a height of 25 meters, the branchlets densely and softly puberulous; leaves ovate to elliptic or oblong-ovate, 2.7 to 7.5 cm. long, 1.2 to 3.3 cm. wide, dull both sides and softly pubescent; racemes 1.5 to 11 cm. long; flowers wine-red or rosy; wings suborbicular, 8 to 11 mm. long; samara spreading-puberulous, 3.8 to 4.7 cm. long; fruiting cell narrowly winged on upper side, the wing prolonged for 3 to 7 mm. beyond the fruiting cell and connate with proper wing.

3. **MONNINA** Ruiz & Pav. Syst. Veg. Peruv. Chil. 169. 1798.

Herbs or shrubs, very rarely scandent; leaves in ours estipulate; flowers racemed; outer sepals free or the 2 lower united; wings petaloid; keel not crested; stamens 8 or 6; fruit (in the following species) drupaceous, 1-celled, 1-seeded, with rugose endocarp surface and thin fleshy exocarp.

Racemes not at all comose; bracts ovate, obtuse to acute, 1.2 to 2.5 mm. long.

Peduncles and young branches densely pilose-tomentose.

1. *M. schlechtendaliana*.

Peduncles and young branches strigillose-----2. *M. xalapensis*.

Racemes comose toward apex; bracts lance-subulate to ovate, acuminate to attenuate, 2.5 to 7 mm. long.

Stem and leaves merely strigillose or incurved-puberulous---3. *M. sylvatica*.

Stem and leaves spreading-pilosulous or hirsutulous.

Branches and leaves softly spreading-pilosulous; leaves oval, cuneate to rounded at base-----4. *M. guatemalensis*.

Branches and leaves hirsutulous; leaves lanceolate, long-attenuate at base.
5. *M. subserrata*.

1. *Monnina schlechtendaliana* D. Dietr. Syn. Pl. 4: 912. 1847.? *Monnina mexicana* Don, Hist. Dichl. Pl. 1: 367. 1831.? *Monnina caerulea* Don, Hist. Dichl. Pl. 1: 367. 1831.*Monnina angustifolia* Schlecht. Linnaea 14: 380. 1840. Not *M. angustifolia* DC. 1824.*Monnina stenophylla* Steud. Nom. Bot. ed. 2. 2: 157. 1841. Not *M. stenophylla* St. Hil. 1829.*Monnina erioclada* Gandog. Bull. Soc. Bot. France 60: 455. 1913.

Tepic to Morelos; type collected near the City of Mexico.

Branching shrub, the branches in youth like the peduncles densely and usually griseously pilose-tomentose with spreading crisped hairs, in age subglabrate; leaves elliptic to lance-elliptic, 4.5 to 8 cm. long, 1 to 2.4 cm. wide, thin, beneath appressed-puberulous and along costa spreading-pilose; racemes solitary or few, dense, 6 cm. long or less; flowers purplish; wings suborbicular, 4 to 4.8 mm. long; drupe obliquely ellipsoid, 6 to 7 mm. long.

2. *Monnina xalapensis* H. B. K. Nov. Gen. & Sp. 5: 414. 1821.? *Monnina bifurcata* DC. Prodr. 1: 339. 1824.? *Monnina ciliolata* DC. Prodr. 1: 340. 1824.? *Monnina obscura* Don, Hist. Dichl. Pl. 1: 367. 1831.? *Monnina ciliolosa* Don, Hist. Dichl. Pl. 1: 368. 1831.*Monnina ocampi* Villada, Mem. Trab. Com. Cient. Pachuca 215. 1865.*Monnina aestuans xalapensis* Kuntze, Rev. Gen. Pl. 1: 48. 1891.

Veracruz; type from Jalapa. Guatemala to Costa Rica.

Shrub, about 3 meters high, strigillose, subglabrate; leaves oblanceolate or obovate-elliptic to elliptic, 3.2 to 8.5 cm. long, 1 to 3 cm. wide, sparsely strigillose; racemes 11 cm. long or less; wings suborbicular-oval or oval, 5 to 6 mm. long; drupe 6 to 8.5 mm. long.

3. *Monnina sylvatica* Schlecht. Linnaea 5: 231. 1830.? *Monnina deppei* Don, Hist. Dichl. Pl. 1: 367. 1831.*Monnina evonymoides* Schlecht. Linnaea 14: 380. 1840.*Monnina sylvicola* Chod. Bull. Soc. Bot. Belg. 30¹: 303. 1891.

Michoacán to Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Branching, apparently shrubby, incurved-puberulous; leaves lance-ovate to elliptic or oval, 7.3 to 12 cm. long, 2.5 to 6 cm. wide, sparsely strigillose; racemes 18 cm. long or less; bracts lance-subulate, 5 mm. long; wings suborbicular, 4 to 4.7 mm. long; drupe crested, 6 to 7 mm. long.

4. *Monnina guatemalensis* Chod. Bull. Herb. Boiss. 4: 249. 1896.

Chiapas. Northern Guatemala; type from Cobán.

Shrub with stout, yellow-green, spreading-pilosulous branches; leaves oval, 5.5 to 11 cm. long, 2.6 to 7 cm. wide, short-pointed, yellowish green; racemes several, 16 cm. long or less; bracts lance-ovate, acuminate, 4.8 to 7 mm. long; wings obovate-suborbicular, 4.3 to 4.8 mm. long; drupe 8 mm. long.

5. *Monnina subserrata* Chod. Bull. Herb. Boiss. 4: 250. 1896.

Mexico, without definite locality.

Branches stout, hirsutulous with very soft thick hairs; leaves lanceolate, 6.5 to 8 cm. long, 2.8 to 3.5 cm. wide or smaller, acute, cinerascens-hirsutulous both sides, the younger tomentose; racemes comose; wings obovate-cuneate.

76. EUPHORBIACEAE. Spurge Family.

Trees or shrubs; juice often milky; leaves usually alternate, sometimes opposite, entire, dentate, or lobate; stipules often present; flowers unisexual, monoe-

clous or dioecious, variously arranged, usually regular; perianth commonly small, sometimes showy, often wanting; anthers 2-celled; fruit usually capsular, sometimes drupaceous, commonly 3-celled but often with fewer or more numerous cells; seeds frequently carunculate.

A large family of plants, represented in Mexico also by numerous herbaceous species. The sap usually has purgative and often poisonous properties.

Flowers surrounded by an involucre containing both pistillate and staminate flowers; perianth none or minute.

Involucre cuplike, regular-----1. **EUPHORBIA**.

Involucre very irregular, oblique-----2. **PEDILANTHUS**.

Flowers not involucrate or, if so, the involucre containing only staminate or pistillate flowers; perianth present and usually well developed.

Ovules 2 in each cell; stamens, at least the outer ones, opposite the sepals.

Leaves all or mostly opposite-----3. **TETRACOCCLUS**.

Leaves alternate.

Fruit drupaceous; flowers racemose, dioecious-----4. **HIERONYMA**.

Fruit capsular, rarely fleshy; flowers never racemose.

Flowers monoecious-----5. **PHYLLANTHUS**.

Flowers dioecious-----6. **ASTROCASIA**.

Ovule 1 in each cell; stamens, at least the outer ones, alternate with the sepals.

Stamens in bud bent inward, the apex of the anther turned downward.

Staminate flowers usually with petals; flowers mostly in terminal racemes-----7. **CROTON**.

Stamens erect in bud.

A. Calyx lobes valvate.

Petals present in the staminate flowers.

Petals 8 to 12; stamens numerous-----8. **GARCIA**.

Petals 4 or 5; stamens 5 to 15.

Petals entire; stamens in 2 or 3 series-----9. **DITAXIS**.

Petals lobed; stamens in one series-----10. **CHIROPETALUM**.

Petals none.

Stamens numerous, the filaments repeatedly branched; leaves lobed.

11. **RICINUS**.

Stamens few or numerous, the filaments simple; leaves not lobed.

Styles united; plants usually with stinging hairs.

Inflorescence subtended by 2 large showy bracts; stamens usually 20 to 30-----12. **DALECHAMPIA**.

Inflorescence with small inconspicuous bracts; stamens 3 or fewer-----13. **TRAGIA**.

Styles distinct; plants without stinging hairs.

Anther cells elongate, often cylindric and curved, separated.

14. **ACALYPHA**.

Anther cells globose, or oblong and adnate.

Anther cells globose-----15. **BERNARDIA**.

Anther cells elongate.

Leaves entire; styles lacerate-----16. **ADELIA**.

Leaves dentate; styles entire-----17. **ALCHORNEA**.

AA. Calyx lobes imbricate.

Corolla present or, if absent, the plants with stinging hairs.

18. **JATROPHA**.

Corolla none; plants never with stinging hairs.

Leaves deeply lobed-----19. **MANIHOT**.

Leaves entire or toothed.

Capsule large, 5 to 20-celled, elastically dehiscent; bracts large, membranaceous, inclosing the buds, in anthesis irregularly cleft.....20. **HURA**.

Capsule small, usually 3-celled, or the fruit drupaceous and many-celled.

Stamens numerous.....21. **MABEA**.

Stamens 1 to 3.

Staminate calyx none or rudimentary.

Inflorescence terminal.....22. **DALEMBERTIA**.

Inflorescence axillary.....23. **GYMNANTHES**.

Staminate calyx well developed.

Calyx 3 to 6-parted.

Seeds carunculate; inflorescence usually terminal.

24. **SEBASTIANIA**.

Seeds ecarunculate; inflorescence axillary.

25. **CORYTHEA**.

Calyx shallowly lobate.

Stamens united; fruit drupaceous.....26. **HIPPOMANE**.

Stamens distinct; fruit capsular.

Column of the capsule present, the seeds usually persistent upon it after dehiscence of the capsule.

27. **SAPIUM**.

Column none, but the receptacle usually persistent after the fall of the capsule cells, becoming indurate, 2 or 3-horned.....28. **STILLINGIA**.

1. **EUPHORBIA** L. Sp. Pl. 450. 1753.

REFERENCE: Boissier in DC. Prodr. 15¹: 7-187. 1865.

Shrubs or small trees with milky juice; leaves alternate, opposite, or verticillate, on long or short petioles, usually entire; flowers involucrate, the involucre cuplike, 4 or 5-lobed, with 4 or 5 glands within, the glands often with petal-like appendages; perianth none; flowers unisexual; stamen 1 in the staminate flowers; fruit a 3-lobed capsule.

One of the largest genera of plants, represented in Mexico also by many herbaceous species. The genus is divided by some authors into several, but the present writer has preferred to consider the species as belonging to a single genus.

Euphorbia splendens Bojer, the "crown-of-thorns," a native of Madagascar, is often cultivated in Mexico, where it is known as "corona de Cristo." It has somewhat climbing stems which are covered with long stout spines; the involucre is subtended by two large red bracts.

A. Leaves alternate, only those of the inflorescence, if any, opposite.

Glands of the involucre without petal-like appendages.

Leaves 1 cm. long or shorter.....1. **E. longecornuta**.

Leaves 2 to 15 cm. long or larger.

Leaves and stems pubescent.....2. **E. fulva**.

Leaves and stems glabrous or nearly so.

Bracts bright red; leaves long-petiolate, broadest at or below the middle, often lobed.....5. **E. pulcherrima**.

Bracts green, white, or yellowish, rarely pink; leaves sessile or short-petiolate, broadest above the middle, entire.

Leaves 2 to 4.5 cm. long; floral bracts acute.....6. **E. xylopoda**.

Leaves 6 to 30 cm. long or larger; bracts suborbicular.

Leaves mostly 6 to 15 cm. long, the blade decurrent to the base of the petiole-----3. *E. calyculata*.

Leaves about 30 cm. long, on naked petioles-----4. *E. elata*.

Glands of the involucre with petal-like appendages.

Plants normally leafless-----7. *E. antisiphilitica*.

Plants leafy, at least in the inflorescence.

Appendages bright red; leaves glabrous-----8. *E. fulgens*.

Appendages white or yellowish or, if reddish, the leaves pubescent.

Involucres glabrous-----9. *E. californica*.

Involucres pubescent.

Stems naked, the inflorescence leafy-----10. *E. consoquitlae*.

Stems leafy.

Stems very thick, gnarled and crooked, woody throughout.

11. *E. misera*.

Stems long and slender, suffrutescent.

Leaves glabrous or nearly so-----12. *E. tresmariae*.

Leaves densely pilose beneath, at least when young.

13. *E. oaxacana*.

AA. Leaves all opposite or verticillate.

Leaves opposite, more or less oblique at base, usually distichous, sometimes dentate; stipules deltoid to linear.

Leaves finely toothed-----14. *E. tomentulosa*.

Leaves entire.

Leaves acute-----15. *E. fruticulosa*.

Leaves rounded or obtuse at apex.

Capsule glabrous; leaves mostly 1 cm. long or shorter.

16. *E. magdalenae*.

Capsule puberulent; leaves mostly 1 to 2 cm. long--17. *E. anthonyi*.

Leaves mostly verticillate, not oblique at base, entire; stipules glandlike.

Leaves linear-----18. *E. peganoides*.

Leaves lanceolate to orbicular.

Involucres glabrous, the appendages nearly obsolete.

19. *E. schlechtendalii*.

Involucres sparsely or densely pubescent, the appendages well developed.

Appendages of the glands linear to oblong, much longer than broad.

Appendages cleft into linear lobes-----20. *E. chiapensis*.

Appendages not cleft into linear lobes.

Bracts of the inflorescence inconspicuous, small, green.

21. *E. tricolor*.

Bracts conspicuous, large, white-----22. *E. leucocephala*.

Appendages broadly ovate to reniform, as broad as long or broader.

Bractlets of the inflorescence white or pink, conspicuous.

23. *E. lucii-smithii*.

Bractlets green, inconspicuous.

Leaves orbicular or nearly so, mostly 4 to 13 cm. wide.

24. *E. cotinifolia*.

Leaves oblong or oblanceolate to ovate, 3 cm. wide or less.

Appendages longer than the tube of the involucre--25. *E. xanti*.

Appendages shorter than the tube of the involucre.

Leaves obovate or oblanceolate, broadest above the middle, usually pubescent beneath-----26. *E. plicata*.

Leaves mostly ovate or elliptic, broadest at or below the middle, glabrous or nearly so-----27. *E. colletioides*.

1. *Euphorbia longecornuta* S. Wats. Proc. Amer. Acad. **25**: 161. 1890.

Nuevo León; type from Sierra de la Silla, near Monterrey.

Stems very thick and woody below, 20 cm. high, densely branched, minutely puberulent; leaves very numerous, oblong or elliptic, acute or acutish, very short-petiolate; glands with long-attenuate horns.

2. *Euphorbia fulva* Stapf, Kew Bull. **1907**: 294. 1907.

Euphorbia elastica Alt. & Rose, El Palo Amarillo 1. *pl.* 1-4. 1905. Not *E. elastica* Jumelle, 1905.

Euphorbiodendron fulvum Millsp. Field Mus. Bot. **2**: 305. 1909.

Jalisco and Guanajuato to Oaxaca.

Tree, 8 to 10 meters high, with smooth yellow bark; leaves 3 to 6 cm. long, 1 to 4 cm. wide, glabrous above or nearly so, densely pubescent beneath; flowering branches usually leafless, forming a 4 or 5-rayed umbel; involucre densely tomentose; capsule glabrous. Generally known as "palo amarillo"; "palo colorado," "palo de cucaracha" (Oaxaca, *Reko*).

This tree is of some importance as a source of rubber. The latex is thin and yellowish white and does not coagulate readily. When dried it is a doughlike, dark yellow substance. By tapping, about a liter of the latex may be obtained from a tree. The greatest difficulty in development of the tree as a source of rubber is found in the separation of the rubber from the resin, the amount of the former being 18 to 20 per cent and of the latter 40 per cent. The resin is said to make an excellent varnish. A good drying oil, suitable for varnish, has been extracted from the seeds.¹

3. *Euphorbia calyculata* H. B. K. Nov. Gen. & Sp. **2**: 59. 1817.

Tithymalus calyculatus Klotzsch, Abh. Akad. Berlin **1860**: 81. 1860.

Euphorbiodendron calyculatum Millsp. Field Mus. Bot. **2**: 305. 1909.

Michoacán and Guanajuato; type from Lake Pátzcuaro, Michoacán.

Shrub of small tree, glabrous throughout, the branches densely leafy; leaves oblanceolate, often very narrowly so, acute or obtuse, pale green; involucre in broad leafy umbels, the bracts suborbicular, whitish or tinged with red, apiculate. "Chupire," "chupiri," "chupireni" (Michoacán, Tarascan, "that which burns"); "tencuanete" or "tenquanete" (*Ramírez*).

The seeds are said to contain 30 per cent of oil, which has purgative properties similar to those of croton oil. The milky juice of the stems causes blisters upon the skin and painful inflammation. This species is said to yield a kind of rubber much inferior to that obtained from *E. fulva*. The plant is discussed by Hernández² in a chapter entitled "De Chupiri, seu Charapeti, aquam rubeo colore tingenti Arcano Venerei morbi." He states that the inhabitants of Michoacán employed the plant as a remedy for venereal diseases and other affections.

4. *Euphorbia elata* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 55. 1914.

Known only from the type locality, Finca Irlanda, Chiapas.

Glabrous tree, 7 meters high; leaves oblanceolate, about 8 cm. wide; obtuse or acutish; cymes naked, long-pedunculate; involucre about 9 mm. broad, the lobes lacerate; ovary glabrous.

¹ See F. Altamirano, El Palo Amarillo, pp. 1-3. *pl.* 1-4, Mexico, 1905; Altamirano, El palo amarillo como productor de caucho, Mexico, 1905; Otto Stapf, A new rubber tree; palo amarillo, Kew Bull. **1907**: 294-296. 1907.

² Thesaurus 120. 1651.

5. *Euphorbia pulcherrima* Willd.; Klotzsch, Allg. Gartenz. 2: 27. 1834.

Poinsettia pulcherrima Graham, Edinburgh New Phil. Journ. 20: 412. 1836.

Euphorbia fastuosa Sessé & Moc. Pl. Nov. Hisp. 80. 1887.

Jalisco to Oaxaca and Veracruz; cultivated in all the warmer parts of Mexico. Central America; cultivated generally in tropical regions.

Shrub or small tree, 1 to 8 meters high, the branches glabrous; leaves large, usually broadly ovate or panduriform, acuminate, long-petiolate, glabrous or sometimes pubescent beneath; bracts of the inflorescence large and leaflike, bright red; involucre yellow. "Flor de Pascua" (Michoacán, Guerrero, Veracruz, Hidalgo, etc., Central America, Cuba); "Santa Catarina," "flor de Santa Catarina" (Oaxaca); "Catalina" (Durango, Hidalgo); "pañó holandés" (Oaxaca); "cuitla-xochitl" (Nahuatl); "flor de Nochebuena," "pañó de Holanda," "flor de fuego," "Nochebuena"; "bandera" (Durango); "bebeta" (Veracruz); "pastora" (Costa Rica); "pastores" (Nicaragua); "Pascuas" (Philippines).

This plant, which is generally known as "poinsettia," is cultivated widely in tropical countries and also in hothouses in temperate regions. In the United States it is especially common in florists' shops about Christmas time. The bright red floral leaves make the plant extremely showy. It grows readily from cuttings.

The bark is said to contain a red coloring principle, and it is reported that the bracts yield a scarlet dye. In Mexico a decoction of the bracts is sometimes taken by nursing women to increase the flow of milk, but the practice is said to be dangerous. The leaves are applied as poultices for erysipelas and various cutaneous affections, and Grosourdy states that the milky juice was employed by the Indians to remove hair from the skin.

6. *Euphorbia xylopoda* Greenm. Proc. Amer. Acad. 33: 480. 1898.

Known only from the type locality, hills of Las Sedas, Oaxaca, altitude 1,800 meters.

Slender glabrous shrub, 0.5 to 1 meter high; leaves elliptic or obovate, 5 to 12 mm. wide, rounded to acutish at apex, pale beneath; involucre terminal, solitary, the floral leaves green and white.

7. *Euphorbia antisiphilitica* Zucc. Abh. Akad. Wiss. München 1: 292. 1829-30.

Euphorbia occulta Klotzsch in Seem. Bot. Voy. Herald 277. 1856.

? *Euphorbia cerifera* Alcocer, Anal. Inst. Méd. Nac. Méx. 11: 155. 1911.

Coahuila to Hidalgo and Puebla.

Stems numerous, suffrutescent, 1 meter high or less, usually pale green, minutely puberulent or glabrous, leafless, simple or branched; leaves said to be linear; involucre puberulent, in small clusters along the stems; capsule glabrous. "Candelilla" (Zacatecas, San Luis Potosí, Coahuila, Durango, Nuevo León).

A kind of wax thickly covers the branches, and factories in Nuevo León and San Luis Potosí have engaged in the extraction of this substance. The plant frequently grows with the guayule (*Parthenium argentatum* A. Gray). To obtain the wax, the branches are boiled in water, whereupon it rises to the surface. It is grayish in the crude state but after refining becomes yellow and finally white. It is used (mixed with paraffin) for candles, which burn with a bright light and agreeable odor. It is said to be excellent for ointments and for soap making, and has been found suitable for phonograph records and as an insulating agent in electrical work. The wax has been used also in shoe polish, floor polish, and lubricants, and for waterproofing. The plant has purgative properties and is much used in Mexico as a remedy for venereal diseases.

8. *Euphorbia fulgens* Karw. Allg. Gartenz. 2: 26. 1834.*Euphorbia jacquiniæflora* Hook. in Curtis's Bot. Mag. pl. 3673. 1839.*Trichosterigma fulgens* Klotzsch, Abh. Akad. Berlin 1860: 42. 1860.

Oaxaca and probably elsewhere; type from Zacatepec.

Stems suffruticose, glabrous; leaves slender-petiolate, lanceolate or narrowly lanceolate, 6 to 10 cm. long, 1 to 2.5 cm. wide, acuminate; involucre few, axillary, solitary or cymose, the lobes petal-like, bright red; capsule glabrous.

A showy plant, sometimes cultivated in hothouses.

9. *Euphorbia californica* Benth. Bot. Voy. Sulph. 49. pl. 23B. 1844.*Euphorbia hindsiana* Benth. Bot. Voy. Sulph. 51. pl. 24. 1844.*Euphorbia comoduana* Millsp. Proc. Calif. Acad. II. 2: 229. 1889.*Trichosterigma californicum* Klotzsch & Garcke, Abh. Akad. Berlin 1860: 42. 1860.*Trichosterigma hindsianum* Klotzsch & Garcke, Abh. Akad. Berlin 1860: 42. 1860.

Baja California, Sonora, and Sinaloa; type from Magdalena Bay, Baja California.

Shrub, 0.5 to 2 meters high, glabrous throughout; leaves long-petiolate, usually orbicular or nearly so, 0.8 to 3 cm. long, rounded or emarginate at base, thin or somewhat fleshy; involucre solitary or clustered, with short whitish appendages.

10. *Euphorbia consoquitlae* T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 327. 1920.

Type from Consoquitla, Veracruz.

Branched shrub with greenish branches; involucre in small leafy-bracted panicles, pubescent, long-pedunculate, the lobes about 2 mm. long, obtuse; capsules glabrous.

11. *Euphorbia misera* Benth. Bot. Voy. Sulph. 51. 1844.*Trichosterigma miserum* Klotzsch & Garcke, Abh. Akad. Berlin 1860: 42. 1860.*Euphorbia benedicta* Greene, Pittonia 1: 263. 1889.

Baja California; type from San Quentín. Southern California.

Shrub, 1 to 2 meters high, or a small tree with very thick trunk, the branches gray or brownish; leaves slender-petiolate, the blades orbicular or nearly so, mostly 1 cm. long or shorter, usually pubescent; involucre mostly terminal, solitary or cymose, with whitish appendages; capsule glabrous or pubescent.

12. *Euphorbia tresmariae* (Millsp.) Standl.*Euphorbia subcaerulea tresmariae* Millsp. U. S. Dept. Agr. N. Amer. Fauna 14: 88. 1899.

Known only from the type locality, María Madre Island, Tepic.

Slender shrub; leaves slender-petiolate, the blades mostly rhombic-ovate or ovate-oval, 0.8 to 1.5 cm. long, thin, obtuse or rounded at the apex; involucre numerous, with whitish appendages; capsule glabrous.

13. *Euphorbia oaxacana* Robins. & Greenm. Proc. Amer. Acad. 32: 37. 1896.*Euphorbia latericolor* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 377. 1913.*Aklema oaxacana* Millsp. Field Mus. Bot. 2: 416. 1916.

Chiapas, Oaxaca, and Veracruz; type from Monte Albán, Oaxaca, altitude 1,740 meters.

Slender shrub, 0.5 to 1.5 meters high, the branches pubescent at first but soon glabrate; leaves slender-petiolate, the blades oval or ovate, 2 to 4 cm. long, obtuse, pubescent on both surfaces when young; involucre clustered or cymose, lateral or terminal.

14. *Euphorbia tomentulosa* S. Wats. Proc. Amer. Acad. **22**: 476. 1887.
Chamaesyce tomentulosa Millsp. Field Mus. Bot. **2**: 412. 1916.
 Baja California and Sonora; type from Rosario, Baja California.
 Low shrub, 60 cm. high or less, with dichotomous branches; leaves short-petiolate, oval or rounded-oval, 5 to 17 mm. long, finely pubescent; involucre pubescent, clustered at the ends of the branches, the glands purplish, with white appendages; capsule glabrous.
15. *Euphorbia fruticulosa* Engelm.; Boiss. in DC. Prodr. **15**³: 38. 1865.
Chamaesyce fruticosa Millsp. Field Mus. Bot. **2**: 409. 1916..
 Known only from the type locality, Saltillo, Coahuila.
 Glabrous erect shrub, 30 cm. high or less; leaves ovate, glaucescent, 4 to 6 mm. long.
16. *Euphorbia magdalenae* Benth. Bot. Voy. Sulph. 50. 1844.
Euphorbia blepharostipula Millsp. Contr. U. S. Nat. Herb. **1**: 77. 1890.
Chamaesyce magdalenae Millsp. Field Mus. Bot. **2**: 410. 1916.
 Baja California; type from Magdalena Bay.
 Low slender shrub with glabrous or minutely puberulent branches; leaves nearly sessile, oblong or oval, often emarginate; appendages of the glands white.
17. *Euphorbia anthonyi* T. S. Brandeg. Erythea **7**: 7. 1899.
Euphorbia clarionensis T. S. Brandeg. Erythea **7**: 7. 1899.
 Baja California; type from San Benito Island.
 Stout shrub, 40 cm. high or less, nearly glabrous; leaves nearly sessile, broadly oblong or oblong-obovate, rounded at apex, very unequal at base; glands of the involucre dark brown, the appendages well developed or nearly obsolete.
18. *Euphorbia peganoides* Boiss. Cent. Euphorb. **22**. 1860.
Aklema peganoides Millsp. Field Mus. Bot. **2**: 416. 1916.
 Colima; type from some unknown locality in Mexico.
 Shrub, glabrous or nearly so; leaves 2.5 to 8 cm. long, nearly sessile; involucre glabrous or sparsely puberulent, mostly in terminal cymes, the appendages white, semiorbicular.
19. *Euphorbia schlechtendalii* Boiss. Cent. Euphorb. **18**. 1860.
Alectoroctonum ovatum Schlecht. Linnaea **19**: 252. 1847.
Euphorbia mayana Millsp. Field Mus. Bot. **1**: 304. pl. 16. 1896.
Euphorbia nelsonii Millsp. Bot. Gaz. **26**: 268. 1898.
Aklema ovata Millsp. Field Mus. Bot. **2**: 416. 1916.
 Tamaulipas to Sinaloa, Oaxaca, and Yucatán; type from Actopán and Papantla, Veracruz. Guatemala and Nicaragua.
 Shrub or small tree, 1 to 4.5 meters high, glabrous or nearly so; leaves slender-petioled, the blades variable in shape, orbicular, ovate, or broadly obovate, 1 to 5 cm. long, rounded to acutish at apex; involucre in terminal cymes, the appendages of the glands usually very narrow; capsule glabrous "Sac-chacah" (Yucatán, Maya); "mulatilla" (Oaxaca).
 The sap is said to yield a kind of rubber.
20. *Euphorbia chiapensis* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 54. 1914.
Eumecanthus chiapensis Millsp. Field Mus. Bot. **2**: 414. 1916.
 Oaxaca and Chiapas; type from Sierra de Tonalá, Chiapas.
 Slender glabrous shrub, 1 meter high; leaves slender-petiolate, ovate or lance-ovate, 3 to 6 cm. long, obtuse; involucre in terminal and axillary cymes; appendages of the glands each cleft into 2 linear lobes.

21. *Euphorbia tricolor* Greenm. Proc. Amer. Acad. 33: 479. 1898.*Aklema tricolor* Millsp. Field Mus. Bot. 2: 417. 1916.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Slender shrub, 1 meter high or less, the branches puberulent at first; leaves slender-petiolate, oblong-ovate to ovate-orbicular, 1 to 2 cm. long, sparsely pubescent beneath; involucre in small terminal cymes, the appendages oblong-ovate, entire or nearly so, white or purplish.

22. *Euphorbia leucocephala* Lotsy, Bot. Gaz. 20: 350. pl. 24. 1895.

Chiapas. Guatemala and Honduras; type from Cuilco, Guatemala.

Shrub, 1 to 2 meters high; leaves slender-petiolate, lance-oblong to oblong-oval, 3 to 6.5 cm. long, obtuse or rounded at apex, sparsely pubescent beneath; inflorescence terminal, large, of numerous cymes, the white bracts very conspicuous; appendages of the glands oblong-ovate. "Puno-puno," "flor de niño," "flor de Pascua." (Chiapas).

23. *Euphorbia lucii-smithii* Robins. & Greenm. Proc. Amer. Acad. 32: 36. 1896.

Michoacán to Chiapas; type from Rancho de Calderón, Oaxaca. Guatemala.

Shrub, 3 to 4.5 meters high, the branches tomentulose; leaves slender-petiolate, usually elliptic, 2 to 5 cm. long, obtuse or acute, pubescent beneath; inflorescence terminal, leafy, the bracts white, pink, or red; appendages oblong or ovate, white; capsule glabrous.

Specimens from Chiapas are noteworthy because of their villous stems.

24. *Euphorbia cotinifolia* L. Amoen. Acad. 3: 112. 1756.*Alectoroctonum cotinifolium* Schlecht. Linnaea 19: 252. 1845.*Alectoroctonum scotianum* Schlecht. Linnaea 19: 252. 1845.*Alectoroctonum yavalquahuatl* Schlecht. Linnaea 19: 252. 1845.*Euphorbia scotana* Boiss. in DC. Prodr. 15²: 60. 1865.*Aklema cotinifolia* Millsp. Field Mus. Bot. 2: 416. 1916.

Oaxaca and Veracruz. Central America and northern South America; type from Curaçao.

Shrub or tree, 3 to 6 meters high; leaves long-petioled, rounded-ovate or orbicular, 5 to 14 cm. long, glabrous beneath or sparsely pubescent; involucre in dense terminal cymes; appendages of the glands broader than long, crenate. "Trompillo," "piñoncillo," "mala-mujer" (Oaxaca); "mata-gallina" (Veracruz); "barrabás" (Costa Rica); "sapo" (Nicaragua); "hierba mala" (Guatemala); "lechera" (Venezuela); "manzanillo" (Colombia).

The milky sap has violent emetic-cathartic properties, and in doses of even small quantity is poisonous. It has been employed by some of the Indians of Central America for criminal poisoning. The natives of certain parts of South America are said to make use of it as an arrow poison and for poisoning fish. The juice is sometimes used to cauterize ulcers. The seeds also are said to have drastic purgative properties.

25. *Euphorbia xanti* Engelm.; Boiss. in DC. Prodr. 15²: 62. 1865.*Euphorbia gymnoclada* Engelm. Proc. Amer. Acad. 5: 171. 1861. Not *E. gymnoclada* Boiss. 1860.*Aklema xanti* Millsp. Field Mus. Bot. 2: 417. 1916.

Baja California; type from Cabo de San Lucas.

Shrub, 1 to 3 meters high, with glabrous branches; leaves petiolate, linear-lanceolate to elliptic or broadly obovate, glabrous or nearly so; involucre few, axillary or in terminal cymes; appendages white or pink, rounded-obovate. "Liga."

The leaves are remarkably variable in form, and it may be that the material represents two species; but the involucre characters are uniform. The milky

juice of the plant sometimes gets upon the lips and faces of feeding animals and causes the hair to fall out. If it comes into contact with their eyes it produces severe inflammation and even blindness.

26. *Euphorbia plicata* S. Wats. Proc. Amer. Acad. **21**: 438. 1886.

Aklema plicata Millsp. Field Mus. Bot. **2**: 417. 1916.

Chihuahua and Sonora to Jalisco; type from Hacienda San Miguel, southwestern Chihuahua.

Shrub, 1.5 to 2.5 meters high, with glabrous branches; leaves petiolate, 2.5 to 10 cm. long, obtuse; involucre in terminal cymes or axillary clusters; appendages of the glands orbicular, entire or crenulate, white; capsule glabrous. "Candelilla china" (Sinaloa).

In Sinaloa the juice is said to be used in very small doses as a purgative.

27. *Euphorbia colletioides* Benth. Bot. Voy. Sulph. 163. 1844.

Euphorbia padifolia T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 54. 1914.

Aklema colletioides Millsp. Field Mus. Bot. **2**: 416. 1916.

Sonora to Oaxaca; type from Acapulco, Guerrero.

Shrub, about a meter high, with glabrous stems; leaves slender-petiolate, 3 to 6 cm. long, obtuse or acute, pale beneath; involucre numerous, in broad terminal cymes; appendages of the glands white, semiorbicular; capsule glabrous.

It is probable that *E. ligustrina* Boiss.,¹ described from Mexico, is a synonym, but it is described as having ovate appendages.

DOUBTFUL SPECIES.

EUPHORBIA ROSSIANA Pax, Repert, Sp. Nov. Fedde **8**: 162. 1910. Type from Zapotitlán, near Tehuacán, Puebla. The leaves are not described.

2. *PEDILANTHUS* Neck. Elem. Bot. **2**: 354. 1790.

REFERENCE: Millspaugh, Field Mus. Bot. **2**: 353-371. 1913.

Shrubs with fleshy branches, the juice milky; leaves alternate, deciduous; flowers monoecious, small, surrounded by an oblique involucre; fruit a 3-lobate capsule.

The following vernacular names are reported for plants of the genus whose specific determination is doubtful: "Perico" (Durango); "aymoz" (Chiapas); "tamaulipa" (Veracruz).

Involucre hood-shaped, the appendix larger than the tube.....1. *P. finkii*.
Involucre shoe-shaped, the appendix smaller than the tube.

Lobe of the appendix entire.

Staminate pedicels pubescent, the pistillate ones glabrous.

2. *P. tithymaloides*.

Staminate and pistillate pedicels glabrous.

Leaves glabrous.....3. *P. parasiticus*.

Leaves pubescent.

Glands of the appendix 4.....4. *P. pringlei*.

Glands 2.....5. *P. campester*.

Lobe of the appendix bipartite or tripartite.

Lobe of the appendix tripartite.

Divisions of the appendix all on one plane.....6. *P. itzaeus*.

Divisions of the appendix on different planes, 2 of them superior and one inferior.....7. *P. peritropoides*.

¹ Cent. Euphorb. **22**. 1860.

Lobe of the appendix bipartite.

Colored floral bracts absent.

Peduncle centrally affixed to the involucre tube----8. *P. macrocarpus*.

Peduncle affixed posteriorly to the tube.

Appendix projecting along the margin of the fissure--9. *P. aphyllus*.

Appendix not projecting along the margin of the fissure.

Tube of the appendix glabrous inside-----10. *P. nodiflorus*.

Tube pubescent inside-----11. *P. cymbiferus*.

Colored floral bracts present, conspicuous, exceeding the inflorescence.

Involucral tube glabrous.

Glands of the appendix 2-----12. *P. articulatus*.

Glands of the appendix 4-----13. *P. bracteatus*.

Involucral tube puberulent or pilose.

Capsule with hornlike projections-----14. *P. spectabilis*.

Capsule without hornlike projections.

Involucral tube pilose-----15. *P. pavonis*.

Involucral tube puberulent.

Pistillate pedicels pubescent, the staminate ones glabrous.

Stamens glabrous-----16. *P. palmeri*.

Stamens pubescent-----17. *P. tomentellus*.

Pistillate and staminate pedicels glabrous.

Lobes of the appendix all laterally compressed.

Lobes glabrous-----18. *P. greggii*.

Lobes puberulent-----19. *P. olsson-sefferi*.

Lobes partly linear or flabellate.

Lateral and fifth lobes of the tube flabellate.

20. *P. involucratus*.

Lateral and fifth lobes linear-----21. *P. rubescens*.

1. *Pedilanthus finkii* Boiss. in DC. Prodr. 15²: 1261. 1866.

Known only from the type locality, Córdoba, Veracruz.

Shrub with hollow stems; leaves oblong, 10 to 14 cm. long, acute.

2. *Pedilanthus tithymaloides* (L.) Poit. Ann. Mus. Hist. Nat. 19: 390. 1812.

Euphorbia tithymaloides L. Sp. Pl. 453. 1753.

Tamaulipas and perhaps elsewhere. Central America, West Indies, and northern South America.

Shrub, 1 to 2 meters high; leaves ovate or oblong, 3.5 to 7.5 cm. long, acute, cuneate at base, glabrous; involucre purple; capsule 9 mm. broad. "Candelilla" (Tamaulipas); "dictamno" (Nicaragua); "bitamo" (Costa Rica); "itamo real," "gallito colorado" (Cuba); "dictamo real" (Cuba, Colombia); "pié de niño" (Guatemala); "ponopinito" (Venezuela).

The milky juice is caustic, irritant, and emetic, and is sometimes used in domestic medicine. It is employed in some regions for venereal diseases. The plant is sometimes cultivated under the names "slipper-plant," "bird-cactus," "redbird cactus," and "Jew-bush."

3. *Pedilanthus parasiticus* Klotzsch & Garcke, Monatsb. Akad. Berlin 253. 1859.

Pedilanthus ramosissimus Boiss. in DC. Prodr. 15²: 5. 1862.

Known only from the type collection, which is said to have come from Mexico.

Leaves 2.5 cm. long or shorter, rounded or subcordate at base.

4. *Pedilanthus pringlei* Robinson, Proc. Amer. Acad. 29: 322. 1894.

Oaxaca to San Luis Potosí; type from Las Palmas, San Luis Potosí. Guatemala.

Shrub, 1 to 1.5 meters high; leaves 4 to 5 cm. long, acuminate, pubescent; involucre dark purplish red; capsule 7 mm. long, long-stipitate.

5. *Pedilanthus campester* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 56. 1914.

Known only from the type locality, dry rocky plains, "Picaco-San Gerónimo," Oaxaca.

Leaves ovate, acute, about 6 cm. long and 3 cm. wide, pubescent.

6. *Pedilanthus itzaeus* Millsp. Field Mus. Bot. 1: 305. 1896.

Yucatán; type from Silam. Cuba and Santo Domingo.

Glabrous shrub, 1.5 meters high; leaves ovate, acute, 5 to 7.5 cm. long, 4 to 6 cm. wide, fleshy; involucre light pink. "Yaxahalche" (Yucatán, Maya).

Sometimes cultivated as an ornamental plant. Dondé states that laundresses employ the leaves for bleaching clothes. Two or three drops of the milky juice in water are sometimes taken as a purgative, but its use is dangerous.

7. *Pedilanthus peritropoides* Millsp. Field Mus. Bot. 2: 369. 1913.

Known only from the type locality, Coahuayula, Michoacán.

Glabrous shrub; leaves oblong to ovate, 12 to 15 cm. long, 5 to 6 cm. wide, rounded at apex.

8. *Pedilanthus macrocarpus* Benth. Bot. Voy. Sulph 49. pl. 23. f. A. 1844.

Baja California and Sonora to Colima; type from Magdalena Bay, Baja California.

Shrub, about a meter high; capsule about 2 cm. broad. "Candelilla" (Baja California).

The juice is said to yield a kind of rubber.

9. *Pedilanthus aphyllus* Boiss.; Klotzsch & Garcke, Abh. Akad. Berlin 106. 1860.

Pedilanthus calcaratus Schlecht. Linnaea 19: 155. 1847.

Veracruz and Puebla.

Shrub, a meter high or less, with whitish branches, usually leafy; involucre red, 2 cm. long. "Periquito" (Oaxaca, *Reko*; perhaps relating to some other species); "gallitos" (Puebla, *Urbina*).

10. *Pedilanthus nodiflorus* Millsp. Field Mus. Bot. 1: 305. 1896.

Yucatán; type from Silam.

Shrub, sometimes 2 meters high, widely branched, leafless; involucre red, 8 mm. long.

11. *Pedilanthus cymbiferus* Schlecht. Linnaea 19: 253. 1847.

Type from somewhere in Mexico.

Branches pubescent, leafless; involucre 12 mm. long.

12. *Pedilanthus articulatus* (Klotzsch & Garcke) Boiss. in DC. Prodr. 15²: 6. 1862.

Diadenaria articulata Klotzsch & Garcke, Abh. Akad. Berlin 108. 1860.

Known only from the type, this said to have come from Mexico.

Leaves oblong, 4 to 5 cm. long, obtuse or retuse, cuneate at base, puberulent

13. *Pedilanthus bracteatus* (Jacq.) Boiss. in DC. Prodr. 15²: 6. 1866.

Euphorbia bracteata Jacq. Pl. Hort. Schönbr. 3: 14. pl. 276. 1798.

Based on specimens said to have come from Mexico.

Shrub, 1.2 meters high; leaves 10 cm. long, glabrous, oblong, obtuse.

14. *Pedilanthus spectabilis* Robinson, Proc. Amer. Acad. 43: 23. 1907.

Zacatecas and Jalisco to Guerrero; type from Iguala Canyon, Guerrero.

Shrub, about 1 meter high, with gray branches; leaves oblong to broadly ovate, 6 to 12 cm. long, rounded or obtuse at apex, pubescent beneath; involucre whitish, nearly 2 cm. long; capsule 1 cm. in diameter.

15. *Pedilanthus pavonis* (Klotzsch & Garcke) Boiss. in DC. Prodr. 15²: 6. 1866.*Diadenaria pavonis* Klotzsch & Garcke, Abh. Akad. Berlin 108. 1860.

Colima and perhaps elsewhere, the type from some unknown Mexican locality.

Leaves 12 to 17.5 cm. long, 6.5 to 7.5 cm. wide, subsessile, acute, glabrous; involucre 1.6 to 1.8 cm. long.

This is the name which has usually been applied to Mexican species of the genus by local writers. The following vernacular names have been reported, but they probably refer to other species: "Candelillo" or "candelilla" (Jalisco, Oaxaca): "jumete" (Jalisco, Oaxaca); "cordobán," "venenillo" (Oaxaca). The plant is reputed to have purgative, emetic, emmenagogue, and antisyphilitic properties.

16. *Pedilanthus palmeri* Millsp. Field Mus. Bot. 2: 364. 1913.

Known only from Tepic, the type locality.

Leaves acute or obtuse, cuneate at base, glabrous, sometimes 15 cm. long; involucre red, 1.5 cm. long.

17. *Pedilanthus tomentellus* Robins. & Greenm. Amer. Journ. Sci. 50: 164. 1896.

Oaxaca; type from the city of Oaxaca.

Shrub, 1.5 to 2.5 meters high: leaves 4 to 5 cm. long, acute, pubescent; involucre 1.2 cm. long. "Cordobán," "cordobancillo."

18. *Pedilanthus greggii* Millsp. Field Mus. Bot. 2: 363. 1913.

Known only from the type locality, somewhere in Mexico.

Leaves oblong-lanceolate, about 9 cm. long and 3 cm. wide, acute, puberulent.

19. *Pedilanthus olsson-sefferi* Millsp. Field Mus. Bot. 2: 363. 1913.

Known only from the type locality, Tomellín, Oaxaca.

Leaves oblong to ovate, 3 to 6 cm. long, obtuse, puberulent beneath; involucre 1 cm. long.

20. *Pedilanthus involucratus* (Klotzsch & Garcke) Boiss. in DC. Prodr. 15²: 6. 1862.*Diadenaria involucrata* Klotzsch & Garcke, Abh. Akad. Berlin 107. 1860.

Described from cultivated plants which were believed to be of Mexican origin.

Shrub, about a meter high; leaves petiolate, oblong, 7.5 cm. long, puberulent beneath.

21. *Pedilanthus rubescens* T. S. Brandeg. Zoe 5: 209. 1905.

Sinaloa; type from Cullacán.

Shrub, 1 to 2 meters high, with pale branches; leaves 9 cm. long or smaller, ovate-lanceolate, nearly glabrous; floral leaves purplish red; involucre 2 cm. long.

DOUBTFUL SPECIES.**PEDILANTHUS GHIESBREGHTIANUS** Baill. Adansonia 1: 340. 1861. Described from Mexico.**PEDILANTHUS TEHUACANUS** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 55. 1914. Type from Tehuacán, Puebla. No material seen by the writer, the diagnosis too incomplete for determination of the position of the species.**3. TETRACOCCLUS** Engelm.; Parry, West Amer. Sci. 1: 13. 1885.**1. *Tetracoccus dioicus* Parry, West Amer. Sci. 1: 13. 1885.***Tetracoccus engelmanni* S. Wats. Proc. Amer. Acad. 20: 373. 1885.

Northern Baja California; type from Santo Tomás.

Much-branched glabrous shrub; leaves mostly opposite, linear, 1 to 2.5 cm. long, entire; flowers small, dioecious, apetalous, mostly solitary in the axils; capsule 4-lobate, about 6 mm. in diameter.

4. **HIERONYMA** Allem. Pl. Nov. Bras. 1848.1. **Hieronyma oblonga** (Tulasne) Muell. Arg. Linnaea 34: 66. 1865.*Stilaginella oblonga* Tulasne, Ann. Sci. Nat. III. 15: 248. 1851.*Stilaginella benthami* Tulasne, Ann. Sci. Nat. III. 15: 248. 1851.

Puebla and Oaxaca. South America; type from British Guiana.

Tree or shrub; leaves alternate, obovate-lanceolate, 15 cm. long or smaller, subcuspidate, acute at base, lepidote-pubescent when young; flowers small, dioecious, racemose; fruit drupaceous.

5. **PHYLLANTHUS** L. Sp. Pl. 981. 1753.

Shrubs or small trees, usually glabrous; leaves commonly distichous, small or large, entire, stipulate; flowers small, racemose, paniculate, or fascicled in the axils; fruit a capsule, sometimes fleshy and succulent.

Several herbaceous species occur in Mexico. *P. grandifolius* L. has been reported from Mexico upon the basis of a specimen collected by Sessé and Mociño; this, however, came from Porto Rico. Some species of the genus are cultivated for ornament. Certain Old World species are employed for poisoning fish.

Petioles half as long as the blades or longer-----1. **P. neurocarpus.**

Petioles much less than half as long as the blades.

Staminate calyx 4-parted.

Fruit fleshy; stipules dentate-----2. **P. acidus.**

Fruit dry; stipules entire-----3. **P. nobilis.**

Staminate calyx 5- (or 6-) parted.

Anthers dehiscent by vertical slits.

Leaves rounded or very obtuse at apex, broadest above the middle.

4. **P. galeottianus.**

Leaves acute or acuminate, broadest near base-----5. **P. purpusii.**

Anthers dehiscent by horizontal or oblique slits.

Flowers in elongate racemes or panicles.

Flowers racemose-----6. **P. oaxacanus.**

Flowers paniculate.

Stipules oblanceolate-----7. **P. tequilensis.**

Stipules linear-lanceolate or ovate-lanceolate-----8. **P. chiapensis.**

Leaves obovate-oblong.

Leaves ovate to ovate-oval.

Pistillate calyx lobes pinnately nerved-----9. **P. glaucescens.**

Pistillate calyx lobes 1-nerved-----10. **P. adenodiscus.**

Flowers solitary or fasciculate in the leaf axils.

Leaves acute or acuminate.

Staminate calyx 1 to 1.5 mm. long-----11. **P. acuminatus.**

Staminate calyx 2.5 mm. long-----12. **P. mocinianus.**

Leaves rounded or very obtuse at apex.

Leaves small, 5 mm. wide or narrower, broadest near apex.

13. **P. subcuneatus.**

Leaves large, 1 to 3.5 cm. wide, broadest at or below the middle.

14. **P. micrandrus.**

1. **Phyllanthus neurocarpus** Muell. Arg. Linnaea 34: 69. 1865.

Tamaulipas and San Luis Potosí; type collected between Victoria and Tula, Tamaulipas.

Leaves orbicular-ovate, 1.2 to 3 cm. long, rounded-obtuse, glabrous.

2. *Phyllanthus acidus* (L.) Skeels, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 148: 17. 1909.

Averrhoa acida L. Sp. Pl. 428. 1753.

Cicca disticha L. Mant. Pl. 1: 124. 1767.

Phyllanthus distichus Muell. Arg. in DC. Prodr. 15³: 413. 1866.

Specimens seen from Tamaulipas, Guerrero, and Oaxaca, but perhaps only cultivated in Mexico. Native of the East Indies but cultivated in most tropical regions, and sometimes naturalized.

Shrub or small tree; leaves orbicular to oval-ovate, mostly 5 to 6 cm. long, short-pointed, distichous upon slender branches, these resembling pinnate leaves; flowers pink, in lax panicles; fruit large and succulent, pale green; seed large, lobate. "Ciruela corteña" (Oaxaca); "manzana estrella" (Tamaulipas); "grosella" (Costa Rica, Nicaragua, Cuba); "cerezo común," "cerezo de la tierra" (Porto Rico); "cerezo occidental" (Cuba).

This plant is often cultivated in warm regions under the names "Otaheite gooseberry," "West Indian gooseberry," "star gooseberry," and "jimbling." The fruit is nearly 2 cm. in diameter, with firm, acid, and astringent flesh. It is usually pickled or made into preserves. The root and seeds are said to have purgative and cathartic properties. The wood is described as rather hard and fine-grained, with a specific gravity of 0.57.

3. *Phyllanthus nobilis* (L. f.) Muell. Arg. in DC. Prodr. 15³: 114. 1866.

Margaritaria nobilis L. f. Suppl. Pl. 428. 1781.

Cicca antillana Juss. Tent. Euphorb. 108. 1824.

Yucatán. West Indies and Central America.

Shrub or tree, 4 to 20 meters high; leaves short-petiolate, lance-oblong or elliptic-oblong, 5 to 12 cm. long, acute or acuminate, glabrous; fruit about 6 mm. in diameter. "Amortiguado," "avispillo," "higuerillo," "higuillo," "millo," "palo de millo," "yuquillo," "siete-cueros" (Porto Rico).

4. *Phyllanthus galeottianus* Baill. Adansonia 1: 32. 1860-61.

Phyllanthus peninsularis T. S. Brandeg. Erythea 7: 8. 1899.

Southern Baja California to Jalisco and Michoacán; type from Morella, Michoacán.

Slender shrub, a meter high or less, or almost wholly herbaceous; leaves nearly sessile, rounded-obovate, 1 to 5 cm. long; flowers clustered in the axils.

5. *Phyllanthus purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 55. 1914.

Known only from the type locality, Cerro del Boquerón, Chiapas.

Tree, 7 to 8 meters high, glabrous; leaves ovate or ovate-lanceolate, 2 to 3.5 cm. long, pale beneath.

6. *Phyllanthus oaxacanus* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 185. 1915.

Known only from the type locality, San Gerónimo, Oaxaca.

Leaves short-petiolate, broadly ovate-oval, 4 to 5 cm. long, obtuse, glabrous.

7. *Phyllanthus tequilensis* Robins. & Greenm. Proc. Amer. Acad. 29: 392. 1894.

Known only from the type locality, Tequila, Jalisco.

Leaves ovate-elliptic, 4.5 to 10 cm. long, rounded to acute at apex, pale beneath; capsule 3.5 cm. broad.

8. *Phyllanthus chiapensis* Sprague, Kew Bull. 1909: 264. 1909.

Known only from the type locality, on dry hills, Cacate, Chiapas.

Shrub, 2 meters high; leaves 3.5 to 5 cm. long, 1.5 to 2.3 cm. wide, rounded at apex, subcuneate at base; flowers reddish; capsule 3 cm. broad or larger.

Reported by Hemsley as *P. laxiflorus* Benth.

9. *Phyllanthus glaucescens* H. B. K. Nov. Gen. & Sp. 2: 115. 1817.

Yucatán Peninsula; type from Campeche. Guatemala.

Shrub; leaves ovate-oval to orbicular-elliptic, 9 to 22 cm. long, acute or short-pointed, glabrous, pale beneath; capsule more than 2 cm. in diameter. "Xpbix-ton" (Yucatán).

10. *Phyllanthus adenodiscus* Muell. Arg. Linnaea 32: 23. 1863.

Tamaulipas, San Luis Potosí, and Veracruz; type from Papantla, Veracruz.

Shrub, 1.5 to 3 meters high; leaves rounded-ovate to oblong-elliptic, 8 to 15 cm. long, acuminate, glabrous, pale beneath; capsule 4 cm. long or larger.

11. *Phyllanthus acuminatus* Vahl, Symb. Bot. 2: 95. 1791.

? *Phyllanthus sessei* Briq. Ann. Cons. Jard. Genève 4: 224. 1900.

Baja California to San Luis Potosí, Yucatán, and Oaxaca. West Indies, Central America, and South America.

Shrub or tree, 3 to 6 meters high, with slender green angulate branches; leaves ovate to oval, mostly 3 to 4 cm. long, green; capsule about 4 mm. long. "Cirue-lillo" (Tabasco); "chilillo," "gallina" (Costa Rica).

12. *Phyllanthus mocinianus* Baill. Adansonia 1: 35. 1860.

Described from specimens believed to have come from Mexico.

Glabrous; leaves ovate or cordate-ovate, 1.5 to 3 cm. long.

13. *Phyllanthus subcuneatus* Greenm. Proc. Amer. Acad. 33: 478. 1898.

Puebla; type from limestone ledges near Tehuacán.

Slender shrub, 1 meter high or less; leaves cuneate-obovate, 4 to 7 mm. long, glabrous; capsule 4 mm. broad.

14. *Phyllanthus micrandrus* Muell. Arg. Linnaea 32: 27. 1863.

Phyllanthus pringlei S. Wats. Proc. Amer. Acad. 26: 147. 1891.

Sinaloa to San Luis Potosí and Guerrero. Guatemala; type from Venezuela.

Slender shrub or tree, 2 to 6 meters high; leaves orbicular or rounded-ovate, 1 to 3.5 cm. long, thin, glabrous; flowers greenish white.

6. **ASTROCASIA** Robins. & Millsp. Bot. Jahrb. Engler 36: Beibl. 80: 19. 1905.

1. *Astrocasia phyllanthoides* Robins. & Millsp. Bot. Jahrb. Engler 36: Beibl. 80: 20. 1905.

Yucatán; type from Itzimna.

Shrub, 1 to 2 meters high; leaves deciduous, slender-petiolate, orbicular to ovate, 4 to 13 cm. long, rounded or obtuse at apex, entire, pale beneath; flowers dioecious, fasciculate on short lateral spurs, borne on long filiform pedicels; capsule 8 mm. long. "Xkahyuc," "xcaba-xpixtolon" (Maya).

This has been reported from Yucatán as *Phyllanthus nutans* Swartz.

7. **CROTON** L. Sp. Pl. 1004. 1753.

Trees or shrubs; leaves alternate, petiolate, stipulate, entire or dentate, rarely lobate; pubescence of stellate hairs or of scales; flowers small, monoecious or dioecious, with or without petals, racemose; fruit a more or less 3-lobate capsule.

Several herbaceous species are found in Mexico. *Croton eluteria* (L.) Swartz, of the Bahamas, produces the cascarilla bark of commerce, which is employed in medicine as a tonic.

Petals well developed in both staminate and pistillate flowers. Pubescence lepidote.

Leaves pinnately nerved.....1. *C. glabellus*.

Leaves 3 or 5-nerved at base.

Ovary and fruit smooth, densely lepidote.....2. *C. niveus*.

Ovary and fruit tuberculate, hispid.....3. *C. reflexifolius*.

Petals rudimentary or absent in one or both kinds of flowers.

Petals rudimentary or absent in both kinds of flowers.

Flowers monoecious-----4. *C. tenuilobus*.

Flowers dioecious.

Staminate racemes long-pedunculate; capsule densely lepidote with short-rayed scales -----5. *C. neomexicanus*.

Staminate racemes sessile or short-pedunculate; capsule covered with long-rayed scales.

Staminate racemes very short, few-flowered; leaves long-petiolate.

6. *C. californicus*.

Staminate racemes elongate, many-flowered; leaves short-petiolate or subsessile -----7. *C. dioicus*.

Petals well developed in the staminate flowers, rudimentary or obsolete in the pistillate ones.

Racemes interrupted, the pistillate portion separated from the staminate by a long sterile portion. Leaves dentate.

Leaves obovate-oblong, acute at base-----8. *C. meissneri*.

Leaves broadly ovate, rounded or subcordate at base----9. *C. liebmanni*.

Racemes continuous.

Lowest bracts of the racemes subtending both staminate and pistillate flowers.

Glands none on the leaves.

Leaves acuminate, denticulate-----10. *C. stipulaceus*.

Leaves obtuse or abruptly short-pointed at apex, entire.

11. *C. suberosus*.

Glands present on the lower surface of the leaf near the base.

Styles divided to the base, the branches laciniate or bifid.

Leaves obscurely 5-nerved or often pinnate-nerved, rhombic-lanceolate -----12. *C. grewiaefolius*.

Leaves conspicuously palmate-nerved, broadly ovate.

13. *C. gossypifolius*.

Styles divided to the base, the branches, however, entire.

Stipules subulate-----14. *C. panamensis*.

Stipules ovate or lance-ovate-----15. *C. draco*.

Lowest bracts subtending only pistillate flowers.

Pubescence of scalelike hairs.

Leaves densely lepidote on the upper surface---16. *C. amphileucus*.

Leaves glabrate on the upper surface.

Leaves obtuse or rounded at apex-----17. *C. hypoleucus*.

Leaves long-acuminate-----18. *C. watsonii*.

Pubescence of stellate hairs.

A. Stipules glandular-laciniate or glandular-denticulate.

Pubescence of closely appressed, depressed hairs.

Leaves glandular-ciliate-----19. *C. jucundus*.

Leaves not glandular-ciliate.

Styles once dichotomous-----20. *C. adpersus*.

Styles 2 or more times dichotomous-----21. *C. soliman*.

Pubescence of loose spreading hairs.

Styles once dichotomous, the branches entire.

Stipules pinnately lobate-----22. *C. incanus*.

Stipules palmately lobate-----23. *C. suaveolens*.

Styles 2 or more times dichotomous or, if once dichotomous, the branches not entire.

Leaves usually glandular-ciliate, entire or nearly so.

Stipules very short and inconspicuous; ciliation of the leaves inconspicuous-----24. *C. humilis*.

Stipules long and conspicuous; ciliation of the leaves very conspicuous.

Stamens about 40; divisions of the stipules long and slender; style branches entire---25. *C. ciliato-glandulosus*.

Stamens about 30; divisions of the stipules short and stout; style branches lacinate-----26. *C. pulcher*.

Leaves not ciliate, dentate.

Bracts lacinate-----27. *C. ovalifolius*.

Bracts entire.

Leaves denticulate-----28. *C. stylosus*.

Leaves coarsely duplicate-dentate---29. *C. macrodontus*.

AA. Stipules entire.

Style branches 2 or more times dichotomous, often lacinate. Leaves coarsely dentate -----30. *C. repens*.

Style branches once dichotomous.

Stamens 20 to 50. Leaves with glands at base.

Stamens 35 to 50; leaves serrulate-----31. *C. xalapensis*.

Stamens 20 to 30; leaves entire-----32. *C. subfragilis*.

Stamens 6 to 20.

Leaves with large glands on the lower surface at the base.

33. *C. mexicanus*.

Leaves without glands, or these very obscure.

Pistillate racemes very dense and congested in fruit, many-flowered; pistillate flowers sessile or nearly so.

Leaves entire, long-petiolate-----34. *C. cladotrichus*.

Leaves repand-dentate-----35. *C. francoanus*.

Pistillate racemes lax, usually few-flowered, if dense the pistillate flowers long-pedicellate.

Leaves rounded or very obtuse at apex.

Leaves mostly palmate-nerved at base; pistillate sepals accrescent-----36. *C. corymbulosus*.

Leaves pinnate-nerved; sepals not accrescent.

Base of the leaf broadly rounded or subcordate; leaves mostly oval-----37. *C. ehrenbergii*.

Base of the leaf cuneate or obtuse; leaves mostly oblong or ovate-oblong-----38. *C. torreyanus*.

Leaves, at least most of them, acute or acuminate.

Stipules large, semireniform, foliaceous, persistent.

39. *C. alamosanus*.

Stipules small, linear or subulate, early deciduous.

Leaves pinnate-nerved, the basal nerves not conspicuous.

Leaves perfectly glabrous on the upper surface.

40. *C. cortesianus*.

Leaves pubescent on the upper surface.

Leaves thin, green on the upper surface, soon glabrate-----41. *C. miradorensis*.

Leaves thin, pale and densely and very finely stellate-pubescent on the upper surface.

42. *C. rhamnifolius*.

Leaves palmate-nerved, the basal nerves (usually 5) very conspicuous.

Lobes of the capsule compressed and acutish above.

43. *C. flavescens*.

Lobes of the capsule broadly rounded.

Upper leaf surface pale, nearly or quite as densely pubescent as the lower.

Leaves cordate at base, very short-petiolate; large shrub-----44. *C. magdalenae*.

Leaves not cordate at base, long-petiolate; very low shrub-----36. *C. corymbulosus*.

Upper leaf surface bright green, usually glabrate. Leaves glabrous or nearly so beneath at maturity.

Leaves very scabrous on the upper surface, the hairs with enlarged bases.

45. *C. calvescens*.

Leaves not scabrous, the hairs without enlarged bases-----46. *C. sonorae*.

Leaves persistently and copiously pubescent beneath.

Pubescence of the lower leaf surface fine and appressed-----47. *C. fragilis*.

Pubescence of the lower leaf surface coarse and spreading.

Capsule finely stellate-puberulent.

48. *C. fruticulosus*.

Capsule coarsely stellate-pillose.

49. *C. morifolius*.

1. *Croton glabellus* L. Amoen. Acad. 5: 409. 1760.

Croton schiedeianus Schlecht. Linnaea 19: 243. 1847.

Veracruz and Tabasco. Central America, West Indies, and northern South America.

Shrub or small tree, the pubescence of small brown scales; leaves oblong-elliptic or oblong-ovate, 5 to 20 cm. long, short-petiolate, abruptly short-acuminate, entire, glabrate; flowers in long slender racemes; capsule coarsely tuberculate. "Copalchí" (Tabasco, Costa Rica); "caobilla" (Veracruz Ramírez); "quizarrá copalchí" (Costa Rica).

The wood is said to be strong, fine-grained, and durable.

2. *Croton niveus* Jacq. Stirp. Amer. 255. pl. 162. f. 2. 1763.

Croton pseudo-china Schlecht. Linnaea 5: 84. 1830.

Croton arboreus Millsp. Field Mus. Bot. 1: 303. pl. 15. 1896.

Colima to Tamaulipas, Yucatán, and Chiapas. Central America, northern South America, and West Indies; type from Cartagena, Colombia.

Shrub or tree (said sometimes to attain a height of 18 meters), the pubescence of silvery scales; leaves ovate or broadly ovate, 5 to 12 cm. long or larger, acute or acuminate, usually somewhat cordate at base, entire; flowers in long or short racemes; capsule about 9 mm. long. "Quina" (Oaxaca); "quina blanca" (Veracruz); "copalchí" (Veracruz, Oaxaca, Costa Rica, El

Salvador, Nicaragua); "vara blanca" (Tamaulipas); "salvia de la playa" (Colombia).

The bark is said to be similar in odor and flavor to cascarilla bark, for which it is sometimes substituted. It contains a bitter principle, copalchin, which is found also in other species of *Croton*. In commerce the bark is known as "copalchi" and "quina blanca," and it is employed as a tonic, especially in intermittent fevers. It was formerly exported to Europe for medicinal purposes, but is no longer used abroad. The leaves are closely covered with silvery or brownish hairs, but they are sometimes also short-pilose.

3. *Croton reflexifolius* H. B. K. Nov. Gen. & Sp. 2: 68. 1817.

Croton sylvaticus Schlecht. Linnaea 19: 240. 1847. Not *C. sylvaticus* Hochst. 1845.

Guerrero to Tamaulipas and Veracruz; type from Acapulco. Central America; reported from Colombia.

Shrub or small tree; leaves ovate or ovate-cordate, 5 to 10 cm. long, acuminate or abruptly acuminate, entire, finely silvery-lepidote, at least beneath, but often glabrate in age; flowers in long slender racemes; capsule about 12 mm. long, conspicuously muricate. "Copalchi" (various parts of Mexico, Ramírez, Costa Rica); "Solimán prieto" (San Luis Potosí, Seler).

4. *Croton tenuilobus* S. Wats. Proc. Amer. Acad. 21: 439. 1886.

Southwestern Chihuahua to Tepic; type from Hacienda San José, Chihuahua.

Slender shrub; leaves linear-lanceolate or linear-oblong, 2 to 6 cm. long, green above, pale beneath, finely stellate-pubescent; flowers short-racemose.

5. *Croton neomexicanus* Muell. Arg. Linnaea 34: 141. 1865.

Chihuahua to Nuevo León. Western Texas and southern New Mexico; type from western Texas.

Plants suffrutescent, 0.3 to 1.5 meters high, covered with close silvery radiate scales; leaves lanceolate to elliptic, 1 to 4 cm. long, petiolate, obtuse or rounded at apex, entire, usually green on the upper surface; staminate racemes slender, many-flowered, 4 to 8 cm. long.

Root bark said to be used as a purgative.

6. *Croton californicus* Muell. Arg. in DC. Prodr. 15³: 691. 1866.

Baja California, Sonora, and Sinaloa. Southern Arizona and California; type from San Francisco, California.

Slender shrub, sometimes 1.5 meters high, or often herbaceous, the pubescence mostly of appressed radiate scales; leaves slender-petiolate, oblong to elliptic, 2.5 to 5 cm. long, obtuse, often green on the upper surface.

7. *Croton dioicus* Cav. Icon. Pl. 1: 4. pl. 6. 1791.

Croton elaeagnifolius Vahl; Geisel. Croton. Monogr. 9. 1807.

Croton gracilis H. B. K. Nov. Gen. & Sp. 2: 69. 1817.

Astogyne crotonoides Benth. Pl. Hartw. 14, 1839.

Nuevo León to Durango, Oaxaca, and Veracruz.

Plants low, shrubby or frequently herbaceous, densely covered with appressed silvery scales; leaves short-petiolate, oval to oblong, 1.5 to 4.5 cm. long, obtuse, entire; staminate flowers in short dense spikes. "Rosval" (Nuevo León); "hierba del gato," "rubaldo," "robaldo" (Coahuila); "encinilla" (Durango, Patoni); "hierba del zorrillo" (Valley of Mexico, Ramírez, Oaxaca, Reko); "yepaxihuitl" (Ramírez); "epaxihuitl" (Nahuatl, "skunk-herb").

The seeds and root are reported to have drastic purgative properties. The plant is said to be used also for hysteria, and in baths for rheumatism.

8. *Croton meissneri* Muell. Arg. in DC. Prodr. 15²: 665. 1866.

Known only from the type locality, near Orizaba, Veracruz.

Stems low, perhaps herbaceous; leaves oblong-obovate, 1.5 to 2.5 cm. long, obtuse, coarsely serrate, stellate-pubescent.

9. *Croton liebmanni* Muell. Arg. in DC. Prodr. 15²: 665. 1866.

Known only from the type locality, near Santiago, Amatlán, Oaxaca.

Leaves long-petiolate, 4 to 8 cm. long, long-acuminate, biglandular at base; racemes slender, 5 to 6 mm. long; capsule 6 mm. long.

10. *Croton stipulaceus* H. B. K. Nov. Gen. & Sp. 2: 85. 1817.

Valley of Mexico to Oaxaca; type collected near the City of Mexico.

Leaves long-petiolate, cordate-ovate, 6 to 10 cm. long, acuminate, denticulate, densely stellate-tomentose; racemes dense, many-flowered; capsule 9 mm. long.

"Sangre de drago" (*Humboldt*).

The species is unknown to the writer.

11. *Croton suberosus* H. B. K. Nov. Gen. & Sp. 2: 86. 1817.

Known only from the type locality, Acapulco, Guerrero.

Branches with corky fissured bark; leaves short-petiolate, 3 to 8 cm. long and nearly as broad, stellate-tomentose, shallowly cordate at base; racemes dense, 3 to 3.5 cm. long.

Known to the writer only from the description, which is strongly suggestive of *C. cladotrichus* Muell. Arg.

12. *Croton grewiaefolius* Muell. Arg. Linnaea 34: 87. 1865.

Known only from the type locality, near the city of Oaxaca.

Leaves long-petiolate, rhombic-lanceolate, 5 to 8 cm. long, acuminate, acute at base, dentate, stellate-pubescent; racemes elongate.

13. *Croton gossypifolius* Vahl, Symb. Bot. 2: 98. 1791.

Reported from Oaxaca. Central America, northern South America, and West Indies; type from Trinidad.

Shrub or tree, sometimes 15 meters high, copiously stellate-tomentose; leaves cordate-ovate, often 30 cm. long, acute or acuminate; flowers in very long stout racemes. "Targuá" (Costa Rica); "sangre de drago" (Venezuela).

It is rather doubtful whether this species actually occurs in Mexico.

14. *Croton panamensis* (Klotzsch) Muell. Arg. in DC. Prodr. 15²: 546. 1866.

Cyclostigma panamense Klotzsch in Seem. Bot. Voy. Herald 105. 1853.

Veracruz, Puebla, Oaxaca, and Chiapas. Central America; type from Volcán de Chiriquí, Panama.

Tree, sometimes 35 meters high, with a trunk 60 cm. in diameter, the bark grayish white, nearly smooth, the crown flat; leaves long-petiolate, broadly ovate-cordate, usually 10 to 20 cm. long, acute or acuminate, densely stellate-pubescent, denticulate; racemes equaling or longer than the leaves. "Sangre de drago" (Chiapas); "targuá" (Costa Rica); "sangrillo" (Panama).

15. *Croton draco* Schlecht. Linnaea 6: 360. 1831.

San Luis Potosí and Veracruz to Chiapas; type from Papantla, Veracruz.

Tree, 4.5 to 15 meters high, copiously stellate-tomentose; leaves long-petiolate, broadly ovate-cordate, 10 to 25 cm. long, acuminate, entire or denticulate; racemes usually very long. "Sangre de drago" (Veracruz, Chiapas, Oaxaca, Guatemala); "tlachinole," "sangregado" (Veracruz); "ezquahuitl," "árbol de sangre" (*Nueva Farmacopea Mexicana*); "cuate," "palo muela" (Sinaloa).

Reputed to have astringent properties, and said to be used locally as a remedy for fevers and for hardening the gums. The blood-red sap is bitter, and gives a red dye; it is employed as a remedy for hoof diseases in burros and horses.

16. *Croton amphileucus* Briq. Ann. Cons. Jard. Genève 4: 227. 1900.

Known only from the type locality, near Real del Monte, Hidalgo, altitude 2,400 meters.

Shrub; leaves elliptic, 10 to 13 mm. long, obtuse, short-petiolate, densely lepidote on both surfaces, entire; racemes 5 to 10 mm. long.

Known to the writer only from the description.

17. *Croton hypoleucus* Schlecht. Linnaea 19: 246. 1847.

Croton shepherdiaefolius Schauer, Linnaea 20: 729. 1847.

Coahuila (?) to Hidalgo; type collected between Zimapán and San José del Oro, Hidalgo.

Shrub; leaves oblong-ovate, 3 to 4.5 cm. long, petiolate, entire, bright green on the upper surface, very densely silvery-lepidote beneath.

18. *Croton watsonii* Standl.

Croton elaeagnoides S. Wats. Proc. Amer. Acad. 26: 147. 1891. Not *C. elaeagnoides* Balf. 1884.

Known only from the type locality, Las Palmas, San Luis Potosí.

Shrub or small tree, 3 to 4.5 meters high; leaves ovate or lanceolate, 1.5 to 5 cm. long, entire, bright green on the upper surface, densely silvery-lepidote beneath; racemes slender, 10 to 15 cm. long; capsule depressed, 5 mm. broad.

19. *Croton jucundus* T. S. Brandeg. Zoe 5: 205. 1905.

Known only from the type locality, Yerba Buena, near Culiacán, Sinaloa.

Plant soon glabrate, green, very sparsely stellate-pubescent; leaves long-petiolate, ovate or lanceolate, 6 to 10 cm. long, attenuate, entire, ciliate with long slender gland-tipped hairs.

Perhaps only a form of *C. ciliato-glandulosus*.

20. *Croton adpersus* Benth. Pl. Hartw. 51. 1840.

Type from Morelia, Michoacán; reported from Oaxaca, Veracruz, and San Luis Potosí.

Leaves petiolate, ovate or ovate-lanceolate, 3.5 to 6 cm. long, acuminate, serrulate, stellate-puberulent. "Solimán" (*Seler*).

21. *Croton soliman* Schlecht. & Cham. Linnaea 6: 361. 1831.

Veracruz, Tabasco, and Oaxaca; type from Papantla, Veracruz.

Slender green shrub; leaves long-petiolate, ovate or rhombic, 5 to 9 cm. long, cuspidate-acuminate, appressed-stellate beneath, obscurely crenate; flowers whitish. "Solimán" (Veracruz).

22. *Croton incanus* H. B. K. Nov. Gen. & Sp. 2: 73. 1817.

San Luis Potosí to Hidalgo; type from Los Organos, Actopán.

Shrub, 2 meters high, densely stellate-pubescent; leaves ovate, 1.5 to 3.5 cm. long, obtuse, entire; racemes 2 to 3 cm. long.

Known to the writer only from the description.

23. *Croton suaveolens* Torr. U. S. & Mex. Bound. Bot. 194. 1859.

? *Croton virletianus* Muell. Arg. Linnaea 34: 133. 1865-66.

Chihuahua, Coahuila, and San Luis Potosí. Western Texas; type collected along the Rio Grande.

Low, densely branched shrub, densely stellate-tomentose, the pubescence usually yellowish; leaves broadly rhombic-ovate, 1 to 3.5 cm. long, obtuse or acutish, thick, entire; racemes short and stout. "Encinillo" (Chihuahua).

Plant fragrant, used in baths in convalescence from fevers.

24. *Croton humilis* L. Syst. Nat. ed. 2. 1276. 1759.

Croton berlandieri Torr. U. S. & Mex. Bound. Bot. 193. 1859.

Nuevo León to Yucatán. Southern Florida and West Indies.

Slender shrub, a meter high or less, stellate-pubescent (usually sparsely so) and viscid; leaves rounded-ovate to lanceolate, 2 to 6 cm. long, rounded or cordate at base, usually acute at apex, nearly entire; racemes 3 to 5 cm. long; capsule 4 to 5 mm. long. "Ycaban," "icaban" (Yucatán).

This has been reported from Yucatán as *C. albidus* Muell. Arg. It may be that two species are represented by the material referred here, but a satisfactory basis of division is not apparent.

25. *Croton ciliato-glandulosus* Orteg. Hort. Matr. Dec. 51. 1797.

Croton penicillatus Vent. Choix Pl. Cels. 12. pl. 12. 1803.

Baja California and Sonora to Tamaulipas, Veracruz, and Chiapas. Guatemala and Honduras; Cuba.

Shrub, 1 to 2 meters high, densely stellate-tomentose; leaves long-petiolate, broadly ovate-cordate, 3 to 12 cm. long, acute or acuminate; capsule about 7 mm. long. "Solimán" (Tamaulipas, etc.); "pícosa" (Querétaro); "canelilla" or "canelillo" (Oaxaca); "xunaxilase," "cuanaxonaxi," "xunalixase," "xonaxe" (Oaxaca); "enchiladora" (Oaxaca, Veracruz); "Solimán blanco" (Seler); "Dominguillo," "hierba de la cruz" (Altamirano); "palillo" (Flores); "chirca," "ciega-vista" (Guatemala, Honduras).

The plant has a strong aromatic odor. It is much used locally as a remedy for fevers, and is said to have purgative properties. It also is reputed to increase the flow of milk in goats which browse upon it. Seler states that (in Chiapas ?) it is the food plant of a red caterpillar which is eaten by the natives. The hairs of the leaves adhere to the hands and injure the eyes when introduced into the latter.

26. *Croton pulcher* Muell. Arg. in DC. Prodr. 15²: 644. 1866.

Puebla; type from Tehuacán.

Low shrub with stout branches, densely stellate-tomentose; leaves short-petiolate, broadly ovate, 4 to 5.5 cm. long, acutish.

Perhaps only a form of *C. ciliato-glandulosus*.

27. *Croton ovalifolius* West, Bidr. Beskr. St. Croix 307. 1793.

Oaxaca. West Indies and South America.

Shrub, green, sparsely stellate-pilose; leaves long-petiolate, oblong to elliptic or obovate, 1 to 3 cm. long, rounded or obtuse at apex, finely denticulate; sepals of the pistillate flowers large, accrescent, glandular-ciliate.

28. *Croton stylosus* Muell. Arg. Linnaea 34: 128. 1865.

Type from Mexico, the locality not known.

Leaves short-petiolate, rhombic-ovate, 6 to 10 cm. long, cuspidate-acuminate.

29. *Croton macrodontus* Muell. Arg. Linnaea 34: 128. 1865.

Veracruz and Oaxaca.

Green, sparsely stellate-pubescent shrub; leaves long-petiolate, ovate, 5 to 13 cm. long, long-acuminate, thin.

30. *Croton repens* Schlecht. Linnaea 19: 237. 1847.

Sinaloa to Oaxaca and Veracruz; type from Hacienda de la Laguna, Veracruz. Central America.

Slender shrub, often decumbent, green, stellate-pubescent; leaves usually short-petiolate, suborbicular to ovate, 2 to 7 cm. long, rounded to acute at apex, often shallowly lobate, crenate-dentate. "Tostoncillo" (El Salvador); "chacotote" (Guatemala Honduras).

The root is used locally for stomach affections.

31. *Croton xalapensis* H. B. K. Nov. Gen. & Sp. 2: 85. 1817.

Veracruz to Chiapas; type from Jalapa, Veracruz. Central America.

Shrub or small tree, 2 to 9 meters high, copiously stellate-tomentose, at least when young; leaves long-petiolate, cordate-ovate, 8 to 20 cm. long or larger, acuminate or cuspidate-acuminate; racemes very long and slender. "Targuá," "terré," "targuacillo" (Costa Rica); "chirca" (Guatemala, Honduras).

The wood is white and weak. The gum which exudes from the trunk is used for cleaning the teeth.

32. *Croton subfragilis* Muell. Arg. Linnaea 34: 111. 1865.

Known only from the type locality, between Tuxtla and Chiapas.

Leaves oblong-ovate, 10 to 15 cm. long, cuspidate-acuminate, stellate-pubescent with ferruginous hairs. "Copalchí."

33. *Croton mexicanus* Muell. Arg. Linnaea 34: 113. 1865.

Described from Mexico, the locality not known.

Leaves oblong-ovate, 12 cm. long or shorter, stellate-pubescent with depressed hairs or glabrate, acuminate, entire or denticulate.

34. *Croton cladotrichus* Muell. Arg. Linnaea 34: 124. 1865.

Croton purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 184. 1915.

Michoacán to Oaxaca.

Shrub, copiously stellate-pubescent or tomentose, the branches covered with thick corky bark; leaves mostly suborbicular, 6 to 15 cm. long, usually abruptly short-pointed, more or less cordate at base; spikes usually shorter than the leaves, very thick and dense. "Gordolobo" (Michoacán, Guerrero).

35. *Croton francoanus* Muell. Arg. Linnaea 34: 124. 1865.

Known only from the type locality, near Oaxaca.

Leaves nearly sessile, broadly triangular-ovate, 5 to 10 cm. long, acuminate, cordate at base, whitish-tomentose beneath.

36. *Croton corymbulosus* Engelm. in Wheeler, Rep. U. S. Surv. 100th Merid. 5: 242. 1878.

Chihuahua, Coahuila, and Sonora. Western Texas to southern Arizona; type from Camp Bowie, Arizona.

Plants low, woody at base, the stems clustered, densely silvery-pubescent throughout; leaves long-petiolate, orbicular to oblong, 2 to 4.5 cm. long; racemes 2 to 4 cm. long. "Encinilla" (Texas).

Tea made from the leaves is used in domestic medicine in western Texas, because of its sudorific and tonic properties.

37. *Croton ehrenbergii* Schlecht. Linnaea 19: 248. 1847.

Hidalgo.

Slender shrub, 0.6 to 1.2 meters high; leaves short-petiolate, 1 to 3 cm. long, entire, densely silvery-pubescent beneath; racemes short, few-flowered.

38. *Croton torreyanus* Muell. Arg. in DC. Prodr. 15²: 579. 1866.

Coahuila and Nuevo León to Veracruz. Western Texas (type locality).

Shrub, 1 to 2 meters high, stellate-tomentose; leaves short-petiolate, 3 to 6 cm. long, entire; racemes 1 to 4 cm. long. "Salvia" (Tamaulipas).

39. *Croton alamosanus* Rose, Contr. U. S. Nat. Herb. 1: 111. 1891.

Sonora to Oaxaca; type from Alamos, Sonora.

Shrub, 1 to 4 meters high; leaves nearly sessile, ovate or oblong-ovate, 5 to 14 cm. long, cordate at base, long-acuminate, green, thinly stellate-pubescent, entire or nearly so. "Ocotillo" (Sinaloa).

The resin is employed as a remedy for toothache.

40. *Croton cortesianus* H. B. K. Nov. Gen. & Sp. 2: 83. 1817.*Croton trichocarpus* Torr. U. S. & Mex. Bound. Bot. 196. 1859.

Sinaloa to Tamaulipas, Campeche, and Chiapas; type collected near Campeche. Western Texas.

Shrub, 1 to 3 meters high; leaves mostly oblong-ovate, 3 to 10 cm. long, short-petiolate, acute or acuminate, rounded or subcordate at base, stellate-pubescent beneath, bright green above; racemes often very long. "Palillo" (Tamaulipas, San Luis Potosí); "pozual," "puzual" (San Luis Potosí *Seler*); "ek-balam" (Maya, *Seler*); "pinolillo" (Tamaulipas).

The juice is applied as a caustic for the treatment of skin diseases.

41. *Croton miradorensis* Muell. Arg. in DC. Prodr. 15¹: 627. 1866.

Veracruz; type from Mirador.

Shrub; leaves ovate or oblong-ovate, 6 to 12 cm. long, acute or acuminate, rounded or subcordate at base, stellate-tomentose beneath.

42. *Croton rhamnifolius* H. B. K. Nov. Gen. & Sp. 2: 75. 1817.

Yucatán to Oaxaca. West Indies and South America; type from Venezuela.

Shrub, 1 to 2 meters high; leaves oblong to ovate, 4 to 7 cm. long, short-petiolate, acute, densely stellate-tomentose beneath, entire, or near so. "Ecbalan," "xa-balam" (Yucatán).

This has been reported from Yucatán as *C. cortesianus*.**43. *Croton flavescens* Greenm. Proc. Amer. Acad. 39: 81. 1903.**

Southwestern Chihuahua to Guerrero; type from Monte León Station, Michoacán, altitude 1,500 meters.

Shrub, 1.5 to 2.5 meters high; leaves broadly ovate-cordate, 6 to 11 cm. long, usually long-acuminate, entire, densely stellate-pubescent beneath.

44. *Croton magdalenae* Millsp. Proc. Calif. Acad. II. 2: 220. 1889.

Baja California; type from Magdalena Island.

Shrub, 1 to 3.5 meters high, very densely and finely stellate-tomentose throughout; leaves broadly cordate-ovate or rounded-cordate, 4 to 10 cm. long, acutish, short-petiolate, entire; racemes longer than the leaves.

45. *Croton calvescens* S. Wats. Proc. Amer. Acad. 26: 147. 1891.

Jalisco and Michoacán; type from Chapala, Jalisco.

Shrub, green, pubescent at first but soon glabrate; leaves ovate or broadly ovate, acute or acuminate, rounded at base, 5 to 8 cm. long, serrulate; flowers in very long slender spikes.

46. *Croton sonorae* Torr. U. S. & Mex. Bound. Bot. 194. 1859.*Croton pringlei* S. Wats. Proc. Amer. Acad. 12: 373. 1885.*Croton gonzalezii* Greenm. Proc. Amer. Acad. 39: 81. 1903.

Sonora to Oaxaca; type from Sonora.

Slender shrub, 1 to 2 meters high, green and glabrate; leaves ovate or broadly ovate, 2 to 5 cm. long, long-acuminate, rounded at base, short-petiolate; racemes very slender and lax.

47. *Croton fragilis* H. B. K. Nov. Gen. & Sp. 2: 75. 1817.*Croton sericeus* Schlecht. Linnaea 5: 85. 1830. Not *C. sericeus* Lam. 1786.

Sinaloa to Veracruz, Yucatán, and Chiapas. Northern South America; type from Cumaná, Venezuela.

Slender shrub, 1 to 4.5 meters high; leaves long-petiolate, lanceolate to broadly cordate-ovate, acute to long-acuminate, bright green above, whitish beneath; racemes long and slender, the flowers brownish yellow. "Taanché" (Yucatán).

The material referred here is very variable, and probably represents two or more species.

48. *Croton fruticulosus* Engelm.; Torr. U. S. & Mex. Bound. Bot. 194. 1859.

Chihuahua to Nuevo León. Western Texas and southern New Mexico; type from western Texas.

Aromatic shrub, about 1 meter high, densely stellate-tomentose; leaves long-petiolate, ovate or deltoid-ovate, 3 to 8 cm. long, acute to attenuate, rounded or subcordate at base, entire or nearly so. "Encinilla," "hierba loca" (Chihuahua, *Ramírez*.)

49. *Croton morifolius* Willd. Sp. Pl. 4: 535. 1805.

Croton sphaerocarpus H. B. K. Nov. Gen. & Sp. 2: 84. *pl.* 105. 1817.

Durango to Veracruz and Oaxaca.

Shrub, 1 to 3 meters high, copiously stellate-tomentose; leaves broadly ovate or cordate-ovate, 3 to 10 cm. long, acute to long-acuminate, entire or nearly so; racemes short or elongate. "Palillo" (Guanajuato, Querétaro, Oaxaca, Michoacán).

The plant is aromatic and contains an essential oil, which is applied externally for the relief of neuralgia. When inhaled, the oil is said to produce insensibility and paralysis. An infusion of the leaves is taken internally for pains in the stomach.

DOUBTFUL SPECIES.

CROTON GAUMERI Millsp. Field Mus. Bot. 2: 418. 1916. Type from Yucatán.

CROTON GLANDULOSEPALUS Millsp. Field Mus. Bot. 2: 419. 1916. Type from Yucatán.

CROTON MALVAVISCIFOLIUS Millsp. Field Mus. Bot. 2: 419. 1916. Type from Yucatán.

8. *GARCIA* Rohr, Skrivt. Naturh. Selsk. (Kjøbenhavn) 2: 217. 1792.**1. *Garcia nutans* Rohr, Skrivt. Naturh. Selsk. (Kjøbenhavn) 2: 217. *pl.* 9. 1792.**

Sinaloa and Tepic and probably elsewhere. Central America, Colombia, and West Indies; type from Santa Marta, Colombia.

Small or large tree; leaves alternate, oblong-obovate, 10 to 20 cm. long, long-petiolate, short-acuminate, entire; flowers monoecious, about 1 cm. long; capsule 2 or 3-seeded, about 2.5 cm. wide, fulvous-tomentulose.

9. *DITAXIS* Vahl; Juss. Euphorb. Gen. Tent. 27. 1824.

REFERENCE: Pax & Hoffm. in Engl. Pflanzenreich IV. 147^v: 51-77. 1912.

Small shrubs, commonly pubescent; leaves alternate, usually petiolate, entire or dentate, 3-nerved at the base, with small stipules; flowers small, monoecious or dioecious.

Several herbaceous species occur in Mexico.

Ovary and capsule glabrous.

Plant densely sericeous, at least on the leaves.....1. *D. heterantha*.

Plant glabrous.....2. *D. brandegei*.

Ovary and capsule pubescent.

Flowers in long-pedunculate axillary racemes; leaves 2 to 6.5 cm. wide.

3. *D. pringlei*.

Flowers solitary or clustered in the axils, sessile or short-pedunculate; leaves mostly less than 2 cm. wide.

Staminodia none or very short.....4. *D. lanceolata*.

Staminodia well developed.

Flowers dioecious.....5. *D. palmeri*.

Flowers monoecious.

Petals of the pistillate flowers lance-linear-----6. *D. guatemalensis*.

Petals of the pistillate flowers ovate or rhombic-ovate.

Leaves linear to lanceolate-----7. *D. sericophylla*.

Leaves mostly ovate to oval.

Staminate petals longer than the calyx-----8. *D. manzanilloana*.

Staminate petals shorter than the calyx-----9. *D. tinctoria*.

1. *Ditaxis heterantha* Zucc. Abh. Akad. Wiss. München 15³: 735. 1829-30.

Argithamnia argentea T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 273. 1912.

Sinaloa, Querétaro, Guanajuato, Hidalgo, and San Luis Potosí; type from Tollmán, Querétaro.

Shrub with thick woody stems; leaves ovate or broadly ovate, 4 to 8 cm. long, acute or acuminate, entire or nearly so, short-petiolate, whitish-sericeous beneath, at least when young; inflorescence slender-pedunculate. "Azafrancillo" (Querétaro); "azafrán de bolita" (Jalisco).

The plant is employed as a dye; the seeds are said to be edible, with a flavor like that of walnuts.

2. *Ditaxis brandegei* (Millsp.) Rose & Standl. Contr. U. S. Nat. Herb. 16: 13. 1912.

Argithamnia brandegei Millsp. Proc. Calif. Acad. II. 2: 220. 1889.

Baja California and Sonora; type from San Gregorio, Baja California.

Shrub, 1 to 2 meters high, glabrous throughout, the stems usually purplish and glaucescent; leaves lanceolate or ovate, 2 to 7 cm. long, acute, finely serrate, long-petiolate; flowers in slender racemes.

3. *Ditaxis pringlei* (Greenm.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147¹: 66. 1912.

Argithamnia pringlei Greenm. Proc. Amer. Acad. 41: 239. 1905.

Known only from the vicinity of the type locality, Cuernavaca, Morelos.

Shrub, 1 to 1.5 meters high; leaves orbicular to ovate, 3 to 8 cm. long, rounded to acute at apex, short-petiolate, entire or denticulate, white-tomentose beneath.

4. *Ditaxis lanceolata* (Benth.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147¹: 71. 1912.

Serophyton lanceolatum Benth. Bot. Voy. Sulph. 52. 1844.

Argyrothamnia lanceolata Muell. Arg. Linnaea 34: 145. 1845.

Baja California and Sonora; type from Magdalena Bay, Baja California.

Slender, sparsely leafy shrub; leaves linear to lanceolate, 1.5 to 4 cm. long, entire, sericeous.

5. *Ditaxis palmeri* (S. Wats.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147¹: 64. 1912.

Argithamnia palmeri S. Wats. Proc. Amer. Acad. 24: 77. 1889.

Known only from the type locality, Guaymas, Sonora.

Slender shrub; leaves mostly lanceolate, 3 to 6 cm. long, long-acuminate, entire or nearly so, short-petiolate, green, nearly glabrous.

6. *Ditaxis guatemalensis* (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147¹: 59. 1912.

Argyrothamnia guatemalensis Muell. Arg. Linnaea 34: 145. 1865.

Jalisco to Guerrero and Puebla. Type from Guatemala.

Shrub, about a meter high; leaves ovate to ovate-oval, 1.5 to 7 cm. long, acute or acuminate, short-petiolate, sericeous, serrulate.

7. *Ditaxis sericophylla* (A. Gray) Heller, Cat. N. Amer. Pl. 5. 1900.

Argithamnia sericophylla A. Gray in S. Wats. Bot. Calif. 2: 70. 1880.

Baja California and Sonora. Southern Arizona and California; type from Arizona.

Low shrub, sparsely leafy; leaves 1 to 3.5 cm. long, entire, short-petiolate or sessile, sericeous.

8. *Ditaxis manzanilloana* (Rose) Pax & Hoffm. in Engl. Pflanzenreich IV. 147^{v1}: 59. 1912.

Argithamnia manzanilloana Rose, Contr. U. S. Nat. Herb. 1: 357. 1895.

Known only from the type locality, Manzanillo, Colima.

Slender shrub; leaves ovate, 4 to 5 cm. long, acuminate, short-petiolate, green, thinly sericeous, entire or denticulate.

9. *Ditaxis tinctoria* (Millsp.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147^{v1}: 59. 1918.

Argithamnia tinctoria Millsp. Field Mus. Bot. 1: 302. pl. 14. 1896.

Type from Xcholac, Yucatán. Nicaragua.

Shrub, 1.3 meters high; leaves ovate-lanceolate, 4 to 6 cm. long, acuminate, nearly entire, short-petiolate, densely pilose beneath. "Azafrán."

The plant is employed as a dye.

10. **CHIROPETALUM** Juss. Ann. Sci. Nat. I. 25: 21. 1832.

1. *Chiropetalum schiedeanum* (Muell. Arg.) Pax in Engl. & Prantl, Pflanzenfam. 3⁵: 45. 1890.

Argyrothamnia schiedeana Muell. Arg. Linnaea 34: 150. 1865.

Nuevo León to Veracruz and Hidalgo; type from Cerro Colorado.

Slender shrub, 1 meter high or less, or more often, perhaps, herbaceous; leaves alternate, slender-petiolate, narrowly or broadly ovate, 1.5 to 6 cm. long, acute or acuminate, serrulate, stellate-pubescent, at least when young; flowers monoecious, in slender axillary racemes; capsule deeply 3-lobate.

11. **RICINUS** L. Sp. Pl. 1007. 1753.

1. *Ricinus communis* L. Sp. Pl. 1007. 1753.

Common in cultivation in Mexico, and naturalized in some localities. Native probably of tropical Africa, but now widely dispersed in tropical regions.

Essentially an annual plant, but often shrublike, and sometimes becoming treelike and 9 meters high or even larger, glabrous, glaucous; leaves alternate, large, palmately lobate, the lobes acuminate, dentate; flowers monoecious, apetalous, large, racemose; fruit a large, smooth or echinate capsule. Commonly known as "higuerilla"; "palma christi" (Oaxaca); "yaga-bilape," "yaga-higo" (Oaxaca, Zapotec, *Reko*); "yutnu-nduchidzaha" (Oaxaca, Mixtec, *Reko*); "deghe" (Otomí); "koch" (Maya); "tlapatl," "higuera infernal" (*Nueva Farmacopea Mexicana*).

The castor-bean is cultivated to some extent in Mexico for its seeds, which are an important source of oil. This ("aceite de castor") is well known and much used in medicine because of its purgative properties. It is widely employed as a lubricant, and has been used for illuminating purposes, in the manufacture of soap, for the manufacture of the Turkey-red oil required in the dyeing and printing of cotton goods, and for dressing tanned hides. In India and China silkworms are fed on the leaves, and the stems have been used for making paper. The ground seeds from which the oil has been extracted afford a valuable fertilizer.

The Indians of Ecuador string the seeds on sticks and burn them like candles. The decoction of the root has been used in the West Indies as a remedy for colic, and that of the leaves for venereal diseases, while the leaves are applied to the head in cases of fever to alleviate pain. The value of the scalded leaves, applied externally, as a powerful galactagogue has long been known. The castor-bean has been in use since ancient times, being known to the Egyptians at least 4,000 years ago, and it is mentioned by the early Greek writers. Most of the seeds of commerce are grown in India. During the European war their production upon a large scale was attempted in the southern United States, but with most unsatisfactory results.

12. DALECHAMPIA L. Sp. Pl. 1054. 1753.

Shrubs, or sometimes almost wholly herbaceous, erect or scandent; leaves alternate, stipulate, petiolate, entire, parted, or lobate; flowers monoecious, apetalous, borne inside a large foliaceous involucre; fruit a small capsule.

Plants erect; leaves pinnately nerved.

Style column dilated at apex; leaves coriaceous-----1. *D. spathulata*.

Style column not dilated at apex; leaves membranaceous---2. *D. roezliana*.

Plants scandent; leaves palmately nerved.

Leaves mostly composed of 3 distinct leaflets-----3. *D. triphylla*.

Leaves merely lobed, or entire.

Leaves mostly lobed; bracts usually 1.5 to 2.5 cm. long----4. *D. scandens*.

Leaves entire; bracts 0.6 to 1.2 cm. long-----5. *D. schottii*.

1. *Dalechampia spathulata* (Scheidw.) Baill. Etud. Gén. Euphorb. 487. pl. 3. f. 16-30. 1858.

Cremophyllum spathulatum Scheidw. Bull. Acad. Sci. Brux. 9¹: 23. 1842.

Reported from Tabasco. Described from cultivated plants.

Leaves spatulate, entire, cuspidate-acuminate, glabrous.

2. *Dalechampia roezliana* Muell. Arg. in DC. Prodr. 15²: 1233. 1866.

Type from Zontecomapan, Veracruz. Guatemala.

Low shrub, usually unbranched; leaves oblanceolate, 15 to 30 cm. long, 4 to 8 cm. wide, acuminate, glabrous, entire or dentate.

3. *Dalechampia triphylla* Lam. Encycl. 2: 258. 1786.

Veracruz and Tabasco. Central America and South America.

Plants scandent, suffrutescent; leaves mostly 3-foliolate, but some of them usually simple, entire or dentate.

4. *Dalechampia scandens* L. Sp. Pl. 1054. 1753.

Chihuahua and Sonora to Guerrero, Veracruz, and Yucatán. Widely distributed in tropical America, with forms in Africa and the East Indies.

Scandent shrub, or sometimes herbaceous, usually with some stinging hairs; leaves mostly 3-lobate, pubescent, cordate at base; bracts large and whitish. "Xmool-coh" (Yucatán, Maya, *Seler*; "puma-foot," the calyx lobes closing like claws after the capsule opens); "ortiga" (Nicaragua); "ortiguilla" (Costa Rica).

In Costa Rica the leaves are rubbed upon the cheeks as a remedy for toothache.

Some of the Madagascar species of *Dalechampia* furnish a black dye, and are used by the natives to blacken their teeth.

5. *Dalechampia schottii* Greenm. Field Mus. Bot. 2: 255. 1907.

Yucatán; type from Mérida.

Leaves 2 to 7.5 cm. long, ovate or broadly ovate, rounded to acuminate at apex.

13. **TRAGIA** L. Sp. Pl. 980. 1753.

Plants scandent or erect, suffrutescent or herbaceous, the pubescence partly of stinging hairs; leaves alternate, more or less cordate at base, variously dentate; flowers small, apetalous, racemose; fruit a 3-lobate capsule.

Several herbaceous species occur in Mexico. The species listed below scarcely deserve to be classified as shrubs.

Racemes bifurcate.

Leaves about 16 cm. wide, deeply cordate at base; pistillate flowers on short stout pedicels-----1. **T. bailloniana**.

Leaves 3 to 7 cm. wide, truncate or shallowly cordate at base; pistillate flowers on very long, slender pedicels-----2. **T. volubilis**.

Racemes simple.

Leaves entire or shallowly crenate, with a broad shallow sinus at base.

3. **T. mexicana**.

Leaves conspicuously dentate, with a deep, narrow or closed sinus at base.

4. **T. affinis**.

1. **Tragia bailloniana** Muell. Arg. *Linnaea* 34: 178. 1865-66.

Known only from the type locality, Teapa, Tabasco.

Plants scandent, pilose; leaves 20 cm. long, acuminate.

2. **Tragia volubilis** L. Sp. Pl. 980. 1753.

Veracruz. Central America, West Indies, South America, and tropical Africa and Asia.

Suffrutescent, scandent, copiously pubescent; leaves conspicuously dentate or serrate. "Pringa-moza" (Nicaragua, Porto Rico).

Reputed to have diuretic and sudorific properties; used in the West Indies for venereal diseases. Grosourdy states that the juice, mixed with salt, was sometimes applied to ulcers.

3. **Tragia mexicana** Muell. Arg. *Linnaea* 34: 182. 1865-66.

Type from Hacienda de Jovo, in southern Mexico. Guatemala.

Scandent; leaves oblong-ovate, 6 to 17 cm. long, 3 to 7 cm. wide, acuminate; capsule densely hispid.

4. **Tragia affinis** Robins. & Greenm. *Proc. Amer. Acad.* 29: 393. 1894.

Jalisco to Morelos; type collected near Guadalajara, Jalisco.

Scandent, copiously pubescent; leaves 5 to 11 cm. long, acute.

14. **ACALYPHA** L. Sp. Pl. 1003. 1753.

REFERENCE: Mueller von Argau in DC. *Prodr.* 15²: 799-889. 1866.

Shrubs; leaves alternate, usually ovate, variously toothed, 3 or 5-nerved or pinnate-veined; staminate flowers glomerate, in slender spikes, the calyx 4-parted; pistillate flowers 1 or more subtended by a foliaceous bract, the bracts usually in ament-like spikes, the calyx of 3 or 4 sepals; fruit a 3-celled capsule.

A large number of herbaceous species occur in Mexico. *Acalypha wilkesiana* Muell. Arg., a shrub native of the islands of the Pacific, is sometimes grown in Mexico for ornament. It has large glossy green leaves, variously bordered or mottled with pink or red.

Pistillate flowers long-pedicellate.

Stipules ovate-lanceolate-----1. **A. flagellata**.

Stipules subulate.

Pistillate inflorescence 1 or 2-flowered-----2. **A. coryloides**.

Pistillate inflorescence many-flowered.

Leaves cuspidate-acuminate, long-petiolate-----3. *A. schlechtendaliana*.

Leaves acute or obtuse, short-petiolate-----4. *A. longipes*.

Pistillate flowers sessile.

Staminate spikes without pistillate flowers, terminal--5. *A. longestipularis*.

Staminate spikes with pistillate flowers at base or, if wholly staminate, axillary.

Pistillate spikes, at least the well-developed ones, with staminate flowers above or, if not so, the bracts divided into subulate lobes, these ciliate with long gland-tipped hairs.

Bracts shallowly lobate or dentate.

Bracts glandular-pubescent.

Teeth of the bracts 9 to 13-----32. *A. langiana*.

Teeth 17 to 21-----6. *A. cuspidata*.

Bracts without glandular pubescence.

Pistillate bracts minutely 1 to 4-dentate; leaves glabrate, mostly 6 to 18 cm. long-----7. *A. diversifolia*.

Pistillate bracts with about 9 short teeth; leaves densely pubescent, 2.5 to 3.5 cm. long-----8. *A. schlumbergeri*.

Bracts divided into long subulate lobes, these ciliate with long gland-tipped hairs.

Pistillate spikes elongate-----9. *A. glandulifera*.

Pistillate spikes subcapitate-----10. *A. arvensis*.

Pistillate spikes without staminate flowers above, the bracts never with subulate and glandular-ciliate lobes.

A. Pistillate spikes all axillary.

Pistillate bracts lobed or cleft to below the middle.

Bracts 3-lobed-----11. *A. seleriana*.

Bracts 9 to 17-lobed.

Lobes of the bracts subulate-linear-----12. *A. trachyloba*.

Lobes of the bracts lanceolate or broader.

Pistillate spikes subsessile-----13. *A. melochiaefolia*.

Pistillate spikes slender-pedunculate.

Bracts 9 to 11-lobed-----14. *A. unibracteata*.

Bracts 13 to 17-lobed-----15. *A. leptopoda*.

Pistillate bracts lobed to the middle or less deeply.

Fertile spikes all or mostly 8 to 15 cm. long, the bracts very numerous.

Stipules lanceolate-----16. *A. macrostachya*.

Stipules setaceous.

Leaves serrate with somewhat spreading teeth; bracts shallowly dentate-----17. *A. macrostachyoides*.

Leaves with appressed and incurved teeth; bracts deeply dentate-----18. *A. flavescens*.

Fertile spikes 1 to 5 cm. long, rarely longer, with comparatively few bracts.

Pistillate inflorescence consisting of a single subsessile bract.

19. *A. rafaensis*.

Pistillate inflorescence with several bracts or, if of a single bract, this long-pedunculate.

Bracts without glandular pubescence.

Teeth of the bracts acuminate-----20. *A. leptoclada*.

- Teeth of the bracts obtuse or acutish.
 Bracts glabrous or nearly so; leaves soon glabrate.
 Bracts about 5-dentate; leaves 7 to 10 cm. long.
 21. *A. oligantha*.
 Bracts 11 to 15-dentate; leaves mostly 3 to 5 cm. long.
 22. *A. acapulcensis*.
 Bracts densely pubescent; leaves finely pubescent beneath.
 23. *A. dioica*.
 Bracts glandular-pubescent.
 Bracts coarsely dentate, with 17 to 25 teeth.
 24. *A. comoduana*.
 Bracts minutely dentate.
 Leaves obtuse, 1 to 3 cm. long, densely pilose beneath.
 25. *A. californica*.
 Leaves acute or acuminate, mostly 3 to 7 mm. long, green
 beneath and short-pilose-----26. *A. umbrosa*.
 AA. Pistillate spikes terminal, some of them also axillary.
 Bracts lobed to the middle or more deeply.
 Bracts with a few short subappressed hairs, not ciliate.
 27. *A. papillosa*.
 Bracts densely pilose or at least pilose-ciliate.
 Bracts glandular-ciliate-----28. *A. ocymoides*.
 Bracts not glandular-ciliate.
 Lateral lobes of the bracts truncate-----29. *A. triloba*.
 Lateral lobes of the bracts acuminate-----30. *A. fournieri*.
 Bracts lobed one-fourth the distance to the base or less.
 Stems glandular-pubescent.
 Bracts 17 to 21-dentate-----31. *A. adenostachya*.
 Bracts 7 to 13-dentate.
 Leaves acute or acuminate-----32. *A. langiana*.
 Leaves rounded or very obtuse at apex-----33. *A. pringlei*.
 Stems without glandular pubescence.
 Leaf blades 1 cm. long or smaller-----34. *A. parvifolia*.
 Leaf blades more than 2 cm. long.
 Leaves glabrous or nearly so.
 Bracts glabrous except for the gland-tipped hairs on the mar-
 gins; leaves long-petiolate-----35. *A. deppeana*.
 Bracts glandular-pubescent on the sides as well as on the
 margins; leaves short-petiolate.
 Bracts 7 or 9-dentate-----36. *A. lignosa*.
 Bracts 3 or 5-dentate-----37. *A. laxiflora*.
 Leaves copiously pubescent beneath.
 Bracts 17 to 21-dentate.
 Leaves lance-ovate, obtusely serrate-----38. *A. vagans*.
 Leaves broadly ovate, acutely serrate-----39. *A. lagascana*.
 Bracts 5 to 13-dentate.
 Ovary muricate.
 Leaves 2 to 4.5 cm. long; petioles less than half as long
 as the blades-----40. *A. liebmanni*.
 Leaves 8 to 17 cm. long; petioles usually more than half
 as long as the blades.
 Leaf blades with a pale distinct margin beneath.
 41. *A. cincta*.
 Leaf blades not marginate-----42. *A. schiedeana*.

Ovary smooth.

Bracts 5 to 7-dentate-----43. *A. oligodonta*.

Bracts 9 to 15-dentate.

Leaves cuspidate-acuminate-----44. *A. mollis*.

Leaves short-acuminate.

Teeth of the bracts acute; leaves serrate.

45. *A. lindeniana*.

Teeth of the bracts obtuse; leaves crenate.

46. *A. frederici*.

1. *Acalypha flagellata* Millsp. Field Mus. Bot. 2: 417. 1916.

Yucatán; type from Buenavista Xbac.

Dioecious shrub, 2 to 5 meters high, glabrous or nearly so; leaves ovate, about 12 cm. long and 7.5 cm wide, acuminate, crenate-dentate; spikes 15 to 35 cm. long; capsule tuberculate.

2. *Acalypha coryloides* Rose, Contr. U. S. Nat. Herb. 1: 357. 1895.

Colima; type from Manzanillo.

Shrub, 1 to 2 meters high, with grayish branches, leaves ovate or oblong-ovate, 2 cm. long or less, very short-petiolate, crenate; staminate spikes very dense, 6 to 12 mm. long; capsule muricate.

3. *Acalypha schlechtendaliana* Muell. Arg. Linnaea 34: 6. 1865.

Linostachys padifolia Schlecht. Linnaea 19: 235. 1845. Not *Acalypha padifolia* H. B. K. 1817.

Veracruz and Chiapas. Guatemala to Costa Rica.

Slender shrub, nearly glabrous; leaves oblong-ovate, obovate, or lance-elliptic, 8 to 18 cm. long, crenate-serrate; pistillate inflorescence loosely paniculate; staminate spikes long and slender; capsule muricate.

Mueller described¹ a var. *mollis* (from Veracruz), in which the leaves are thinly pilose beneath. It seems to differ from the typical form only in pubescence.

4. *Acalypha longipes* S. Wats. Proc. Amer. Acad. 26: 149. 1891.

San Luis Potosí; type from Tamasopo Canyon.

Slender shrub, glabrous or nearly so; leaves oblong-ovate or ovate-elliptic, 5 to 13 cm. long, serrate; pistillate inflorescence laxly paniculate; staminate spikes lax, 7 to 12 cm. long; ovary muricate.

5. *Acalypha longestipularis* Muell. Arg. Linnaea 34: 51. 1865.

Known only from the type locality, near Oaxaca.

Stipules setaceous, 10 to 12 mm. long; leaves lance-rhombic, 11 to 14 cm. long, 4.5 to 6 cm. wide, acuminate, tomentulose beneath, pubescent above, serrulate; ovary sericeous-hispid.

6. *Acalypha cuspidata* Jacq. Pl. Hort. Schönbr. 2: 63. pl. 243. 1797.

Oaxaca and perhaps elsewhere. West Indies and South America.

Slender shrub; leaves ovate, 6 to 14 cm. long, acuminate or long-acuminate, crenate or serrate, pubescent; spikes usually little longer than the petioles; ovary hirtellous.

7. *Acalypha diversifolia* Jacq. Pl. Hort. Schönbr. 2: 63. pl. 244. 1797.

Tamaulipas, Veracruz, and Oaxaca. Central America and South America.

Shrub, 1 to 3 meters high; leaves lance-ovate to broadly ovate, 5 to 18 cm. long, acuminate or cuspidate-acuminate, serrate or serrulate, glabrate or pubescent beneath; spikes mostly sessile, solitary or fasciculate, 3 to 10 cm. long, dense; ovary hispidulous, tuberculate.

¹ Linnaea 34: 159. 1865.

8. *Acalypha schlumbergeri* Muell. Arg. in DC. Prodr. 15³: 861. 1866.

Described from southern or central Mexico, the locality not known.

Shrub, densely soft-pubescent; leaves ovate or lance-ovate, acute, crenate-serrate; spikes longer than the leaves; ovary hispid.

9. *Acalypha glandulifera* Robins. & Greenm. Amer. Journ. Sci. 50: 164. 1895.

Oaxaca; type from Sierra de San Felipe.

Shrub, 1.5 to 2.5 meters high; leaves ovate or broadly ovate, cordate at base, 5 to 12 cm. long, cuspidate-acuminate, crenate or serrate-dentate, pubescent, especially beneath, long-petiolate; staminate spikes, 5 to 10 cm. long; ovary hispid.

10. *Acalypha arvensis* Poepp. & Endl. Nov. Gen. & Sp. 3: 21. 1845.

Acalypha pavoniana Muell. Arg. Linnaea 34: 50. 1865.

Acalypha capitellata T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 183. 1915.

Veracruz and Oaxaca. Central America to Peru; type from Peru.

Slender shrub; leaves lanceolate to broadly ovate, 3 to 10 cm. long, acuminate, serrate or crenate, pubescent or glabrate; pistillate heads long-pedunculate; capsule hirsute.

11. *Acalypha seleriana* Greenm. Field Mus. Bot. 2: 254. 1907.

Yucatán; type from Xkombec.

Shrub, 1 to 2.5 meters high; leaves ovate to oblong-lanceolate, 2.5 to 5 cm. long, acute or obtuse, dentate or crenate-dentate, pubescent at first but soon glabrate; ovary muricate-hispid.

12. *Acalypha trachyloba* Muell. Arg. Flora 1872: 25. 1872.

Known only from the type locality, near Oaxaca.

Shrub; leaves broadly ovate, 5 to 7 cm. long, cuspidate-acuminate, serrate-dentate, pubescent, especially beneath; staminate spikes 6 to 9 cm. long; pistillate spikes pedunculate.

13. *Acalypha melochiaefolia* Muell. Arg. in DC. Prodr. 15³: 821. 1866.

Known only from the type locality, Hacienda Perado, near Orizaba.

Leaves triangular-ovate, 4 to 5 cm. long, crenate-serrate, velutinous; pistillate spikes 1.5 cm. long.

14. *Acalypha unibracteata* Muell. Arg. Linnaea 34: 160. 1865.

Veracruz to Yucatán and Chiapas; type collected between Mirador and Jalapa, Veracruz. Guatemala.

Shrub, 1.5 to 3 meters high, with reddish brown branches; leaves ovate or lance-ovate, 2 to 7 cm. long, acute to long-acuminate serrate-dentate, pubescent or glabrate; pistillate bracts 1 or 2; staminate spikes 1 to 2 cm. long. "Chilibtux" (Yucatán, Maya).

15. *Acalypha leptopoda* Muell. Arg. Linnaea 34: 39. 1865.

Veracruz. Guatemala to Costa Rica.

Slender shrub; leaves ovate, 4 to 12 cm. long, cuspidate-acuminate, serrate, densely pubescent or glabrate; pistillate bracts usually 1 or 2; staminate spikes 1.5 to 6 cm. long; ovary puberulent.

The typical form (*A. leptopoda glabrescens* Muell. Arg. in DC. Prodr. 15³: 824. 1866) has glabrate leaves. *A. leptopoda mollis* Muell. Arg. (loc. cit.) is a form with densely pubescent leaves.

16. *Acalypha macrostachya* Jacq. Pl. Hort. Schönbr. 2: 63. pl. 245. 1797.

Veracruz, Oaxaca, and Chiapas. Central America and South America.

Shrub, 1 to 3 meters high, leaves broadly ovate, 10 to 20 cm. long, cuspidate-acuminate, serrate, densely pubescent or glabrate; ovary hispidulous. "Chichicaste" (Guatemala).

17. *Acalypha macrostachyoides* Muell. Arg. in DC. Prodr. 15²: 809. 1866.

Veracruz.

Shrub, 2.5 to 4.5 meters high; leaves broadly ovate, 8 to 13 cm. long, acuminate, serrate, densely velvety-pubescent; pistillate spikes often longer than the leaves; ovary smooth, hispidulous.

18. *Acalypha flavescens* S. Wats. Proc. Amer. Acad. 26: 149. 1891.

Known only from the type locality, Tamasopo Canyon, San Luis Potosí.

Shrub, 1.5 to 3 meters high; leaves ovate, 7 to 16 cm. long, long-pedunculate, cuspidate-acuminate, finely velutinous beneath; bracts about 7-dentate; ovary densely pubescent.

19. *Acalypha rafaensis* Standl., sp. nov.

Type from Agua del Medio, Minas de San Rafael, San Luis Potosí (*Purpus* 5478; U. S. Nat. Herb. no. 463984).

Slender shrub, the branches brownish, densely pilose when young; stipules setaceous, 6 to 10 mm. long; petioles 1.2 to 2.5 cm. long, slender or stout; leaf blades ovate or lance-ovate, 5 to 10 cm. long, 2.5 to 4.5 cm. wide, acuminate, rounded or subcordate at base, short-hispid above, densely pilose beneath; pistillate inflorescences axillary, each consisting of a single subsessile bract; bracts reniform, about 5 mm. long and 11 mm. broad, 15-dentate, densely pilose, the teeth triangular-ovate, acute; ovary smooth, densely white-hispid, the styles with numerous dark red branches.

No other Mexican species has a pistillate inflorescence like that of the present plant. In a few species it is reduced to a single bract, but in those cases the bract is borne on a long slender peduncle.

20. *Acalypha leptoclada* Benth. Bot. Voy. Sulph. 164. 1844.

Known only from the type locality, between San Blas and Tepic.

Leaves ovate-lanceolate, 5 to 7 cm. long, acuminate, coarsely dentate, pubescent; spikes about as long as the petioles; ovary hispid.

21. *Acalypha oligantha* Muell. Arg. Linnaea 34: 159. 1865.

Known only from the original localities, Santa María Tlapacoyo and Paso del Correo, banks of the Río Tecolata, Veracruz.

Leaves lance-elliptic, 7 to 10 cm. long, acuminate, appressed-denticulate, soon glabrate; staminate spikes slightly shorter than the leaves; pistillate spikes scarcely equaling the petiole; ovary smooth, puberulent.

22. *Acalypha acapulcensis* Fernald, Proc. Amer. Acad. 33: 87. 1897.

Known only from the type locality, Acapulco, Guerrero.

Very slender shrub with dark brown branches; leaves ovate or lance-ovate, 2 to 5 cm. long, long-acuminate, crenate-dentate, glabrate; staminate spikes 2 cm. long or less; pistillate spikes sessile, 2 to 4 cm. long; capsule hispid.

23. *Acalypha dioica* S. Wats. Proc. Amer. Acad. 25: 162. 1890.

Known only from the type locality, near Monterrey, Nuevo León.

Stems suffrutescent, 30 to 60 cm. high; leaves lance-ovate, 3 to 6 cm. long, acuminate, crenate-serrate, pubescent; staminate spikes long-pedunculate, about equaling the leaves; pistillate spikes lax, with 3 to 8 bracts; capsule pubescent.

24. *Acalypha comoduana* Millsp. Proc. Calif. Acad. II. 2: 222. 1889.

Baja California; type from Comondú.

Slender shrub; leaves broadly ovate, 5 to 11 cm. long, acute or acuminate, crenate-dentate, pubescent or glabrate; pistillate spikes equaling or longer than the petioles, the bracts distant.

25. *Acalypha californica* Benth. Bot. Voy. Sulph. 51. 1844.

Baja California and northwestern Sonora; type from Magdalena Bay, Baja California.

Slender shrub; leaves broadly ovate, obtuse or acute, crenate-dentate, densely pubescent; staminate spikes 1 to 2.5 cm. long; pistillate spikes 2 cm. long or less; ovary muricate.

26. *Acalypha umbrosa* T. S. Brandeg. Erythea 7: 7. 1899.

Baja California; type from Socorro Island.

Leaves ovate or lance-ovate, acuminate, crenate-serrate, glandular-pubescent, long-petiolate; staminate spikes pedunculate, equaling or shorter than the leaves.

27. *Acalypha papillosa* Rose, Contr. U. S. Nat. Herb. 1: 358. 1895.

Known only from the type locality, Agiabampo, Sonora.

Shrub, 1.5 to 2 meters high, nearly glabrous; leaves deltoid-ovate, 5 to 11 cm. long, cuspidate-acuminate, crenate-serrate; pistillate spikes all terminal, few-bracted; capsule hispid.

28. *Acalypha ocymoides* H. B. K. Nov. Gen. & Sp. 2: 93. 1817.

Known only from the type locality, Volcán de Jorullo, Michoacán.

Leaves ovate, 8 cm. long, acuminate, coarsely serrate, appressed-pilosulous beneath; staminate spikes 4 to 6 cm. long; pistillate spikes 10 to 20 cm. long; ovary hirtellous and muricate.

29. *Acalypha triloba* Muell. Arg. Linnaea 34: 23. 1865.

Described from Mexico, the locality not known.

Stems hispid; leaves ovate, 5 to 8 cm. long, acuminate, serrulate, hispid; pistillate spikes 5 to 9 cm. long; ovary muricate, hirsute.

30. *Acalypha fournieri* Muell. Arg. Linnaea 34: 162. 1865.

Colima, Jalisco, San Luis Potosí, and Veracruz; type from San Luis Potosí.

Shrub; leaves broadly ovate to lance-oblong, 2 to 6 cm. long, acute or acuminate, crenate-serrate, densely pilose beneath; pistillate spikes very dense; ovary muricate and hispid.

31. *Acalypha adenostachya* Muell. Arg. Linnaea 34: 21. 1865.

Acalypha subviscida S. Wats. Proc. Amer. Acad. 21: 440. 1886.

Sonora and Chihuahua to San Luis Potosí, Morelos, and Guerrero.

Stems woody or suffruticose, 0.5 to 1.5 meters high, viscid-pubescent; leaves ovate or lanceolate, 3 to 11 cm. long, acuminate, serrate or crenate-serrate, viscid-pubescent beneath; staminate spikes long and slender, pedunculate; ovary muricate and glandular-pubescent. "Hierba del cáncer" (Sinaloa).

The plant is used in Sinaloa as a remedy for wounds.

32. *Acalypha langiana* Muell. Arg. Linnaea 34: 159. 1865.

Sinaloa to Querétaro and Oaxaca; type from Cuilapa, Oaxaca. Guatemala.

Stems suffruticose, a meter high or less, viscid-pubescent; leaves ovate or broadly ovate, 2 to 8 cm. long, crenate-serrate or dentate, viscid-pubescent, rarely glabrate; spikes usually very numerous and dense; ovary muricate. "Hierba del cáncer" (Puebla).

33. *Acalypha pringlei* S. Wats. Proc. Amer. Acad. 20: 373. 1885.

Known only from the shores of the Gulf of California, northwestern Sonora, the type locality.

Low shrub; leaves broadly ovate, 2 to 3.5 cm. long, crenate-dentate, viscid-pubescent; staminate spikes pedunculate; pistillate spikes short, few-flowered; bracts 7 to 11-dentate.

34. *Acalypha parvifolia* Muell. Arg. *Linnaea* 34: 161. 1865.

Known only from the type locality, San Agustín, Oaxaca.

Shrub, about 30 cm. high, intricately branched; leaves triangular-ovate, acute, denticulate; staminate spikes pedunculate, 1 to 2 cm. long; pistillate spikes 12 to 17 mm. long; bracts acutely 9 or 11-dentate; ovary muricate.

35. *Acalypha deppeana* Schlecht. *Linnaea* 7: 385. 1832.

Acalypha schiedeana Muell. Arg. *Linnaea* 34: 20. 1865.

Veracruz; type from Plan del Río.

Slender shrub, glabrous or nearly so; leaves broadly ovate to oblong-ovate, 5 to 11 cm. long, crenate-serrate, cuspidate-acuminate; pistillate spikes all terminal, dense.

36. *Acalypha lignosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 184. 1915.

Known only from the type locality, San Gerónimo, Oaxaca.

Shrub, nearly glabrous; leaves ovate, 6.5 cm. long, acuminate, crenate-dentate; pistillate spikes about 2 cm. long, dense; ovary hirsute.

37. *Acalypha laxiflora* Muell. Arg. *Linnaea* 34: 18. 1865.

Type from Veracruz. Also in Cuba.

Leaves ovate, 7 to 10 cm. long, acutely acuminate, appressed-serrate, glabrous or nearly so; spikes about 8 cm. long; ovary sericeous.

38. *Acalypha vagans* Cav. Icon. Pl. 6: 47. pl. 569. f. 1. 1801.

Jalisco and Michoacán to Chiapas and Veracruz; type from Acapulco.

Stems suffruticose, pubescent; leaves 4 to 7 cm. long, acuminate, long-pedunculate, pubescent beneath or rarely glabrate; spikes equaling or shorter than the leaves; ovary muricate, hirsute.

39. *Acalypha lagascana* Muell. Arg. *Flora* 1872: 27. 1872.

Described from Mexico, the locality not known.

Leaves 3.5 to 4.5 cm. long, acuminate, villosulous beneath; staminate spikes 4 to 5 cm. long; ovary muricate, hirtellous.

40. *Acalypha liebmanni* Muell. Arg. *Linnaea* 34: 161. 1865.

Known only from the type locality, Colipa, Veracruz.

Stems suffruticose, puberulent; leaves triangular-ovate, 2 to 4.5 cm. long, shortly cuspidate-acuminate, serrate; pistillate spikes twice as long as the leaves or longer, about 1 cm. thick.

41. *Acalypha cincta* Muell. Arg. *Linnaea* 34: 20. 1865.

Sinaloa and Jalisco to Guerrero; type from some unknown Mexican locality.

Shrub, 1 to 2 meters high; leaves ovate or rounded-ovate, 8 to 17 cm. long, cuspidate-acuminate, crenate, puberulent beneath, with a narrow, pale green border about the margin; pistillate spikes all terminal, 5 to 9 cm. long, dense.

42. *Acalypha schiedeana* Schlecht. *Linnaea* 7: 384. 1832.

Veracruz; type from Jalapa. Guatemala; reported from Venezuela.

Shrub, 1 to 3 meters high; leaves broadly ovate, 5 to 10 cm. long, shortly cuspidate-acuminate, crenate-serrate, pilose beneath; pistillate spikes dense, the staminate axillary, equaling or longer than the leaves.

43. *Acalypha oligodonta* Muell. Arg. in DC. Prodr. 15¹: 831. 1866.

Oaxaca and Veracruz; type from Sierra San Pedro Nolasco, Oaxaca.

Stems suffrutescent, sericeous when young; leaves triangular-ovate, 5 to 6 cm. long, acuminate, crenate, puberulent or glabrate beneath; staminate spikes about 4 cm. long.

44. *Acalypha mollis* H. B. K. Nov. Gen. & Sp. 2: 94. 1817.*Acalypha microstachya* Benth. Pl. Hartw. 71. 1840.

Central Mexico; type from Venta de Chalco, Mexico.

Leaves ovate or lance-ovate, cuspidate-acuminate, serrate, densely pilose; pistillate spikes elongate, very dense.

45. *Acalypha lindeniana* Muell. Arg. in DC. Prodr. 15¹: 827. 1866.

Veracruz and Puebla; type from Puente Nacional, Veracruz.

Leaves ovate, 4 to 5 cm. long, acute or short-acuminate, serrate, densely pilose beneath; staminate spikes half as long as the leaves, pedunculate; pistillate spikes about 1.5 cm. long, lax.

46. *Acalypha frederici* Muell. Arg. in DC. Prodr. 15²: 828. 1866.

Veracruz; type from Orizaba.

Stems slender, 1 meter high or less, suffruticose, hirsute, leaves ovate or lance-ovate, 3 to 7 cm. long, acuminate, pilose beneath; spikes equaling or longer than the leaves.

15. BERNARDIA Adans. Fam. Pl. 2: 356. 1763.REFERENCE: Pax in Engl. Pflanzenreich IV. 147¹¹: 21-45. 1914.

Shrubs, the pubescence of simple or fasciculate hairs; leaves alternate, petiolate or sessile, usually dentate; flowers small, apetalous, monoecious or dioecious, mostly in axillary spikes; fruit a 3-lobate capsule.

Leaves entire, 3 to 7 mm. long-----1. *B. fasciculata*.

Leaves dentate, usually much larger.

Style branches entire. Leaves 6 to 16 cm. long-----2. *B. interrupta*.

Style branches laciniate.

Leaves small, most of them less than 2 cm. long; capsule usually less than 1 cm. wide-----3. *B. myricifolia*.

Leaves large, mostly 3 to 11 cm. long; capsule 1.2 to 1.5 cm. wide.

Leaves very scabrous on both surfaces-----4. *B. aspera*.Leaves soft-pubescent, at least beneath-----5. *B. mexicana*.**1. *Bernardia fasciculata* S. Wats. Proc. Amer. Acad. 18: 153. 1883.**

Chihuahua and Coahuila; type from mountains northeast of Monclova, Coahuila.

Shrub, about 1.5 meters high; leaves fasciculate or alternate, spatulate, glabrate.

A doubtful plant, scarcely of this genus.

2. *Bernardia interrupta* (Schlecht.) Muell. Arg. Linnaea 34: 171. 1865.*Acalypha interrupta* Schlecht. Linnaea 7: 386. 1832.*Alevea leptotachia* Baill. Étud. Gén. Euphorb. 509. 1858.

San Luis Potosí, Veracruz, and Hidalgo; type from Hacienda de la Laguna, Veracruz.

Shrub or small tree, sometimes 5 meters high; leaves conspicuously petiolate, elliptic or obovate, sinuate-dentate, sparsely stellate-pubescent or glabrate; flowers dioecious; capsule 12 mm. broad.

3. *Bernardia myricifolia* (Scheele) S. Wats. Bot. Calif. 2: 70. 1880.*Tyria myricifolia* Scheele, Linnaea 25: 581. 1852.*Bernardia viridis* Millsp. Proc. Calif. Acad. II. 2: 223. 1889.

Baja California to Tamaulipas. Western Texas to southern California; type from New Braunfels, Texas.

Shrub, 1 to 3 meters high, densely branched; leaves elliptic or obovate, coarsely repand-crenate, densely tomentose beneath. "Palo de tarugo," "oreja de ratón" (Tamaulipas).

4. *Bernardia aspera* Pax & Hoffm. in Engl. Pflanzenreich IV. 147¹¹: 24. 1914.
Tepic to Guerrero; type from Acapulco, Guerrero.
Leaves short-petiolate, ovate, ovate-oblong, or elliptic, 5.5 to 11 cm. long, acute or acutish, very rough.

5. *Bernardia mexicana* (Hook. & Arn.) Muell. Arg. Linnaea 34: 171. 1865.
Hermesia mexicana Hook & Arn. Bot. Beechey Voy. 309. 1841.
Bernardia brandegei Millsp. Proc. Calif. Acad. II. 3: 172. 1891.
San Luis Potosí to Hidalgo and Puebla. Central America and Venezuela.
Shrub, 1 to 3 meters high; leaves oblong to orbicular-ovate, acute or obtuse, coarsely crenate-dentate, thick, densely tomentose beneath when young but sometimes glabrate in age; capsule densely tomentose.

16. *ADELIA* L. Syst. Nat. ed. 10. 1298. 1759.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147¹¹: 64-71. 1914.

Shrubs or trees, often with spinose branchlets; leaves alternate, entire, short-petiolate; flowers small, dioecious, apetalous; fruit a 3-lobate capsule.

Leaves spatulate, 7 mm. wide or narrower-----1. *A. vaseyi*.

Leaves not spatulate, most of them 2 cm. wide or more.

Leaves pinnately nerved, soon glabrate beneath-----2. *A. barbinervis*.

Leaves 3-nerved at base, densely pubescent beneath-----3. *A. oaxacana*.

1. *Adelia vaseyi* (Coulter) Pax & Hoffm. in Engl. Pflanzenreich IV. 147¹¹: 69. 1914.

Euphorbia vaseyi Coulter, Contr. U. S. Nat Herb. 1: 48. 1890.

Western Texas, the type from Brazos Santiago; collected also at Brownsville, Texas, and doubtless in Tamaulipas.

Shrub, 1 to 2 meters high; leaves 1.5 to 3 cm. long.

2. *Adelia barbinervis* Schlecht. & Cham. Linnaea 6: 362. 1831.

Tamaulipas and San Luis Potosí to Oaxaca; type from Papantla, Veracruz, Guatemala.

Shrub or small tree, sometimes 6 meters high; leaves mostly obovate, 4 to 9 cm. long, obtuse to acuminate; capsule about 1 cm. wide.

3. *Adelia oaxacana* (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 3: 129. 1883.

Ricinella oaxacana Muell. Arg. Linnaea 34: 154. 1865.

San Luis Potosí to Yucatán and Oaxaca.

Shrub or tree, sometimes 6 meters high; leaves obovate, ovate, or elliptic, 2 to 7 cm. long, obtuse or short-pointed, velvety-pilose; capsule 1 cm. broad.
"Xtompac" (Yucatán, Maya).

17. *ALCHORNEA* Swartz, Prodr. Veg. Ind. Occ. 98. 1788.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147¹¹: 220-253. 1914.

1. *Alchornea latifolia* Swartz, Prodr. Veg. Ind. Occ. 98. 1788.

Veracruz and Oaxaca. Central America and West Indies; type from Jamaica.

Tree, 8 to 20 meters high; leaves alternate, long-petiolate, ovate or elliptic, 11 to 27 cm. long, short-pointed, crenate-dentate, with minute scattered stellate hairs on the lower surface; flowers small, apetalous, dioecious, spicate; capsule 1 cm. broad. "Palo mujer," "palo de puta" (Oaxaca); "achiotillo," "palo de cotorro," "yobillo" (Porto Rico); "aguacatillo" (Santo Domingo).

DOUBTFUL SPECIES.

ALCHORNEA SIMILIS Muell. Arg. Flora 47: 434. 1864. Type from Sierra San Pedro Nolasco. Probably synonymous with *A. latifolia*.

18. *JATROPHA* L. Sp. Pl. 1006. 1753.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147: 21-113. 1910.

Trees or shrubs, often armed with stinging hairs; leaves alternate, usually long-petiolate, entire or palmately lobate, the stipules small or large and dissected; flowers usually monoecious, petaliferous or apetalous, usually cymose; fruit a capsule.

A few herbaceous species occur in Mexico.

Flowers apetalous; plants usually armed with stinging hairs.

Pistillate calyx persistent as a disk at the base of the capsule.

Leaves repand-dentate, not lobate, 2.5 to 6.5 cm. wide-----1. *J. palmeri*.

Leaves conspicuously lobate, usually more than 10 cm. wide.

Leaves lobed halfway to the base or less, the lobes entire or repand-denticulate-----2. *J. tubulosa*.

Leaves usually lobed more than halfway to the base, the lobes laciniate or coarsely dentate.

Lobes of the leaves merely dentate-----3. *J. multiloba*.

Lobes laciniate.

Stamen column glabrous-----4. *J. liebmannii*.

Stamen column villous at the base-----5. *J. polyantha*.

Pistillate calyx caducous.

Calyx surrounded by a calyculus of slender-clavate hairs--6. *J. calyculata*.

Calyx not calyculate.

Outer filaments free-----7. *J. urens*.

Outer filaments united with the others.

Leaves not lobed-----8. *J. rotundifolia*.

Leaves conspicuously lobate.

Staminodia none-----9. *J. kunthiana*.

Staminodia present, filiform.

Leaves lobed less than halfway to the middle--10. *J. angustidens*.

Leaves lobed more than halfway to the middle--11. *J. aconitifolia*.

Flowers with petals; plants without stinging hairs.

Petals free or nearly so.

Stipules reduced to sessile glands-----12. *J. andrieuxii*.

Stipules persistent, setaceous-dissected or subulate.

Petioles with gland-tipped hairs-----13. *J. gossypiifolia*.

Petioles without glands.

Leaves peltate -----14. *J. podagrica*.

Leaves not peltate.

Lobes of the leaves deeply lobate-----15. *J. multifida*.

Lobes of the leaves merely dentate.

Leaves shallowly lobate; cymes few-flowered----16. *J. purpurea*.

Leaves deeply lobate; cymes many-flowered.

17. *J. longipedunculata*.

Petals conspicuously united.

Cymes much reduced, the flowers mostly fasciculate.

Leaves sessile or very short-petiolate.

Stipules small, not dissected; leaves glabrous or nearly so.

18. *J. spathulata*.

Stipules large, setose-dissected; leaves densely pubescent.

19. *J. neopauciflora*.

Leaves borne on long slender petioles.

Leaves and pistillate sepals glandular-ciliate.

Staminate sepals ciliate; leaves mostly acuminate....20. *J. cordata*.

Staminate sepals eciliate; leaves acutish or rounded and short-pointed.....21. *J. vernicosa*.

Leaves and sepals not glandular-ciliate.

Leaves pubescent on one or both surfaces.....23. *J. cinerea*.

Leaves glabrous on both surfaces.

Leaves broadly rounded or emarginate at apex.

Leaves acute or acuminate.....24. *J. cercidiphylla*.

Leaves 5 to 10.5 cm. wide, entire.....29. *J. gaumeri*.

Leaves 1.5 to 2.5 cm. wide, crenate.....22. *J. cardiophylla*.

Cymes large, much branched, broad.

Leaves conspicuously peltate.....25. *J. platyphylla*.

Leaves not peltate.

Teeth of the leaves ending in stipitate glands.....26. *J. olivacea*.

Teeth (if present) without stipitate glands.

Cymes sessile.....27. *J. alamani*.

Cymes pedunculate.

Leaves all or mostly entire.

Leaves obovate.....28. *J. sympetala*.

Leaves cordate.

Branches of the inflorescence glabrous.....29. *J. gaumeri*.

Branches of the inflorescence densely pilose.

30. *J. yucatanensis*.

Leaves, at least most of them, conspicuously lobate or angulate.

Leaves glabrous or glabrate at maturity.....31. *J. curcas*.

Leaves densely pubescent beneath at maturity.

Leaves densely tomentose beneath, puberulent or thinly tomentulose on the upper surface.....32. *J. rufescens*.

Leaves villosulous beneath, velvety-pilose on the upper surface.

33. *J. pseudocurcas*.

1. *Jatropha palmeri* S. Wats. Proc. Amer. Acad. 24: 76. 1888.

Sonora and Baja California; type from Guaymas, Sonora.

Shrub; leaves long-petiolate, orbicular or flabellate, coarsely dentate, pubescent on both surfaces.

2. *Jatropha tubulosa* Muell. Arg. Linnaea 34: 212. 1865.

Jatropha jurgensenii Briq. Ann. Cons. Jard. Genève 4: 229. 1900.

? *Jatropha tepiquensis* Cost. & Gall. Rév. Gén. Bot. 18: 388. 1906.

Tepic(?) to Puebla and Oaxaca. Central and South America.

Shrub or small tree, armed with long stiff stinging hairs; leaves about 20 cm. wide; flowers white; capsule covered with stinging hairs. "Mala mujer" (*Pax*).

3. *Jatropha multiloba* Pax in Engl. Pflanzenreich IV. 147: 107. 1910.

Tamaulipas and Veracruz; type from Orizaba, Veracruz.

Shrub or small tree, sometimes 3.5 meters high, with few thick branches; leaves 20 to 25 cm. wide, densely velvety-puberulent; flowers white, about 1 cm. long. "Mala mujer lisa" (Tamaulipas).

4. *Jatropha liebmannii* Muell. Arg. Linnaea 34: 212. 1865.

Known only from the type locality, Tehuanac, Veracruz.

Leaves 3 to 7-parted, puberulent when young.

5. *Jatropha polyantha* Pax & Hoffm. in Engl. Pflanzenreich IV. 147: 105. 1910.
Known only from the type locality, La Orilla, Michoacán.

Frutescent, the branches armed with stinging hairs; leaves about 20 cm. wide, glabrous except for stinging hairs; flowers white. "Ortiga."

6. *Jatropha calyculata* Pax & Hoffm. in Engl. Pflanzenreich IV. 147: 97. 1910.
Known only from the type locality, La Pitirem, Michoacán or Guerrero, altitude 200 meters.

Leaves cordate, 10 to 15 cm. wide, armed with needle-shaped hairs, coarsely salient-dentate; flowers white. "Ortiga."

Said to be herbaceous, but inserted here because of its close relationship to some of the other species, most of which become shrubs at times. Roots large and fleshy, employed as a remedy for venereal diseases.

7. *Jatropha urens* L. Sp. Pl. 1007. 1753.

Jatropha herbacea L. Sp. Pl. 1007. 1753.

Tamaulipas, San Luis Potosí, Veracruz, Oaxaca, and probably elsewhere. Widely distributed in tropical America.

Shrub, 3 meters high, or often herbaceous, copiously armed with stinging hairs; leaves 12 to 30 cm. wide; flowers white, sweet-scented, about 1 cm. long; seeds grayish, 8 mm. long. "Mala mujer" (Oaxaca, San Luis Potosí, Veracruz, Tamaulipas); "chichicaste," "chichicaste de burro" (Guatemala); "guarito-to" (Venezuela); "pringamoza" (Colombia).

The hairs sting the skin painfully, and often cause sores. The thick, fleshy roots are employed locally for venereal and other diseases.

8. *Jatropha rotundifolia* Muell. Arg. Linnaea 34: 211. 1865.

Known only from the type locality, San Luis (Potosí?).

Leaves 4 to 6 cm. wide, deeply cordate at base, repand-dentate; flowers 7 mm. long.

9. *Jatropha kunthiana* Muell. Arg. Linnaea 34: 211. 1865.

Veracruz. Northern South America; type from Cumaná, Venezuela.

Shrub, 1 to 1.5 meters high; leaves 12 to 25 cm. wide; flowers about 1 cm. long.

10. *Jatropha angustidens* (Torr.) Muell. Arg. in DC. Prodr. 15²: 1102. 1866.

Cnidoscolus angustidens Torr. U. S. & Mex. Bound. Bot. 198. 1859.

Baja California and Sonora to Guerrero and Tamaulipas; type from Santa Cruz, Sonora.

Herbaceous, or sometimes a shrub 1.5 meters high, densely armed with long stinging hairs; leaves 10 to 25 cm. wide, long-petiolate, with numerous spine-tipped teeth and shallow lobes; flowers white, 1 to 1.5 cm. long; seeds spotted with brown and gray, 8 to 10 mm. long. "Mala mujer," "mala mujer china" (Tamaulipas).

11. *Jatropha aconitifolia* Mill. Gard. Dict. ed. 8. *Jatropha* no. 6. 1768.

Jatropha papaya Medic. Bot. Beob. (1782) 194. 1783.

Veracruz, Oaxaca, and Yucatán. Central America.

Tree, sometimes 8 meters high; leaves 15 to 20 cm. wide; flowers white, 1 cm. long. "Chaya," "picar" (Yucatán); "quelite" (Pax).

Sometimes planted as a shade tree or for hedges. Cultivated plants are occasionally destitute of stinging hairs.

12. *Jatropha andrieuxii* Muell. Arg. Linnaea 34: 208. 1865.

Type collected between Puebla and Oaxaca.

Plant densely pubescent throughout; leaves 15 cm. broad, suborbicular, shallowly lobate; petals 1.5 cm. long.

13. *Jatropha gossypifolia* L. Sp. Pl. 1006. 1753.

Veracruz and perhaps elsewhere. Widely distributed in tropical America; also in western Africa (adventive?).

Shrub, 1 to 2 meters high; leaves 10 to 15 cm. wide, 3 or 5-parted, the lobes acute; flowers purplish. "Frailecillo" (Costa Rica, Cuba, Venezuela, Colombia); "frailejón," "purga de fraile" (Colombia); "túatúa" (Venezuela, Santo Domingo, Porto Rico, Cuba); "San Juan del Cobre" (Cuba); "higuereta cimarrona" (Porto Rico).

The seeds are eaten by doves and domestic fowls. They contain much oil and have drastic purgative and emetic properties. A decoction of the leaves is employed as a blood purifier and for venereal diseases, and is administered as an emetic for pains in the stomach. The root has some reputé as an antidote for snake bites and as a remedy for the poison of manchineel (*Hippomane mancinella*).

14. *Jatropha podagrica* Hook. in Curtis's Bot. Mag. pl. 4376. 1848.

Puebla, probably cultivated. Central America; cultivated in the West Indies.

Plants mostly 1 meter high or less, glabrous; leaves long-petiolate, peltate, 10 to 20 cm. long, deeply 3 or 5-lobate, the lobes broad, acute or obtuse, entire; cymes long-pedunculate, the flowers red; petals 6 to 7 mm. long; capsule 1.5 cm. long. "Ruibarbo" (El Salvador).

15. *Jatropha multifida* L. Sp. Pl. 1006. 1753.

Reported from Veracruz, but perhaps only cultivated. Widely distributed in tropical America; naturalized in the tropics of the Old World.

Shrub or tree, sometimes 6 meters high, glabrous; leaves with numerous narrow lobes; flowers red or purplish, the petals 4 to 7 mm. long; capsule nearly 3 cm. long. "Cabalongo" (Veracruz, *Seler*); "chicaquil" (Costa Rica); "tartora," "piñón" (Venezuela); "yuca cimarrona" (Santo Domingo).

The leaves are said to be cooked sometimes as a vegetable. The yellow sap is used in Brazil in the treatment of wounds, and the roasted seeds for fevers and venereal diseases. The seeds are purgative like those of many other species.

16. *Jatropha purpurea* Rose & Pax in Engl. Pflanzenreich IV. 147: 42. f. 15. 1910.

Dry hillsides, Sinaloa and southern Baja California; type from Agiabampo, Sonora.

Shrub, about 2.5 meters high, with thin, papery, pale brown bark; leaves slender-petiolate, 4 cm. wide or narrower, more or less 3-lobate; petals 7 to 8 mm. long.

17. *Jatropha longipedunculata* T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 328. 1920.

Jatropha urens longipedunculata T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 368. 1917.

Veracruz; type from Zacuapan.

Shrub or small tree, 5 meters high or less, nearly glabrous; leaves long-petiolate, 12 to 27 cm. long, 3 or 5-lobate, cordate at base, the lobes acute or acuminate, coarsely dentate; petals 5 mm. long; capsule about 1 cm. long.

18. *Jatropha spathulata* (Orteg.) Muell. Arg. in DC. Prodr. 15³: 1081. 1866.

? *Jatropha dioica* Cérvant. Supl. Gac. Lit. Méx. 4. 1794.

Mozinna spathulata Orteg. Hort. Matr. Dec. 105. pl. 13. 1799.

Loureira cuneifolia Cav. Icon. Pl. 5: 17. pl. 429. 1799.

Zimapania schiedeana Engl. & Pax in Engl. & Prantl, Pflanzenfam. 3⁵: 119. f. 75. 1890.

Baja California to Tamaulipas and Puebla. Western Texas and southern Arizona.

Shrub, 0.5 to 5 meters high, with thick, succulent, reddish-brown branches; leaves usually fasciculate, 1 to 7 cm. long, linear to spatulate, entire or often 3-lobate; flowers very small, fasciculate, sessile or pedicellate; fruit usually 1-seeded. "Sangregrado" (San Luis Potosí, Sonora, Zacatecas, Durango, etc.); "sangre de drago" (Durango, Chihuahua, Nuevo León, San Luis Potosí, Hidalgo, Zacatecas, Mexico, Texas); "sangre de grado" (Durango, Coahuila); "sangregado" (*Urbina*); "tecote prieto" (Sinaloa, Sonora); "tocote prieto" (Sonora); "matacora," "torote prieto" (Baja California); "telondilla" (Distrito Federal); "drago" (Texas, Tamaulipas); "piñón del cerro" (Oaxaca, *Villada*); "torote amarillo" (Sonora); "coatli" (*Sahagún*); "tlapalezpatli" (*Hernández*).

The stems are flexible and tough; they are useful for whips and withes, and have been used for making baskets. The bark is used for tanning and dyeing, and has been exported for those purposes. It gives a dark red dye, but is said to be injurious to cloth. The juice has astringent properties and is used in domestic medicine for hardening the gums, for skin eruptions, sores, dysentery, hemorrhoids, and venereal diseases, to prepare a gargle for sore throat, as a wash to restore and give luster to the hair, and to remove stains from the teeth. The roots are chewed to relieve toothache.

The species exhibits great variation in the form of the leaves, even upon a single plant.

19. *Jatropha neopauciflora* Pax in Engl. Pflanzenreich IV. 147: 134. 1910.

Mozinna pauciflora Rose, Contr. U. S. Nat. Herb. 12: 282. pl. 22. 1909.

Jatropha pauciflora Pax in Engl. Pflanzenreich IV. 147: 82. 1910.

Puebla; type from Tehuacán.

Shrub, 3 to 4 meters high, similar to the last species; leaves usually larger, usually 1.5 to 3 cm. wide; seed about 1 cm. in diameter.

20. *Jatropha cordata* (Orteg.) Muell. Arg. in DC. Prodr. 15²: 1078. 1866.

Mozinna cordata Orteg. Hort. Matr. Dec. 107. 1799.

Loureira glandulosa Cav. Icon. Pl. 5: 18. pl. 430. 1799.

Sonora and southern Chihuahua to Jalisco.

Shrub or small tree, 2 to 6 meters high; leaves ovate-cordate, crenate, usually not lobate, glabrous, lustrous. "Mata-muchachos" (Chihuahua); "jiotillo" (Sinaloa).

The bruised leaves are applied to sores, and they are added to water in which children are bathed, because of supposed strengthening properties. The juice is yellowish, and when dry forms a sulphur-colored powder.

21. *Jatropha vernicosa* T. S. Brandeg. Zoe 5: 206. 1905.

Southern Baja California; type from mountains of the Cape Region.

Shrub, 2 to 4 meters high, glabrous; leaves rounded-cordate, 3 to 7 cm. wide.

Rather doubtfully distinct from *J. cordata*.

22. *Jatropha cardiophylla* (Torr.) Muell. Arg. in DC. Prodr. 15²: 1079. 1866.

Mozinna cardiophylla Torr. U. S. & Mex. Bound. Bot. 198. 1859.

Sonora. Southern Arizona; type collected near Tucson.

Low glabrous shrub. "Torote" (Sonora.)

The roots are employed for tanning. When dried they contain over five per cent of tannic acid.

23. *Jatropha cinerea* (Orteg.) Muell. Arg. in DC. Prodr. 15²: 1078. 1866.

Mozinna cinerea Orteg. Hort. Matr. Dec. 107. 1799.

Mozinna canescens Benth. Bot. Voy. Sulph. 52. pl. 25. 1844.

Jatropha canescens Muell. Arg. in DC. Prodr. 15²: 1079. 1866.

Dry plains and hillsides, Baja California, Sonora, and Sinaloa.

Shrub or small tree, 1 to 6 meters high, with brown or whitish bark; leaves 2 to 7 cm. wide, more or less cordate at base, entire or somewhat undulate; flowers pinkish; capsule 2 to 2.5 cm. wide. "Sangregrado" (Sinaloa, Sonora); "sangre en grado" (Sonora); "lomboy" (Baja California); "torotito" (Sonora).

A decoction is employed as a mordant in dyeing. The juice is astringent and is used as a remedy for warts and sore throat, and for hardening the gums.

24. *Jatropha cercidiphylla* Standl., sp. nov.

Type collected between San Luis Potosí and Tampico (*Palmer* 1140; U. S. Nat. Herb. no. 42743); also in the Tres Marias Islands, Tepic.

Stipules linear-lanceolate, entire, persistent; petioles slender, 4 to 8 mm. long, inserted above the base of the blade; leaf blades orbicular to reniform, sometimes flabellate-orbicular, 1 to 2.3 cm. long, 1 to 2.7 cm. wide, broadly rounded or shallowly emarginate at apex, rounded or subcordate at base, subcoriaceous, glabrous or nearly so, glaucescent beneath, the venation conspicuous and reticulate; pistillate flowers axillary, solitary, the pedicels 1.5 to 6 cm. long; capsule glabrous, about 1 cm. long; seeds 4 to 5 mm. long, brown, rugulose.

25. *Jatropha platyphylla* Muell. Arg. in DC. Prodr. 15²: 1077. 1866.

Sinaloa to Michoacán.

Shrub, nearly glabrous; leaves 15 to 35 cm. broad, glaucous beneath, with short rounded lobes; seeds about 12 mm. long. "Sangregrado."

Sometimes cultivated as a hedge plant.

26. *Jatropha olivacea* Muell. Arg. *Linnaea* 34: 207. 1865.

Mexico to Oaxaca; type from San Juan del Estado, Oaxaca.

About a meter high, nearly glabrous; leaves 5 to 7 cm. long, 3 or 5-lobate; corolla about 8 mm. long.

27. *Jatropha alamani*¹ Muell. Arg. *Linnaea* 34: 207. 1865.

Known only from the type locality, Tehuantepec, Oaxaca.

Trunk 2.5 to 3 meters high; leaves 10 cm. wide, 5-lobate, cordate at base, puberulent.

28. *Jatropha sympetala* Standl. & Blake, Proc. Biol. Soc. Washington 33: 188. 1920.

Type from Playa de Coyula, Oaxaca.

Tree; leaves petiolate, obovate, 7 to 9 cm. long, rounded at apex, cuneate at base, glabrous, glaucescent beneath; cymes shorter than the leaves, hispidulous, long-pedunculate, the flowers red; corolla 8 mm. long. "Piñoncillo."

29. *Jatropha gaumeri* Greenm. Field Mus. Bot. 2: 256. 1907.

Yucatán; type from Izamal.

Shrub or tree, 3 to 10 meters high, the trunk sometimes 50 cm. in diameter; leaves of medium size, broadly cordate, usually cuspidate-acuminate, glabrous or nearly so. "Pomolché."

Branches sometimes used for making whistles. This has been reported from Yucatán as *Ficus jaliscana* and as *Jacaratia mexicana*.

¹ The species is named in honor of Lucas Alamán (1792–1853), who was born at Guanajuato. He studied under Cervantes, and traveled for some time in Europe. He forwarded notes and botanical specimens to De Candolle, and is said to have been well informed upon botanical subjects. He is best known for his literary and historical publications.

30. *Jatropha yucatanensis* Briq. Ann. Cons. Jard. Genève 4: 230. 1900.

Campeche and Chiapas; type from Campeche.

Tree; leaves 5 to 11.5 cm. wide, broadly cordate, pubescent beneath at first but soon glabrate; flowers green.

One collection from Puebla is closely related to this species, but may represent a distinct species. The material is too poor for certain determination.

31. *Jatropha curcas* L. Sp. Pl. 1006. 1753.

Sinaloa to Veracruz, Yucatán, and Chiapas. Widely distributed in tropical America; naturalized in the tropics of the Old World.

Shrub or tree, 1 to 6 meters high; leaves 6 to 35 cm. wide, shallowly 3 or 5-lobate, long-petiolate; flowers greenish yellow; capsule large, drupaceous, 2 or 3-celled; seeds about 2 cm. long. "Sangregado" or "sangregrado" (Sinaloa); "xcacal-ché," "siclte" (Yucatán, Maya); "piñoncillo" (Chiapas, Veracruz, Oaxaca); "quauhayohuatli," "quauhayohuachtli" (Nahuatl); "avellanas purgantes" (seeds), "piñón de Indias" (Veracruz, *Ramírez*); "piñón purgante" (Oaxaca); "piñón" (Guatemala, Nicaragua, Honduras, Venezuela, Santo Domingo, Porto Rico); "piñón botija" (Cuba); "coquillo" (Panama, Costa Rica); "tártago" (Porto Rico); "tempate" (Costa Rica, Nicaragua, El Salvador); "tempacte" (Guatemala); "tapate" (Costa Rica).

Known in the British West Indies as "physic-nut." Often cultivated in Mexico as a hedge plant, because the branches take root quickly when placed in the ground, and because the plant is not eaten by stock. Palmer reports that the plant gives a purple dye and is sometimes used for tanning. The wood is very soft and spongy. The seeds have an agreeable flavor and have been eaten by children, but sometimes with fatal results, for they are poisonous. They contain from 25 to 40 per cent of inodorous oil which is easily extracted by pressure. This has been employed in some regions for illuminating purposes, also for soap making, as a lubricant, and in paints. The leaves are said to be used in the Philippines for stupefying fish. In Costa Rica they are applied as poultices for eczema and other skin diseases. The seeds possess drastic purgative properties.

The plant is described at length by Oviedo (Lib. X, Cap. IV), who mentions the purgative properties of the seeds, which were known to the Indians who, on this account, planted the trees about their houses. He relates how his own small children in the city of Santo Domingo in 1520 ate some of the seeds and narrowly escaped death. The plant is described and figured by Hernández,¹ who says: "The *Quauhayohuachtli* is a tree of medium size, with large leaves like those of burdock, round and angled. The fruit, somewhat like plums or nuts, has three piñones contained in its cavities, in their form, size, and kernels much like the fruits of our pine, but very different in their properties. It is a powerful vomitive, and purges all kinds of humors. For chronic diseases the seeds are much used, in the quantity of five or seven; always an odd number; I do not know the reason for this injunction. They are accustomed to make their action milder by roasting them and soaking them for some time in water or wine. Their nature is hot and oily. The tree grows in hot places, such as Tepecuacuilco [Guerrero]." Sessé and Mocino state that the roasted seeds were ground and mixed with chile and tomato to make a sauce or condiment known as "pipián." Humboldt and Bonpland report that the Indians ate the seeds after removing the embryo.

¹ Thesaurus 87-88. 1651.

An interesting account is given by Urbina¹ of *axi*, *axin*, or *aje*, an oily yellowish substance which is produced by a scale insect of the same name upon the branches of *Jatropha curcas*, *Spondias*, and other trees. Urbina quotes from Llave, who says:

"The *Coccus axin* was brought from Tlacotalpan in the State of Veracruz, and Dr. Schiede, a German physician, has told me that he has seen it also at Papantla. This animal lives on the bark of the plant called in the tierra caliente Piñón (*Jatropha curcas*) and on that called Jobo (*Spondias mombin*).

"We know that they cultivate these insects in Tlacotalpan, whence they have sent information regarding the conservation, propagation, and extraction of the *Axi*. The first is practiced by placing the insects, when they have reached their full development (in October or November), within corn husks filled with corn silk, which latter alone should come in contact with the insects. These bundles are stored in a place which is dry and free from ants or other insects which might injure them; and in the month of May or June, when the rains begin, they open the bundles at one end, and find within a white envelope like spider web; and then they bind the bundles to the trees destined for propagation, and in a short time the trees are covered with the new insects. The trees used are known by the vernacular names of *Jobo* and *Piñón*; and as soon as the insects find a place on the bark they remain fixed there until they are scraped off in order that the *Axi* may be extracted from them. This operation is practiced by separating the insects first from the dust which covers them; next they are put to boil in ordinary water until they disintegrate and the wax rises to the surface, whereupon they are strained in a piece of cloth in order to extract all the wax possible. This is placed in jars and left to stand 20 hours or more, when it is found to be slightly coagulated; then it is stirred until it forms small balls, which are washed and put over a slow fire to remove the moisture; afterward the wax is strained, and when cold it is in form fit for use.

"Among other uses, we know that the natives of Tlacotalpan employ this wax, melted, for varnishing pieces of crockery; and if a certain degree of heat is applied, there is obtained a sort of jelly, which, if rubbed over paintings, gives a very brilliant varnish.

"The culture of the *Axin* is a fact which confirms the favorable opinion which must be held of the ancient inhabitants of our country, for the domestication of plants and animals is always a proof of civilization."

Urbina quotes also from Herrera, who says: "The *Aje* has a consistency like butter; it is yellow, and has a peculiar odor similar to that of rancid butter. * * * The Indians used it for erysipelas and as a resolute and vulnerary; they employed it also for the cure of hernia, mixing it with hule [crude rubber], turpentine, and arrayán; it is used for various uterine affections. In the arts it is used as an excellent varnish for wood and metals, and it is employed by the natives to varnish *jícaras*."

"*Axin*" is produced in many parts of Mexico. It is well known in Yucatán, where the Maya name is "ni-in." The varnish is said to be very durable, and is employed, among various uses, for varnishing guitars. Dondé states (according to Urbina, loc. cit.): "It is probable that the ancient inhabitants of the country (Yucatán) employed this oil in painting their buildings, and for this reason there are still seen, after three centuries, their decorations, whose good state of preservation aroused the admiration of Mr. Stephens, when, in 1842, he visited our ruins."

For an illustration of *Jatropha curcas* see Contr. U. S. Nat. Herb. 8: pl. 42.

¹ Naturaleza 7: 363-365. 1902.

32. *Jatropha rufescens* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 88. 1910.

Known only from the type locality, Tlacuilotepec, Puebla, altitude 1,800 to 2,100 meters.

Branches thick and succulent; leaves 6 to 10 cm. wide, shallow-lobate or merely undulate, cordate at base, bright green on the upper surface, covered beneath with a dense brownish tomentum.

33. *Jatropha pseudocurcas* Muell. Arg. Linnaea 34: 208. 1865.

Jalisco to Oaxaca; type from Oaxaca.

Shrub, 3 to 4.5 meters high; leaves 10 to 20 cm. wide, broadly cordate at the base, copiously pubescent; capsule 2.5 cm. long.

DOUBTFUL SPECIES.

The following, described from Mexico by Cervantes in 1794 (Supl. Gac. Lit. Méx. 3, 4), are so imperfectly characterized that their identification is altogether doubtful: *J. ciliata*, *J. edulis*, *J. octandra*, *J. palmata*, *J. quinqueloba*, *J. triloba*.

19. **MANIHOT** Adans. Fam. Pl. 2: 356. 1763.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147 II: 21-99. 1910.

Shrubs or trees, or sometimes herbs, usually with succulent stems, often glaucescent; leaves alternate, petiolate, usually large and lobate; flowers large, monoecious, apetalous, racemose or paniculate; fruit a capsule.

Manihot glaziovii Muell. Arg. is the Ceara rubber tree, an important rubber plant of Brazil.

Bracts of the inflorescence large and foliaceous.

Lobes of the leaves shallowly lobate-----1. *M. pringlei*.

Lobes of the leaves entire.

Calyx glabrous outside-----2. *M. crassisepala*.

Calyx pubescent-----3. *M. foetida*.

Bracts small and inconspicuous.

Lobes of the leaves lobate.

Lobes of the leaves linear or lance-linear, broadest below the middle.

4. *M. angustiloba*.

Lobes of the leaves broad, dilated at apex.

Calyx 1 cm. long; bractlets usually absent-----5. *M. carthaginensis*.

Calyx 1.5 cm. long; bractlets of the pedicels linear, 5 to 10 mm. long.

6. *M. intermedia*.

Lobes of the leaves entire.

Bracts incised-laciniate-----7. *M. microcarpa*.

Bracts entire.

Calyx pubescent within, glabrous outside.

Anthers very short; ovary 6-angulate; capsule winged 8. *M. esculenta*.

Anthers elongate; ovary terete; capsule not winged-----9. *M. dulcis*.

Calyx glabrous throughout.

Leaves 3-parted, the lobes truncate or emarginate--10. *M. pauciflora*.

Leaves 3 to 7-lobed or parted, the lobes acutish to acuminate.

Lobes of the leaves lanceolate-----11. *M. olfersiana*.

Lobes of the leaves rhombic or obovate.

Lobes rhombic, abruptly dilated above-----12. *M. rhomboidea*.

Lobes obovate, not abruptly dilated.

Lobes abruptly cuspidate-acuminate-----13. *M. caudata*.

Lobes merely acuminate-----14. *M. aesculifolia*.

1. *Manihot pringlei* S. Wats. Proc. Amer. Acad. **26**: 148. 1891.

Tamaulipas and San Luis Potosí; type from Las Canoas, San Luis Potosí.

Shrub, 2 meters high, the stems as much as 4 cm. in diameter; bark thin, brownish gray, nearly smooth; wood white, soft and fibrous; leaves 5 or 7-parted, 9 to 12 cm. long, the lobes usually lobate; flowers white, about 2 cm. long. "Matorral" (Tamaulipas).

2. *Manihot crassisepala* Pax & Hoffm. in Engl. Pflanzenreich IV. **147**^{II}: 28. 1910.

Known only from the type locality, Colima.

Tree; leaves 3-lobate, glabrate; calyx 2 cm. long; seeds red.

3. *Manihot foetida* (H. B. K.) Pohl, Pl. Bras. **1**: 55. 1827.

Janipha foetida H. B. K. Nov. Gen. & Sp. **2**: 84. 1817.

Known only from the type locality, Mexicala, Guerrero.

Large tree with gray bark; leaves 3-parted, glabrous; calyx 1.3 cm. long; ovary white-tomentulose. "Ayotectli."

4. *Manihot angustiloba* (Torr.) Muell. Arg. in DC. Prodr. **15**²: 1073. 1866.

Janipha manihot angustiloba Torr. U. S. & Mex. Bound. Bot. 199. 1859.

Chihuahua and Sonora to Oaxaca; type from Santa Cruz, Sonora. Southern Arizona; Guatemala.

Low shrub, or often herbaceous; leaves 3 to 7-parted, the lobes 3 to 15 cm. long, usually lobate but sometimes entire; calyx about 1 cm. long.

5. *Manihot carthaginensis* (Jacq.) Muell. Arg. in DC. Prodr. **15**²: 1073. 1866.

Jatropha carthaginensis Jacq. Stirp. Amer. 256. pl. 162. f. 1. 1763.

Manihot chlorosticta Standl. & Goldm. Contr. U. S. Nat. Herb. **13**: 375, 1911.

Baja California to Chiapas and Yucatán. Southern Arizona, Central America and northern South America; type from Cartagena, Colombia.

Tree or shrub, sometimes 6 meters high, sparsely branched; leaves 8 to 12 cm. long, 5 or 7-lobate. "Xcaché" (Yucatán, Maya); "yuca de monte" (Costa Rica); "yuca," "yuquilla" (Venezuela), "cuadrado" (Sinaloa).

This species is said to be cultivated in Brazil for the fleshy roots, from which flour is obtained. The tubers are smaller than those of *M. utilissima*, but richer in starch. The seeds have emetic and purgative properties.

6. *Manihot intermedia* Weatherby, Proc. Amer. Acad. **45**: 427. 1910.

Guerrero; type from Iguala Canyon, altitude 915 meters.

Shrub, 1 to 2 meters high, glabrous; calyx bluish outside, yellowish within.

7. *Manihot microcarpa* Muell. Arg. Flora **55**: 42. 1872.

Type from Mexico, the locality not known.

Leaves 5 or 7-parted, 6 to 8 cm. long; calyx 11 to 12 mm. long; capsule 7 mm. long.

8. *Manihot esculenta* Crantz, Inst. Herb. **1**: 167. 1766.

Jatropha manihot L. Sp. Pl. 1007. 1753.

Manihot utilissima Pohl, Pl. Bras. **1**: 32. pl. 24. 1827.

Manihot manihot Karst. Deutsch. Fl. 588. 1880-83.

Cultivated, especially in Yucatán, Veracruz, Oaxaca, etc., and in some places escaped from cultivation. Native of Brazil, but cultivated in most tropical regions.

Shrub, usually 2 to 3 meters high; roots tuberous, elongate and thick; leaves 3 to 7-parted, 8 to 17 cm. long, usually glabrous and glaucous beneath; capsule about 1.5 cm. long, "Huacamote," "huacamotl," "huacamotli," "yuca," "yuca brava" (*Ramírez*); "cuacamote" (Oaxaca); "yuca amarga" (Yucatán); "yuca

agria" (Cuba); "cáxcamote" (Guatemala); "quiscamote" (Honduras); "guacamote" (Oaxaca, *Conzatti*).

Cassava¹ is one of the valuable food plants of the world, and the most important one in many tropical regions, taking the place of corn and wheat. It is much cultivated in some parts of Mexico, especially in the Yucatán Peninsula, and is said to have been introduced in preconquest times. The plants are grown from cuttings. Two well-marked varieties occur: One may be used without special treatment ("yuca dulce"); the other has very poisonous juice, the injurious principle of which is made harmless by heat. The poisonous properties have been attributed to hydrocyanic acid, but others claim that they are due to a peculiar principle, manihotoxine. Meal, starch, and cassava or tapioca are obtained from the roots. The first is prepared by peeling and grating the root, expressing the juice, and drying and sifting the meal, which must also be heated in the case of the poisonous variety. Starch is obtained by precipitation from an infusion of the grated roots. Tapioca is prepared by roasting the starch grains. The roots of the cassava plant also furnish a useful food for stock of all kinds. Cassaripe, the thickened gum obtained from the root of yuca agria, has antiseptic properties and is commonly used in Brazil for the preservation of meat. The Caribs prepared an intoxicating liquor from the roots. According to Barham, the fresh roots, when eaten, cause pain in the stomach, swelling of the abdomen, violent vomiting and purging, giddiness, chills, dimness of vision, and in a few hours death.

The cassava plant is treated at great length by Oviedo (Lib. VII, Cap. II) as well as by most other early writers upon tropical American natural history. He describes the method of cultivation with considerable detail. The yuca dulce, he states, was not known in the islands. He asserts that the yuca agria is poisonous to all animals except cows, horses, and rats, and that "a small draught of the juice will kill an elephant or any other animal or man." He does not claim to have had personal experience in the case of the elephant. "If this deadly juice is boiled two or three times, the Indians eat it, making soup of it, as a good pottage and tonic; but as it cools, they cease to eat it, for although it will not kill after it has been cooked, they say that it is difficult of digestion if eaten cold. If when the juice is expressed it is boiled down two-thirds and left to stand two or three days, it turns sweet, and this they use as a sweet beverage, mixing it with other food; and after it is boiled and settled, the juice turns sour and is used like vinegar or sour wine. * * * When there were many Indians in Hispaniola, if one of them wished to die, he ate the yuca roots, and after two or three days or less he died; but if he drank the fresh juice, he had no time for repentance, for his life ended then and there." Oviedo states that six varieties of yuca, which he names, were grown in Hispaniola. According to the same author, "yuca" was the Haitian name for the plant, and the bread made from it was known as "caçabi."

9. *Manihot dulcis* (Gmel.) Pax in Engl. Pflanzenreich IV. 147^{II}: 71. 1910.

Jatropha dulcis Gmel. Onom. Bot. 5: 7. 1772-78.

Manihot aipi Pohl, Fl. Bras. Icon. Descr. 1: 29. pl. 23. 1827.

Cultivated in Yucatán, Oaxaca, and perhaps elsewhere; in some localities said to be naturalized. Native of South America.

Shrub, 1 to 4 meters high; leaves deeply 3 to 13-parted, glabrous or nearly so; calyx 12 to 14 mm. long; capsule about 1.5 cm. long. "Yuca dulce"

¹ Introduced into Mexico in precolumbian times, and called by the Aztecs "quauhcamotl," "tree-potato."

(Yucatán, Oaxaca); "cuacamote dulce" (Oaxaca, *Reko*); "guh-yaga" (Oaxaca, Zapotec, *Reko*).

This species also has edible tuberous roots, which are often cooked as a vegetable. The starch is sometimes extracted.

10. *Manihot pauciflora* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 89. 1910.

Puebla; type from Santa Lucía.

Glabrous shrub, 2 to 3 meters high, with dark brown branches; leaves 3-parted, the lobes broadly cuneate, about 1.5 cm. long; flowers solitary or fasciculate, the calyx 2 cm. long; capsule nearly 2 cm. in diameter.

Very unlike the other Mexican species, the leaves resembling those of some species of *Oxalis*.

11. *Manihot olfersiana* Pax in Engl. Pflanzenreich IV. 147^{II}: 55. 1910.

Known only from the type locality, in Oaxaca.

Glabrous; leaves 10 to 14 cm. long; calyx 1 cm. long.

12. *Manihot rhomboidea* Muell. Arg. Linnaea 34: 205. 1865.

Described from Mexico, the locality not known.

Leaves 5 or 7-parted.

13. *Manihot caudata* Greenm. Proc. Amer. Acad. 39: 82. 1903.

Southern Chihuahua to Guanajuato and Michoacán; type from Batopilas, Chihuahua.

Shrub or small tree, 4 to 5 meters high; leaves deeply 3 to 7-lobate, the lobes 3 to 15 cm. long, tipped with a mucro 1 to 2 cm. long; capsule 1.8 to 2.2 cm. long.

14. *Manihot aesculifolia* (H. B. K.) Pohl, Pl. Bras. 1: 55. 1827.

Janipha aesculifolia H. B. K. Nov. Gen. & Sp. 2: 107. pl. 109. 1817.

Yucatán Peninsula; type from Bay of Campeche; Veracruz(?).

Glabrous; leaves 5 or 7-parted, 8 to 12 cm. long; calyx 1.5 to 1.8 cm. long, greenish. "Xchaché" (Maya); "yuca cimarrona" (*Ramírez*).

20. HURA L. Sp. Pl. 1008. 1753.

1. *Hura polyandra* Baill. Étud. Gén. Euphorb. 543. 1858.

Ignatia amara Sessé & Moc. Pl. Nov. Hisp. 21. 1887.

Sinaloa to Chiapas, Yucatán, and Veracruz; often planted; type from Echi-covia, Oaxaca. Guatemala to Costa Rica.

Large tree, often 15 meters high, with a trunk 40 cm. or more in diameter, the crown broad and spreading, the bark grayish; branches and trunk often provided with sharp spines; leaves alternate, deciduous, long-petiolate, cordate-ovate, glabrous, crenate-dentate; flowers monoecious, apetalous, the pistillate in thick spikes; fruit depressed-globose, 8 to 10 cm. broad, about 15-celled; seeds flattened, brown, about 3 cm. long. "Ovillo" (Michoacán, Guerrero); "jabilla" or "habilla" (Yucatán, Veracruz, Morelos, Oaxaca, Guatemala, etc.); "solimanché" (Yucatán); "haba de San Ignacio" (Oaxaca, Puebla); "quauhtlatlatzin" "quauhayohuatli" (*Hernández*); "pepita de San Ignacio" (Morelos); "árbol del diablo," "haba de Guatemala" (Oaxaca); "haba de indio" (*Ramírez*); "tetereta" (Guatemala); "haba" (Sinaloa); "cua-tatachi" (*Robelo*).

The Mexican plant has nearly always been referred to *H. crepitans* L., but that species, which has a wide range in the West Indies and South America, and extends into Costa Rica, probably does not reach Mexico. Strangely enough, also, the plant has been reported in some Mexican publications as *Strychnos ignatii*, a Philippine plant of a distantly related family. *Hura polyandra* dif-

fers from *H. crepitans* in the structure of the stamens, but otherwise resembles it closely, and it may be presumed that the two species have the same properties.

The wood is light and soft, whitish, with brown stripes; the specific gravity is about 0.50. It is used for various purposes but not very extensively. In parts of Mexico the trunks have been employed for telegraph poles. The copious milky juice is poisonous in contact with the skin or if taken internally. On the west coast it is much used for poisoning fish. The most curious part of the tree is the large fruit, which resembles a small pumpkin. When ripe the fruit explodes with considerable violence, scattering the sections (which are arranged like those of an orange) with the inclosed seeds in every direction. The seeds, which contain about 50 per cent of oil, have violent purgative properties, and are sometimes administered internally, but their use is dangerous. They are used for poisoning coyotes and other animals. The juice of this and *H. crepitans* is said to have been used as a remedy for elephantiasis and leprosy.

The English name usually applied is sandbox tree. This is derived from the fact that in early days the immature fruits were dried, and after the seeds had been removed the capsule was used as a container for the sand employed in drying or blotting ink.

The tree is figured by Hernández¹ and described in a chapter headed "De Quauhtlatlatzin," seu arbore Crepitanti II."

21. *MABEA* Aubl. Pl. Guian. 2: 867. 1775.

1. *Mabea occidentalis* Benth. in Hook. Journ. Bot. 6: 364. 1854.

Tabasco and Chiapas. Central America and northern South America; type from Panama.

Slender shrub or tree, 2 to 6 meters high; leaves lance-elliptic or lanceolate, 5- to 15 cm. long, cuspidate-acuminate, coriaceous, entire or crenulate, very lustrous on the upper surface, glabrate; flowers monoecious, purplish, in long raceme-like panicles; capsule trisulcate, about 1.5 cm. long, puberulent.

The sap is said to yield a kind of rubber.

22. *DALEMBERTIA* Baill. Étud. Gén. Euphorb. 545. 1858.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147^v: 268-270. 1912.

Shrubs, glabrous or pilose with simple hairs; leaves large, alternate, long-petiolate, entire, dentate, or lobate; flowers monoecious, apetalous, the spikes bisexual, the pistillate flowers numerous, very densely spicate.

Pistillate pedicels early reflexed-----1. *D. populifolia*.

Pistillate pedicels not reflexed.

Young branches ferruginous-pubescent-----2. *D. triangularis*.

Young branches glabrous.

Leaves subentire or irregularly trilobate-----3. *D. hahniana*.

Leaves deeply 3 to 11-lobate-----4. *D. platanoides*.

1. *Dalembertia populifolia* Baill. Étud. Gén. Euphorb. 346. pl. 5, f. 11-15. 1858.

Alcoceria pringlei Fernald, Proc. Amer. Acad. 36: 493. 1901.

Guerrero and Oaxaca.

Shrub, 3 to 5 meters high, glabrous or nearly so; leaves 5 to 14 cm. long and about as wide, often cuspidate at apex, remotely repand-dentate or 3 or 5-lobate, bright green; flowers purplish; capsule about 1 cm. wide, borne on a pedicel 1 to 4.5 cm. long.

¹ Thesaurus 88. 1651.

² The Nahuatl name signifies "explosive tree."

2. *Dalembertia triangularis* Muell. Arg. Linnaea 34: 218. 1865.

Type from Mexico, the locality not known.

Leaves 3.5 to 4 cm. long, cordate at base, usually 3-lobate, densely pubescent when young.

3. *Dalembertia hahniana* Baill. Adansonia 11: 125. 1873.

Known only from the type locality, Xochicalco, Morelos.

4. *Dalembertia platanoides* Baill. Ann. Sci. Nat. IV. 9: 197. 1858.

Known only from the type locality, mountain forests of Oaxaca.

23. GYMNANTHES Swartz, Prodr. Veg. Ind. Occ. 95. 1788.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147: 81-11. 1912.

Glabrous shrubs or trees; leaves alternate, petiolate, entire or glandular-denticulate, stipulate; flowers usually monoecious, apetalous, spicate; capsule 3-sulcate.

Leaves mostly obovate, broadest above the middle; ovary stipitate.

1. *G. lucida*.

Leaves broadest at or below the middle; ovary sessile.

Mature leaves firmly membranaceous-----2. *G. riparia*.

Mature leaves coriaceous.

Leaves rather dull, not reticulate-veined-----3. *G. actinostemonoides*.

Leaves lustrous, prominently reticulate-----4. *G. longipes*.

1. *Gymnanthes lucida* Swartz, Prodr. Veg. Ind. Occ. 96. 1788.

Yucatán. Southern Florida and the West Indies.

Shrub or tree, sometimes 10 meters high, with a trunk 20 cm. in diameter, the bark thin, smooth or somewhat scaly, brown; leaves 5 to 10 cm. long, short-petiolate, obtuse, crenate-serrulate or entire; capsule 7 to 9 mm. in diameter; wood hard, close-grained; dark brown, taking a fine polish, the specific gravity about 1.09. "Aité," "yaití," "aceitillo" (Cuba).

In the West Indies the wood is sometimes used for making canes. The milky juice is said to be very poisonous; if it falls upon the skin it produces inflammation or even ulceration.

2. *Gymnanthes riparia* (Schlecht.) Klotzsch, Arch. Naturg. 7: 182. 1841.

Excoecaria riparia Schlecht. Linnaea 7: 386. 1832.

Gymnanthes schlechtendaliana Muell. Arg. Linnaea 32: 100. 1863.

Veracruz; type collected near Zoncuautila and Jalapa.

Leaves elliptic-lanceolate, 5 to 10 cm. long, 2.5 to 3 cm. wide, shortly cuspidate-acuminate, short-petiolate, obscurely crenate-serrulate; capsule 8 to 10 mm. long.

3. *Gymnanthes actinostemonoides* Muell. Arg. Linnaea 32: 103. 1863.

Veracruz; type from Zacuapan.

Shrub or tree, sometimes 13 meters high; leaves deciduous, elliptic-lanceolate to ovate-oval, 4 to 9 cm. long, acute or acuminate, crenate-serrulate.

4. *Gymnanthes longipes* Muell. Arg. Linnaea 34: 216. 1865.

Veracruz and San Luis Potosí (type locality).

Leaves persistent, elliptic-lanceolate, cuspidate-acuminate, crenate-serrulate; capsule 9 mm. long.

The last three species are closely related and it is doubtful whether they are distinct.

24. **SEBASTIANIA** Spreng. Neu. Entd. 2: 118. 1821.REFERENCE: Pax in Engl. Pflanzenreich IV. 147^v: 88-153. 1912.

Trees or shrubs; leaves alternate, petiolate, usually serrulate, with small stipules; flowers usually monoecious, apetalous, spicate.

Bracts of the inflorescence petiolate-----1. *S. adenophora*.
Bracts sessile-----2. *S. pavoniana*.

1. *Sebastiania adenophora* Pax & Hoffm. in Engl. Pflanzenreich IV. 147^v: 145. 1912.

Yucatán; type from Silam.

Shrub or tree, 3 to 6 meters high, glabrous; leaves ovate or oval-ovate, 3 to 5 cm. long, acute or acuminate, serrulate, slender-petiolate. "Kanchunup."

This has been reported from Yucatán as *Excoecaria glandulosa* Swartz.

2. *Sebastiania pavoniana* Muell. Arg. in DC. Prodr. 15^a: 1189. 1866.

Gymnanthes pavoniana Muell. Arg. Linnaea 32: 106. 1863.

Sebastiania pringlei S. Wats. Proc. Amer. Acad. 26: 149. 1891.

Sebastiania palmeri Rose, Contr. U. S. Nat. Herb. 1: 112. 1891.

Sebastiania ramirezii Maury, Naturaleza II. 2: 405. 1894.

Sonora to Tepic and San Luis Potosí.

Shrub, 1.5 to 2.5 meters high, glabrous, with slender branches; leaves lanceolate or ovate, 4 to 11 cm. long, acuminate, irregularly serrulate; slender-petiolate; spikes slender, 1 to 3 cm. long; capsule about 1 cm. in diameter. "Palo de la flecha," "hierba de la flecha" (Sonora); "minecapatli" (Nahuatl).

The milky juice was employed formerly by the Indians for poisoning their arrows. The best-known part of the plant, however, is the fruit, which furnishes the famous "jumping beans" or "semillas brincadoras," which are a common article in curio shops of the Southwest. The following is a translation of the notes upon the subject published by Pax:

"The jumping seeds have a curved outer side, with a rounded keel, and two flat sides. They are yellowish gray and show on the outside no opening or point of injury. If they are laid upon one of the flat sides, with a quick movement they turn upon the other. A longer time is demanded for the movement from the curved side to one of the flat ones. Frequently the beans hop several millimeters in the air, and thus they may also move forward.

"Soon after the first notice of these peculiar seeds it was conjectured that the cause of the movement must be a living occupant, which was verified by investigation. In the 'jumping beans' lives the whitish larva of a small butterfly belonging to the *Tortricidae*, named by Westwood as *Carpocapsa saltitans*. The insect occurs especially in the Mexican States of Sonora, Michoacán, Guerrero, Puebla, and Veracruz. The larva consumes the contents of the 'seed' and covers the inner surface of the latter with a web. The French entomologist Lucas gives as an explanation of the jumping that the larva, which lacks much of filling the cavity, supports itself upon the web by its body-feet, then loosens its chest-feet and anterior body-feet, stretches itself out violently, and strikes upon the wall of its dwelling with its head.

"With a warm temperature the intensity of the movement increases, although it is not brought to a halt by a lower temperature. Consequently the seeds occasionally brought to Europe retain their movement for some time. In Berlin the larvae survived for weeks in unheated rooms. Buchenau reports that Martens in 1871 brought jumping seeds to Europe * * *. He had left Mexico in the middle of June. There was no longer any food left in the seeds for the larvae. Nevertheless their violent movements continued until March of the following year. In April the larvae changed into chrysalises, and in May or June the butterflies emerged, for which they lifted up a circular lid which

the larva earlier had cut out of the seed wall. Different investigations were made in order to discover the advantage derived by the insect from the movements. Some observers, among them Ascherson, surmise that the jumping of the seeds is a means of frightening seed-eating animals, an explanation which can scarcely be considered adequate. The 'jumping beans' are not produced in equal abundance every year. Many years none at all are found."

The "jumping beans" were not known in Europe until 1854, when some were sent to England by the British minister, and the determination of the plant which produced them was long unknown. In Mexico they are known to be derived in part from *Sapium biloculare*, and probably they are borne by plants of other related genera.¹ In other countries also similarly affected fruits are found in nearly related plants: In Africa, *Sapium ellipticum* (Hochst.) Pax; in Brazil and Chile, species of *Colliguaya*.

It may be that more than one species is represented here, but this seems very doubtful.

25. CORYTHEA S. Wats. Proc. Amer. Acad. 22: 451. 1887.

Shrubs; leaves alternate, petiolate, crenate, stipulate; flowers monoecious (?), the staminate glomerate in the axils of scarious galeate bracts; staminate sepals 4; pistillate sepals 6; capsule 3-celled, tuberculate.

The following are the only species known.

Pistillate flowers solitary or fasciculate in the axils; leaves short-petiolate.

1. *C. filipes*.

Pistillate flowers racemose; leaves long-petiolate-----2. *C. multiflora*.

1. *Corythea filipes* S. Wats. Proc. Amer. Acad. 22: 451. 1887.

Known only from the type locality, barranca near Guadalajara, Jalisco.

Slender shrub, about 2 meters high; leaves alternate, thin, ovate to oblong-elliptic, 3 to 7 cm. long, obtuse or acutish, obtuse at base, coarsely crenate, puberulent or glabrate; staminate flowers spicate; pedicels 3 cm. long or less.

2. *Corythea multiflora* Standl., sp. nov.

Type collected between Acaponeta and Concepción, Tepic (Rose 1532; U. S. Nat. Herb. no. 300375).

Branchlets sparsely pubescent or glabrate; stipules small, scarious; petioles 6 cm. long or less; leaf blades elliptic-ovate to rounded-ovate, 5 to 12 cm. long or larger, acute or obtuse, rounded to subcordate at base, coarsely crenate, puberulent along the veins, 3 or 5-nerved at base; pistillate flowers few or numerous, racemose, the racemes 3 to 5 cm. long, the slender pedicels 2 to 10 mm. long, puberulent; capsule (immature) 3-lobate, strongly tuberculate, puberulent.

26. HIPPOMANE L. Sp. Pl. 1191. 1753.

1. *Hippomane mancinella* L. Sp. Pl. 1191. 1753.

Chiefly along seashores, Veracruz and Yucatán; Oaxaca; Socorro Island. Southern Florida, West Indies, Central America, and northern South America.

¹The following literature upon the subject may be cited: C. V. Riley, Mexican jumping beans and the plants upon which they are produced, Amer. Garden 1891: 552-554. 1891; C. V. Riley, Mexican jumping beans, Proc. Entomol. Soc. Washington 2: 178-181. 1892; José Ramírez, Otros datos para la historia de las semillas brincadores, Naturaleza II. 2: 403; José Ramírez, Nuevos datos para la historia de las semillas brincadoras, Naturaleza II. 2: 408.

Tree, sometimes 18 meters high, with a trunk 90 cm. in diameter, but usually much smaller, the branches spreading, forming a rounded crown, the bark thick, scaly, gray or brown; leaves alternate, persistent, ovate or oval, 4 to 10 cm. long, usually acute or short-pointed, crenulate-serrate, long-petiolate; flowers monoecious, in stout spikes; fruit drupaceous, 2.5 to 3.5 cm. broad, shallowly 6 or 8-lobate, yellow or yellowish green, tinged with red; wood soft, close-grained, dark brown, its specific gravity about 0.53. "Manzanillo" (Oaxaca, Veracruz, Cuba, Porto Rico, Santo Domingo, etc.); "árbol de la muerte" (Oaxaca); "manzanillo de la playa" (Costa Rica); "mançanila" (Colombia, Venezuela); "pinipiniche," "penipeniche" (Cuba); "hincha-huevos" (Mexico); "manzanillo de la costa" (Cuba).

The usual English name is "manchineel," evidently a corruption of the Spanish "manzanillo," the latter name having been applied by the early Spanish explorers because of the resemblance of the fruit to an apple. The milky juice was used by the Caribs for poisoning their arrows. It is very poisonous if taken internally, and upon the skin produces severe inflammation, but some people seem to be immune to the external effects of the juice. The smoke from the burning wood will cause inflammation of the eyes. The early explorers gave the most extravagant reports of the plant, stating that a person who rested beneath a tree would be blinded, or even die, but these statements were long ago proved to be erroneous. The wood has been employed in the West Indies for cabinetwork and interior finish, but great care must be taken in working with it, even when dry, and in cutting the trees. The fruit was often mistaken by the early explorers for crabapples, and was sometimes eaten with fatal results. It is reported in the West Indies that the flesh of fish or crabs which eat the fruit is poisonous, but goats are said to eat the fallen fruit greedily without injurious results. The seeds and bark have been employed as a vermifuge, but their use is dangerous. A gum which exudes from the trunk has been used in Jamaica in the treatment of dropsy and venereal diseases.

There are many references to manchineel in early American literature. Oviedo (Lib. IX, Cap. XII) writes of it as follows:

"In these regions there are innumerable *manzanillos*, with which and other poisonous mixtures the Indians are accustomed to make that diabolic poison for their arrows. These trees are usually low or spreading and some are more than 6 yards high; they have large tops full of leaves which resemble those of the pear. The trees are loaded with a fruit like apples, of good odor, as large as pears but round, or sometimes elongate, variegated with red, which gives them a pleasing appearance; but both they and the tree are poisonous in their effects. In Hispaniola the Indians did not use the plant, but there is no man who sees the fruit, if he does not know it, who does not wish to feast upon it, for its appearance and odor are inviting. It has been proved many times that if men carelessly lie down to sleep under the trees, when they rise after a short nap there is great pain in the head and swelling of the eyes and cheeks. And if by chance the dew from the tree falls on the face, it is like fire, blistering and burning the skin wherever it touches; and if it falls in the eyes it blinds or burns them, and the sight is endangered. If the wood is burned no one can endure it long, for it causes much heaviness, and such headache that all stand away from it, be they men or any other animals." Oviedo also cites one instance of a man who ate five or six of the fruits and was not injured thereby.

Richard Ligon, in one of the early English publications upon the West Indies,¹ which is quaintly written and full of interesting information, gives the following notes about the manchineel:

"The people that have lived long there, say, 'tis not wholsom to be under the shade of this tree. The fellers, as they cut them down, are very careful of their eyes; and those that have Cipers, put it over their faces; for if any of the sap fly into their eyes, they become blind for a month. * * * Yet, of this timber we make all, or the most part, of the Pots we cure our Sugar in; for, being sawed, and the boards dried in the Sun, the poyson vapours out. * * * The fruit is like an apple *John*, and 'tis said to be one of those poysons, wherewith the Indian Caniballs envenome their arrows."

27. *SAPIUM* Jacq. Stirp. Amer. 249. 1763.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147^v: 199–258. 1912.

Trees or shrubs, glabrous; leaves alternate, petiolate, usually glandular-denticulate, the stipules small; flowers monoecious, apetalous, spicate, the spikes terminal or lateral.

Some of the species are said to be used for dyeing and tanning. *Sapium jenmanii* Hemsl. is the chief source of rubber in British Guiana. *S. verum* Hemsl., of Colombia, is an important source of rubber, and the same is true of *S. pavonianum* Huber, also a native of Colombia, where it is known as "palo de leche."

Spikes lateral or axillary; leaves mostly 15 to 20 cm. long---1. *S. lateriflorum*.
Spikes terminal; leaves mostly less than 15 cm. long.

Glands at base of the leaf blade small, depressed.

Leaves oval, 3 to 5.5 cm. wide-----2. *S. appendiculatum*.

Leaves narrowly oblong or linear-oblong, less than 1.5 cm. wide.

3. *S. biloculare*.

Glands large, conic or cylindric.

Capsule sessile or nearly so; lateral nerves of the leaves nearly horizontal and straight-----4. *S. macrocarpum*.

Capsule long-stipitate; lateral nerves ascending, arcuate.

5. *S. pedicellatum*.

1. *Sapium lateriflorum* Hemsl. in Hook. Icon. pl. 2680. 1901.

Sinaloa to Oaxaca, Tabasco, and Veracruz. Guatemala.

Tree; leaves mostly elliptic, 10 to 20 cm. long, 5 to 6 cm. wide, usually rounded and short-pointed at apex, entire or nearly so, long-petiolate, with two large conic glands at the apex of the petiole. "Hierba de la flecha," "palo de la flecha" (Oaxaca); "hiza" (Sinaloa).

The milky sap is reported to be irritating and poisonous.

2. *Sapium appendiculatum* (Muell. Arg.) Pax & Hoffm. in Engl. Pflanzenreich IV. 147^v: 214. 1912.

Stillingia appendiculata Muell. Arg. Linnaea 32: 87. 1863.

Sinaloa to southern Chihuahua and Oaxaca.

Slender tree, 8 meters high; leaves long-petiolate, 5 to 10 cm. long, short-pointed at apex, serrulate or entire, often glaucescent; capsule 9 mm. long. "Hierba de la flecha" (Sinaloa); "palo de la flecha" (Sinaloa, Chihuahua).

As in other species, the milky juice is poisonous, and was used by the Indians for poisoning their arrows.

¹ Richard Ligon, a true and exact history of the island of Barbadoes, p. 68. 1673.

3. *Sapium biloculare* (S. Wats.) Pax in Engl. Pflanzenreich IV. 147^v: 221. 1912.

Sebastiania bilocularis S. Wats. Proc. Amer. Acad. 20: 374. 1885.

Sonora and Baja California; type collected between Rayón and Ures, Sonora.

Shrub or tree, sometimes 6 meters high; leaves 3 to 7 cm. long, short-petiolate, often glaucescent, rounded to acuminate at apex, glandular-serrulate; fruit 2-celled, about 1 cm. long. "Hierba de la flecha" (Sonora, Baja California); "hierba mala" (Sonora); "mago," "magot" (Opata).

This plant, like *Sebastiania pavoniana*, produces "jumping beans" (see p. 648). The juice is poisonous as in other species, and in Baja California the finely chopped branches are thrown in water to stupefy fish. Exposure to smoke from the burning wood or sleeping in the shade of the tree is said to cause sore eyes. The juice is said to be used by the Opata Indians to poison their arrows, but according to McGee¹ the evidence to this effect is not conclusive.

This is probably the plant to which Clavigero (Historia de la California, 1789) makes reference, as follows:

"Among the few plants of California there are some harmful ones, one of which is a certain shrub called by the Spaniards of that region *palo de la flecha*, for from it the Indians dwelling along the coast of Sonora obtain the terrible poison with which they poison their arrows, so as to cause mortal wounds. The Californians, although they are acquainted with the evil properties of the plant, have never employed it."

The leaves are broader in Baja California specimens than in those from Sonora, but it is doubtful whether the peninsular plant differs essentially. For an illustration of the tree see Contr. U. S. Nat. Herb. 16: pl. 117, B.

4. *Sapium macrocarpum* Muell. Arg. Linnaea 32: 119. 1863.

Sapium mexicanum Hemsl. in Hook. Icon. Pl. pl. 2680. 1901.

Guanajuato to Morelos.

Tree, 4.5 to 9 meters high; leaves 7 to 15 cm. long, 2 to 4 cm. wide, acute or obtuse, long-petiolate, obscurely denticulate; seeds nearly 1 cm. long. "Palo lechón," "hincha huevos" (Morelos).

The juice causes inflammation if it comes in contact with the skin. The wood is weak and soft.

5. *Sapium pedicellatum* Huber, Bull. Herb. Boiss. II. 6: 352. f. 9. 1906.
Sinaloa to Colima.

Tree of medium size; leaves 5 to 12 cm. long, long-petiolate, acuminate or short-pointed, serrulate; seeds 5 to 7 mm. long. "Higuerillo bravo" (Colima).

28. STILLINGIA A. Garden in L. Mant. Pl. 19. 1767.

REFERENCE: Pax in Engl. Pflanzenreich IV. 147^v: 180-199. 1912.

Glabrous shrubs; leaves alternate or opposite, petiolate, glandular-serrate; flowers monoecious, apetalous, spicate, the spikes usually terminal; capsule 3 or 2-lobate.

A few herbaceous species occur in Mexico.

The dried root of *S. sylvatica* L., a United States species, is official in the U. S. Pharmacopoeia. The plant is known locally as "queen's-delight" and "yaw-root." The root is said to contain an alkaloid, stillingine. The fluid extract is used in large doses as an emetic and cathartic and in smaller ones as

¹ Ann. Rep. Bur. Amer. Ethnol. 17: 259*. 1898.

an alterative. It is employed for syphilitic affections, scrofula, cutaneous diseases, and chronic hepatic affections.

Hernández gives two figures¹ that appear to represent species of this genus, both without description. Each is said to bear the name "amozotl."

Staminate flowers solitary in the bracts.

Staminate calyx 1.5 mm. long-----1. *S. acutifolia*.

Staminate calyx 3 to 3.5 mm. long-----2. *S. macrantha*.

Staminate flowers several in each bract.

Leaves opposite -----3. *S. sanguinolenta*.

Leaves alternate.

Leaves linear or lance-linear, less than 8 mm. wide----4. *S. bicarpellaris*.

Leaves lanceolate or elliptic, 12 to 22 mm. wide-----5. *S. zelayensis*.

1. *Stillingia acutifolia* Benth.; Hemsl. Biol. Centr. Amer. Bot. 3: 135. 1883.

Sapium acutifolium Benth. Pl. Hartw. 90. 1842.

Stillingia propria T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 185. 1915.

Chiapas. Guatemala; type from Hacienda de Argueta.

Shrub; leaves alternate, ovate-lanceolate, 4 to 7 cm. long, acuminate, sharply serrate; capsule 5 mm. long.

2. *Stillingia macrantha* (Muell. Arg.) Benth.; Hemsl. Biol. Centr. Amer. Bot. 3: 135. 1883.

Gymnostillingia macrantha Muell. Arg. Linnaea 32: 90. 1863.

Based upon a plant said to have been collected in Mexico by Pavón.

Leaves ovate-lanceolate, 6 to 7 cm. long, cuspidate-acuminate, serrate.

3. *Stillingia sanguinolenta* Muell. Arg. Linnaea 32: 88. 1863.

Nuevo León, San Luis Potosí, and Veracruz; type from "Baños de Atot."

Shrub, about a meter high or smaller; leaves linear-lanceolate to ovate, 2 to 5 cm. long, serrate.

Very variable in leaf shape. Material from Chiapas is closely related.

4. *Stillingia bicarpellaris* S. Wats. Proc. Amer. Acad. 21: 455. 1886.

Coahuila to Guanajuato and Hidalgo; type from Sierra Jimulco, Coahuila.

Shrub, 1 to 1.5 meters high; leaves 3 to 7 cm. long, very shortly petiolate, remotely glandular-denticulate; capsule about 9 mm. long.

5. *Stillingia zelayensis* (H. B. K.) Muell. Arg. Linnaea 32: 87. 1863.

Sapium zelayense H. B. K. Nov. Gen. & Sp. 2: 51. 1817.

Jalisco to San Luis Potosí and Morelos; type from Celaya, Guanajuato.

Shrub, about a meter high; leaves 3.5 to 9.5 cm. long, acuminate to very obtuse, sharply serrulate; capsule 10 to 12 mm. long.

77. BUXACEAE. Box Family.

Shrubs or small trees; leaves opposite, persistent, entire; flowers unisexual, in axillary inflorescences, small and inconspicuous; perianth of 4 or 5 sepals in the staminate flowers; petals none; stamens 4 or numerous; ovules solitary or geminate; fruit a 3-celled capsule.

Stamens 4; capsule 3-horned at apex-----1. **BUXUS**.

Stamens numerous; capsule not 3-horned-----2. **SIMMONDSIA**.

1. **BUXUS** L. Sp. Pl. 983. 1753.

Shrubs, glabrous or pubescent; leaves short-petiolate, coriaceous; flowers in dense axillary clusters, sessile or short-pedicellate; stamens opposite the sepals; sepals 6 in the pistillate flowers; seeds 3-angled.

¹ Thesaurus 349, 458. 1651.

The Old World box, *Buxus sempervirens* L., which is the best-known species, is often grown as a hedge plant. The plant is bitter and contains an alkaloid, buxine. A volatile oil distilled from the wood has been used in epilepsy, and a decoction of the wood has been employed in the treatment of rheumatism and secondary syphilis. A tincture of the wood was formerly employed as an antiperiodic. The leaves have been used in Europe as a substitute for hops in brewing beer.

Leaves and branches copiously pubescent-----1. *B. pubescens*.
Leaves and branches glabrous.

Leaves mostly oblanceolate, 4 to 6 cm. long, acute-----2. *B. lancifolia*.

Leaves oval or elliptic, 1.5 to 2 cm. long, obtuse or rounded at apex.

3. *B. mexicana*.

1. *Buxus pubescens* Greenm. Proc. Amer. Acad. 33: 481. 1898.

Known only from María Madre Island, Tepic.

Shrub or small tree, 4.5 to 8 meters high; leaves rhombic-ovate or oblong-ovate, 2 to 5 cm. long, 1.5 to 3 cm. wide, obtuse or acutish, glabrate on the upper surface; calyx 2 mm. long; ovary glabrous.

2. *Buxus lancifolia* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 273. 1912.

Known only from the type locality. Río de las Gallinas, near Rascón, San Luis Potosí.

Glabrous shrub; leaves subsessile, about 1.5 cm. wide, 3-nerved; calyx 2 mm. long; stamens exserted.

3. *Buxus mexicana* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 382. 1909.

Known only from the type locality, summit of Cerro de Coatepe, near San Luis Tultitlanapa, Puebla, altitude 2,100 to 2,400 meters.

Glabrous shrub, 1 meter high; leaves short-petiolate, 5 to 12 mm. wide; sepals 3.5 mm. long, pubescent; capsule about 8 mm. long.

2. *SIMMONDSIA* Nutt. Lond. Journ. Bot. 3: 400. 1844.

1. *Simmondsia californica* Nutt. Lond. Journ. Bot. 3: 401. pl. 16. 1844.

Simmondsia pabulosa Kellogg, Proc. Calif. Acad. 2: 21. 1859.

Sonora and Baja California. Southern California; type from San Diego.

Shrub or small tree, 1 to 4.5 meters high, with dichotomous puberulent branches; leaves oblong to oval, 3 to 6 cm. long, nearly sessile, obtuse or rounded at apex, pale green, strigillose; flowers dioecious, the staminate in sessile or pedunculate clusters, the pistillate solitary, on recurved pedicels; sepals 5; pistillate calyx accrescent in fruit; capsule 3-valvate, about 3 cm. long; seeds by abortion usually one. "Jojoba" (Sonora, Baja California).

Known in California as "pignut," "goatnut," "sheepnut," "wild hazel," and "quinine plant." Goats, sheep, and deer are fond of the fruit and leaves. The seeds have the flavor of chestnuts or hazelnuts, with a slight bitterness. The Indians ate them either raw or parched, and sometimes used them as a substitute for coffee. The seeds contain about 48 per cent of oil, which is used locally as a hair tonic. In southern California and northern Mexico the native people sometimes make a beverage from the seeds by roasting them and grinding them with the yolk of hard-boiled egg, then boiling the mass in water with sugar and milk, thus making a well-flavored and nourishing substitute for chocolate or coffee.

The first reference to the plant is that of Clavigero (Historia de la California, 1789), whose account is as follows: "The *jojoba* is one of the most highly valued fruits of California. The plant which produces it is a shrub which grows on the dry slopes of the mountains, and its leaves are oblong,

notched, smooth, the size of those of the rose, of a rather grayish green color. The fruit is an oblong berry, the size of a filbert kernel, dark red outside, white within, and with an oily and not unpleasant flavor. This fruit has become noted because of its medicinal virtues, especially as a remedy for retention of the urine, resulting from phlegmonous concretions, as an aid to parturition, and as a cure for wounds. The oil obtained from it is an excellent remedy for cancer, and since it has a good flavor, some of the people of California use it in salads like olive oil. This plant does not bear fruit every year, but only when there has fallen at least a heavy shower in the winter."

78. CORIARIACEAE. Coriaria Family.

1. CORIARIA L. Sp. Pl. 1037. 1753.

1. *Coriaria thymifolia* Humb. & Bonpl.; Willd. Sp. Pl. 4: 819. 1805.

Coriaria atropurpurea DC. Prodr. 1: 740. 1824.

Coriaria cuneifolia Sessé & Moc. Pl. Nov. Hisp. 173. 1887.

Jalisco to San Luis Potosí, Mexico, and Chiapas. Central America and South America; New Zealand; type from Ecuador.

Slender shrub or small tree, 1 to 4 meters high; leaves opposite, subsessile, distichous, lance-oblong or oblong-ovate, 1 to 2 cm. long, acute or acutish, puberulent or glabrate; flowers small, perfect, in long slender racemes, puberulent; sepals 5, imbricate, persistent; petals shorter than the sepals; stamens 10; fruit of 5 to 8 laterally compressed cocci, purplish. "Tlalocopetate," "tlalocopetlatl"¹ (Nahuatl); "tisfs" (Venezuela).

The slender lateral branches with the crowded distichous leaves suggest a compound leaf. The plant contains a toxic principle, coriamyrtine, which in animals causes convulsions, increase in the respiratory movement and heart action, and finally death by asphyxiation and nervous exhaustion. Children have been poisoned by eating the fruit, and in Mexico the plant is used for poisoning dogs and other animals. In Ecuador the fruit is used to make ink, which has a beautiful violet color; it writes black, but after a few hours reddens, and the writing is said to be indelible. Other species, notably *C. myrtifolia* L. of the Mediterranean region, have similar properties. *C. myrtifolia* is rich in tannin and is employed for tanning skins, and the leaves yield a black dye.

79. ANACARDIACEAE. Cashew Family.

REFERENCE: Engler in DC. Monogr. Phan. 4: 171-500. 1883.

Trees or shrubs, usually with resinous sap; leaves alternate, estipulate, simple, trifoliolate, or pinnate; flowers small, paniculate, perfect, dioecious, or polygamous; calyx 3 to 5-lobed or parted; petals 3 to 5, rarely none; stamens as many as the petals or twice as many; fruit superior, usually drupaceous.

Ovary 2 to 5-celled. Leaves pinnate.

Petals valvate in bud. Fruit glabrous.....1. SPONDIAS.

Petals imbricate.

Fruit glabrous; embryo curved; leaves nearly glabrous....2. TAPIRIRA.

Fruit pubescent; embryo straight; leaves densely pubescent.

3. CYRTOCARPA.

¹The Nahuatl name signifies "dwarf-ocopetlatl," *ocopetlatl* being a kind of fern.

Ovary 1-celled.

Fruit large, more than 2 cm. long; leaves simple.

Receptacle of the fruit enlarged and fleshy; drupe reniform, compressed.

4. **ANACARDIUM.**

Receptacle not enlarged; drupe ovoid, not compressed--5. **MANGIFERA.**

Fruit comparatively small, rarely over 1 cm. long; leaves usually compound, sometimes simple.

Petals none-----6. **PISTACIA.**

Petals present.

Stamens twice as many as the petals.

Fruit globose; petals deciduous-----7. **SCHINUS.**

Fruit compressed; petals deciduous-----14. **PACHYCORMUS.**

Stamens as many as the petals.

Pericarp not separating from the mature fruit.

Calyx in fruit accrescent and winglike-----8. **ASTRONIUM.**

Calyx not accrescent.

Flowers 3 or 4-parted; leaflets usually dentate or sinuate.

9. **COMOCLADIA.**

Flowers 5-parted; leaflets entire.

Leaflets long-petiolulate; flowers polygamous.

10. **METOPIMUM.**

Leaflets nearly sessile; flowers dioecious.

11. **MOSQUITOXYLUM.**

Pericarp separating easily from the fruit when dry.

Fruit strongly compressed, flat, broader than long, glabrous.

12. **PSEUDOSMODINGIUM.**

Fruit not compressed or only slightly so, usually as long as broad, pilose or sometimes glabrous-----13. **RHUS.**

1. **SPONDIAS** L. Sp. Pl. 371. 1753.

Trees or shrubs; leaves large, pinnate, deciduous, the leaflets unequal at base; flowers small, pedicellate, paniculate, polygamous; sepals 4 or 5; petals 4 or 5, oblong-ovate, acute, spreading, valvate; stamens 8 or 10; fruit a drupe with large, usually 5-celled stone.

Leaflets acute to rounded at apex, mostly 2 to 5 cm. long; panicles mostly 2 to 4 cm. long-----1. **S. mombin.**

Leaflets abruptly obtuse-acuminate, mostly 6 to 10 cm. long; panicles usually 15 to 30 cm. long-----2. **S. lutea.**

1. **Spondias mombin** L. Sp. Pl. 371. 1753.

Spondias purpurea L. Sp. Pl. ed. 2. 613. 1762.

Spondias mexicana S. Wats. Proc. Amer. Acad. 22: 403. 1887.

Sinaloa and Jalisco to Yucatán and Chiapas. Widely distributed in tropical America.

Shrub or tree, sometimes 10 meters high, with thick branches; bark smooth, grayish or white; leaflets 5 to 12 pairs, often subsessile, very variable in shape, pubescent when young but soon glabrate; petals purple, 3 mm. long; fruit 2 to 3 cm. long, usually purplish. "Ciruela" (the fruit; Spanish word for "plum"), "ciruelo" (the tree; Guerrero, Jalisco, Yucatán, Central America, etc.); "chiabal" (Yucatán); "ciruela agria," "ciruela roja," "ciruela colorada," "ciruela de México," "ciruela del país" (various localities); "jobo," "hobo," or "xobo" (Morelos, Guerrero, Veracruz, Colombia, Santo Domingo, Porto Rico); "biaxhi" (Oaxaca, Zapotec, *Reko*); "jocote" (Oaxaca, etc., Cen-

tral America; from the Nahuatl, *xocotl*¹); "abal" (Yucatán, Maya); "atoyaxotl," "costixocotl," "atoyaxocotl" (Nahuatl); "capuatlcacao" (Mexico, Morelos, *Ramírez*); "cupu" (Tarascan); "jocote tronador," "sismo" (Costa Rica); "ciruela campechana" (Cuba); "jobillo," "jobo francés" (Porto Rico); "ciruela calentana" (Colombia).

The English name is "hog plum." The tree is common in many parts of Mexico and is often planted, especially along fences. According to Merrill, it was introduced into the Philippines at an early date, and the name used there by the Tagalogs is "sirihuelas," evidently a corruption of "ciruela."

Usually the plant is only a shrub, with few long branches which frequently spread along the ground, but often it gets to be a small tree. It grows readily from cuttings. The wood is white or yellowish and when procurable in sufficiently large pieces may be used for interior finish and other purposes; it has been used in Brazil for paper pulp. The fruit varies greatly in size and quality. The skin is rather thick, usually purplish, but often yellow. The flesh is acidulous and somewhat resinous. Large quantities of the fruit are eaten in Mexico, raw or cooked, and it is sometimes dried or made into sweetmeats. It is used also to make cooling beverages and sometimes for intoxicating liquors. There is a popular belief in Mexico that if eaten in too great quantity the fruit causes fevers. Cattle and pigs are very fond of the fruits and fatten upon them.² The fruit is reputed to have diuretic and antispasmodic properties.

The tree is treated by most of the early writers upon tropical America. Oviedo (Lib. VIII, Cap. XXI) treats of it under the names "xocot," "ciruelo," and "hobo." "The wine made from the fruit," he says, "is of fair quality and keeps a year; to me it appears better than the apple cider of Vizcaya. * * * They also make very good vinegar of the *ciruelas*, and a good green sauce with them and *axi*." *Spondias purpurea* is illustrated by Hernandez,³ but without description, under the name "mazaxochotli." It is probably to this species also that Sahagún refers, under the names "macaxocotl" and "atoyaxocotl." The latter, he states, "is a large plum, sweet, and very good to eat, either raw or cooked. They make from it a drink more intoxicating than *pulque*."

2. *Spondias lutea* L. Sp. ed. 2. 613. 1762.

Veracruz, Tabasco, Yucatán, Oaxaca, and perhaps elsewhere. Widely distributed in the Tropics of both hemispheres.

Tree, often 10 to 15 meters high, with broad crown; leaflets, 5 to 9 pairs, conspicuously petiolulate, oblong or ovate-oblong, glabrous or nearly so; flowers, fragrant, white; petals, 3 mm. long; fruit, ovoid, yellow, 3 to 4 cm. long. "Jobo," "hobo," "jovo" (Veracruz, etc., Central America, Cuba, Venezuela); "abal," "xkinin-hobó," "mompin" (Yucatán); "ciruela" (Yucatán, Nicaragua); "ciruela amarilla" (Veracruz, Oaxaca); "chupandilla" (Oaxaca, *Reko*); "pompoqua," "popoqua" (Michoacán, Tarascan, *León*); "cozticxocotl," "coztixocotl" (Nahuatl); "jobo espino," "jobo roñoso"

¹ The name indicates an acidulous fruit, and was applied generally to plum-like fruits, in contradistinction to *zapotl*, or "sweet-fruit."

² For an account of the horticultural aspects of the genus *Spondias* see Popenoe in Bailey, Stand. Cycl. Hort. 3216-3217, 1917. For an account of the production of lac on *Spondias* see p. 641 of the present work, under *Jatropha curcas*.

³ Thesaurus 384. 1651.

(Tabasco, *Rovirosa*) ; " ciruelo obo," " obo de zopilote " (Oaxaca, *Reko*) ; " jobo hembra," " jobo negro," " jobito," " ciruela agria," " ciruela loca " (Cuba) ; " jocote de jobo " (Nicaragua) ; " palo de mulato " (Guatemala).

This species is rather rare in Mexico but it is sometimes found in cultivation; it may be that it is not native there. *Spondias lutea* is similar to *S. mombin* in its properties, but the fruit, although larger, is of inferior quality. The wood is described as soft but strong, grayish yellow, with a specific gravity of about 0.508. This species has doubtless been confused in Mexico with *S. mombin*. In the latter the fruit is either purple or yellow, while in *S. lutea* it is always yellow.

Spondias lutea is treated at length by Oviedo (Lib. VIII, Cap. II) under the name " hobo " (a word of Carib origin). " The young shoots of this tree," he states, " are good for shaving the face, and for bathing the limbs, and they are of exquisite odor. The bark of the *hobo* tree, boiled and used to bathe the limbs, is astringent and relieves exhaustion due to traveling, and it is a healthful bath. And when in the country men seek a sleeping place they try to have it beneath this tree, for its shade keeps off the dew and never causes headache as many other trees do. * * * There may be mentioned another property of this tree which can be tested any day that one wishes or that necessity compels. When in traveling water can not be found and men are suffering from thirst, if trees of this sort are at hand they dig out the roots, and cutting a piece put one end in the mouth and raise the other, whereupon there comes forth enough water to satisfy any thirsty man. * * * This have I tried, as well as many others overcome by thirst, and it was learned from the Indians."

2. **TAPIRIRA** Aubl. Pl. Guian. 1: 470. 1775.

1. **Tapirira mexicana** Marchand, Rév. Anacard. 162. 1869.

Veracruz.

Large tree; leaves pinnate, glabrous, the leaflets 5 to 9, oblong or oblong-lanceolate, 6 to 10 cm. long, obtuse or acute; flowers small, paniculate, polygamo-dioecious; branches of the inflorescence appressed-pubescent; sepals 5; petals 5, 2.5 mm. long, ovate; stamens 10; fruit an ovoid drupe, about 1.7 cm. long.

3. **CYRTOCARPA** H. B. K. Nov. Gen. & Sp. 7: 19. 1825.

Trees; leaves pinnate, deciduous, the leaflets entire, densely pubescent beneath; flowers small, in axillary panicles, polygamous; sepals 5, ovate, imbricate; petals 5, oval, spreading; stamens 10; fruit a large drupe, the stone 1 or 2-celled.

Leaflets about 17, oblong or lance-oblong, mostly 4 to 7 cm. long--1. *C. procera*.
Leaflets usually 7 to 11, mostly oval, 1 to 3 cm. long-----2. *C. edulis*.

1. **Cyrtocarpa procera** H. B. K. Nov. Gen. & Sp. 7: 20. *pl.* 609. 1825.

Dasycarya mexicana Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 98. 1854.

Tapirira purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 382. 1909.

Jalisco to Puebla and Oaxaca; type from Mexcala, Guerrero.

Tree, 6 meters high or larger, densely pubescent throughout; leaflets opposite or the upper ones alternate, obtuse or acutish, the rachis often narrowly winged; panicles about 6 cm. long; petals white, 3 mm. long; fruit pubescent, about 2 cm. long. " Copaljocote," " copalcocote " (Guerrero, Oaxaca, Jalisco, Morelos; from the Nahuatl *copalxocotl*); " copal " (Guerrero, Oaxaca, *Ramírez*); " copalhi " (*Ramírez*); " maxocote " (Oaxaca, *Villada*); " popoaqua " (Tarascan); " chupandfa " (*Conzatti*).

The wood is said to be soft and purplish, with a strong odor, and to be used for making trays, small images, and other articles. Goats are fond of the leaves. The fruit, which is much eaten, is yellow and the flesh resinous, with acid flavor. The fruits are said to be known at Jojutla (Morelos) as "berracos" and "chupandías." The large seeds are eaten by pigs, and they have been used locally (taken internally) as a remedy for leprosy. The bark is employed as a substitute for soap.

The tree is figured by Hernández¹ and described in a chapter entitled "De Copalxochotl, seu arbore Gummosa pruniformi." He gives the Tarascan name as "pompoqua," and reports that the plant was used in Michoacán for fevers, diarrhea, and dysentery.

2. *Cyrtocarpa edulis* (T. S. Brandeg.) Standl.

Tapirira edulis T. S. Brandeg. Zoe 5: 78. 1900.

Southern Baja California.

Tree, 7 to 9 meters high, with a trunk 15 to 30 cm. in diameter; leaflets rounded or very obtuse at apex, opposite, subsessile, the rachis terete; flowers white; fruit 1.5 to 2 cm. long, yellow, velvety-pubescent. "Ciruela."

The fruit has an acid flavor; on some trees it is pleasant to the taste but on others bitter (perhaps because immature). It is much eaten by the people of Baja California, and the stones are eaten by various animals. This is probably the "ciruelo" described by Clavigero (Historia de la California). For an illustration of the tree see Contr. U. S. Nat. Herb. 16: pl. 119.

4. ANACARDIUM L. Sp. Pl. 383. 1753.

1. *Anacardium occidentale* L. Sp. Pl. 383. 1753.

Yucatán, Campeche, Chiapas, and Oaxaca. Central America, West Indies, and South America; naturalized in the tropics of the Old World.

Shrub or tree, 2.5 to 10 meters high; leaves obovate, petiolate, 9 to 15 cm. long, rounded at apex, glabrous; flowers polygamo-dioecious, in large terminal panicles; calyx 5-parted; petals 5, linear-lanceolate, 7 to 8 mm. long, puberulent outside; fruit reniform, 2 to 2.5 cm. long, borne on a large, thickened fleshy hypocarp. "Marañón" (Yucatán, Oaxaca, Guerrero, Cuba, El Salvador, Panama, Costa Rica, Peru); "jocote marañón" (Guatemala); "pajuil," "acaju" (Porto Rico); "caujil" (Venezuela); "mery" (Colombia, Venezuela); "casoy" (Philippines); "cacahuil," "cajuil" (Santo Domingo).

Specimens obtained at Acapulco by Palmer were taken from a cultivated tree said to have been brought from Panama, and the plant is probably not native so far north. The English name for the tree is "cashew" or "cashew-nut," and the French name is "acajou," although the latter belongs more properly to the mahogany.

The wood is close-grained, strong, and durable, the specific gravity being reported as 0.488. The flowers are green tinged with yellow or purple; they are sweet-scented and much frequented by bees. From the trunk there exudes a gum somewhat like gum arabic. This can be used for varnish, and in South America it is used for bookbinding in order to prevent the attacks of insects.

The most important products of the tree are the fruit and receptacles, both of which are edible. The receptacle is pear-shaped, very fleshy, and yellow or reddish; it is astringent when green, but when ripe has a pleasantly acid flavor. In Mexico sweetmeats are sometimes made from the receptacles, and in some parts of tropical America a kind of wine is made from them, and this after fermentation is distilled to obtain brandy.

¹ Thesaurus 82. 1651.

The pericarp of the fruit proper contains an oil, cardol, which is acrid and caustic. This is driven off by heat, but the fumes which rise when the nuts are heated should not be allowed to reach the face or eyes. The roasted kernels are edible and have a pleasant milky flavor. The oil obtained from the nuts is applied in India to the floors and rafters of houses to preserve them from insects, but its use is dangerous. The ground kernels are sometimes used to flavor wine, and they are mixed with chocolate.

A decoction of the bark has been employed as a remedy for diarrhea, for syphilitic swellings of the joints, and for diabetes. The oil from the pericarp is sometimes used for ulcers, persistent skin diseases, and leprosy, and as an application to remove warts and freckles, but because of its caustic properties it must be employed with great caution.¹

5. *MANGIFERA* L. Sp. Pl. 200. 1753.

1. *Mangifera indica* L. Sp. Pl. 200. 1753.

Widely cultivated in the warmer portions of Mexico and sometimes growing without cultivation. Native of Asia; cultivated in all tropical countries.

Tree, 10 to 15 meters high, with dense spreading crown; leaves petiolate, oblong-lanceolate, usually narrowly so, 10 to 20 cm. long, acute or cuspidate-acuminate, subcoriaceous, glabrous; flowers polygamous, whitish green, in large terminal panicles; sepals 5, 2.5 mm. long; petals 5, 5 mm. long; fertile stamens 1 or 2, but 3 or 4 staminodia present; fruit a drupe, 3 to 4 cm. long or much larger. Generally known in Spanish-speaking countries as "mango," which is the English name also.

The mango is one of the finest and most widely known of tropical fruits. It is said to have been introduced into Mexico at the beginning of the 19th century by Don Juan Antonio Gómez, a Spaniard living at Córdoba.² It has been introduced into Florida and California in comparatively recent years. The mango makes a fine shade tree. The leaves are evergreen and when crushed they emit an odor of turpentine. Those of young branches are usually tinged with red or purple. The trees are most commonly grown from seeds, but the better varieties are propagated by budding or grafting.

The fruit is borne in the greatest profusion. Like most cultivated fruits, it varies greatly in size and quality. Some fruits weigh as much as 4 or 5 pounds, while others are no larger than plums. The shape varies from round to long and slender. The skin is smooth, usually yellow or greenish but often tinged with red. The flesh is juicy and often has a delightful fragrance. In some varieties it has a strong flavor of turpentine, but in the better forms this is wholly lacking. The large seed is covered with long, tough fibers which extend into the flesh, but in the best varieties there is no fiber. The mango is most commonly used as a dessert fruit, but it is often cooked or made into preserves, and various beverages are made from it. The unripe fruit is often pickled in India and used in various sauces and condiments. Alcoholic liquors are sometimes prepared from the ripe fruit.³

The wood is soft, brownish gray, with small spots and irregular lines of brown; its specific gravity is reported as 0.864. The seeds are said to possess anthelmintic and astringent properties. The bark also is astringent and is used locally for cutaneous diseases, chronic diarrhea, and fevers, while the gum

¹ See Mariano Bárcena, *El marañón: Sus caracteres y propiedades, su aclimatación en Jalisco*, *Naturaleza* 1: 335.

² See Alcocer, *Anal. Mus. Nac. Méx.* II. 2: 431. 1905.

³ For a full account of the mango, its culture, etc., see Popenoe in Bailey. *Stand. Cycl., Hort.* 1984-1989. 1916.

which exudes from the trunk is employed for the same purposes. The leaves and petioles are sometimes employed as brushes to cleanse the teeth and harden the gums, and even as a remedy for toothache. They are also used as a domestic remedy for affections of the chest and liver. For an illustration of the tree see Contr. U. S. Nat. Herb. 9: pl. 28.

6. *PISTACIA* L. Sp. Pl. 1025. 1753.

Pistacia vera L., of the Mediterranean region and western Asia, furnishes the pistachio nuts of commerce, and is extensively cultivated for that purpose. Pistachio nuts are the seeds or kernels of a dry drupe; they are green and have a peculiar flavor. *P. lentiscus* L., also of the Mediterranean region, yields mastic or mastiche, an official drug, which is a resinous exudate from the branches. It was formerly used for debility of the stomach and chronic diarrhea, but is now seldom given internally. The gum is employed to fill cavities in the teeth and is chewed to sweeten the breath, and varnish is prepared from it. The seeds yield an oil, and the leaves are used for tanning. *P. terebinthus* L. is the Cyprus turpentine tree.

1. *Pistacia mexicana* H. B. K. Nov. Gen. & Sp. 7: 22. pl. 608. 1825.

Coahuila and Tamaulipas to Guerrero and Chiapas; type from Chilpancingo, Guerrero. Western Texas; Guatemala.

Shrub or tree, sometimes 6 meters high; leaves pinnate; leaflets 11 to 29, mostly alternate, oblique-oblong, 1 to 2 cm. long, acute or obtuse, nearly glabrous; flowers small, dioecious, the pistillate ones in panicles 5 to 10 cm. long; stamens usually 5; fruit a nearly dry drupe, oblique, slightly compressed, 3 to 4 mm. long, purplish, glaucous. "Ramón" (Oaxaca); "lentisco" (Nuevo León, Oaxaca; sometimes corrupted into "lantrisco"); "yaga-guieguei" (Oaxaca, Zapotec, *Reko*); "almáciga" (the resin; Oaxaca).

A resin exudes from the branches. The seeds are edible. The specimens from northeastern Mexico have comparatively few leaflets, but some specimens from southern Mexico also have fewer than the typical form. The form occurring in Texas and northeastern Mexico has been described recently as a new species, *Pistacia texana* Swingle,¹ but it does not appear to the writer to deserve specific rank, since it is impossible to find any definite character by which it can be separated from typical *P. mexicana*.

7. *SCHINUS* L. Sp. Pl. 388. 1753.

1. *Schinus molle* L. Sp. Pl. 388. 1753.

Widely cultivated in Mexico and often growing without cultivation. Native of Peru and occurring elsewhere in South America.

Tree, often 15 meters high or larger, with spreading crown and graceful drooping branches; leaves pinnate, the rachis marginate; leaflets 15 to 27, sessile, linear-lanceolate, acute, entire or nearly so; flowers small, yellowish white, in large panicles; petals 5, oblong; stamens 10; fruit drupaceous, globose, 5 mm. in diameter, rose-red. "Arbol del Perú," "Perú," "Pirul," "molle," "pimienta de América" (various parts of Mexico); "pelonquahuitl," "copalastle" (fruit), "copalquahuitl" (Nahuatl); "ttzacthunni," "ttzac-thûmi," "xâza" (Otomí, *Buelna*); "pimiento," "muelle" (Colombia); "pimiento de California" (Costa Rica); "pimentero" (Chile).

The pepper-tree (sometimes known also as "California pepper-tree") is very commonly planted as a shade tree in some parts of Mexico, especially in the Valley of Mexico, and is grown abundantly in southern California. The

¹ Journ. Arn. Arb. 2: 107. 1920.

tree ascends in the Andes to an altitude of 3,600 to 3,900 meters, but often occurs at much lower altitudes. It thrives in dry, sandy soil and can endure extended drought. The pepper-tree is said to have been introduced into Mexico by Don Antonio de Mendoza, the first viceroy, who sent the seeds from Peru. The specific name, *molle*, is the name by which the tree is known in western South America, and is derived from *mulli*, the old Peruvian name.

Schinus molle is an excellent shade tree and a handsome one, remaining green throughout the year. The only objection to it is the fact that it harbors the black scale, which is a serious pest of citrus fruits. The wood is useful for various purposes and the bark for tanning skins. When fragments of the leaves are placed in water they execute quick jerking movements, due to the sudden discharge of the oil which they contain. The fruit contains a volatile oil, and has a flavor resembling that of a mixture of fennel and pepper. The seeds are sometimes used to adulterate pepper. In Mexico the fruit is ground and mixed with *atole* or other substances to form beverages. An intoxicating liquor, known as "copalocle" or "copalote" is obtained by fermenting the fruit with pulque for one or two days.

The pepper-tree is much used in local medicine. The powdered bark or its decoction is used as a remedy for swollen feet and as a purgative in domestic animals; it is reported to have astringent and balsamic properties. The gum which exudes from the trunk is bluish white, acrid, and bitter, and burns with a pleasant odor. It is often chewed as a chewing gum, and is said to have purgative and vulnerary properties. It is applied in Mexico in the form of an emulsion to the eyes to hinder the development of cataracts, and is used for genito-urinary and venereal diseases. The leaves are chewed to harden the gums and to heal ulcers of the mouth. The fruit has been used by European physicians as a substitute for cubeb in the treatment of gonorrhoea, and a syrup prepared with it is used in Mexico for bronchitis.¹ The tree is figured and described by Hernández.²

8. *ASTRONIUM* Jacq. Enum. Pl. Carib. 10. 1760.

1. *Astronium konzattii* Blake, Contr. Gray Herb. n. ser. 53: 59. 1918.

Astronium zongolica Reko, El México Antiguo 1: 157. 1918.

Known only from the type locality, Cafetal Concordia, Pochutla, Oaxaca, altitude 600 meters.

Leaves alternate, pinnate; leaflets 9 or 11, ovate, 3.5 to 5.3 cm. long, 1.5 to 2.5 cm. wide, acuminate, obscurely serrulate, pilosulous beneath; flowers dioecious, paniculate, the panicles glabrous, 1 cm. long; sepals 5; petals 5, yellow, 2.5 mm. long. "Zongolica," "sangolica"; "yaga-biche" (Zapotec).

9. *COMOCLADIA* L. Syst. Nat. ed. 10. 861. 1756.

Trees or shrubs; leaves pinnate, the leaflets entire or irregularly dentate; flowers small, perfect or polygamous, in large axillary panicles; calyx usually 3 or 4-parted; petals 3 or 4, deltoid-ovate, imbricate, spreading; stamens 3 or 4; fruit drupaceous, the endocarp membranaceous.

The juice of all the species is extremely poisonous, causing swelling of the parts affected and blisters upon the skin. That of some species has been used in the West Indies to cure ringworm and destroy warts, but its use is dangerous. The species of Santo Domingo and their properties are described by Oviedo (Lib. IX, Cap. XXXIII), under the name "guao." "The Indian women

¹ See M. G. Jiménez, El árbol del Perú, Naturaleza 2: 217.

² Thesaurus 54-55. 1651.

of Hispaniola," he states, "some of them who are willing to endure suffering to improve their appearance, since they are envious of the white women of Spain, take the roots of the *guao* and roast them carefully; and after they are well cooked and soft they rub them between their hands into a sort of paste; with this they anoint the face and neck and whatever part of the body they wish to whiten, and over this they place other ointments of herbs and comforting juices, in order that the *guao* may not cook them alive, or that they may endure it; at the end of nine days they take off all this coating and wash, and they are now as changed and white as if they were born in Castile."

Comocladia acuminata DC.¹ was assigned erroneously to Mexico by DeCandolle and Hemsley. It is a Porto Rican plant.

Leaflets glabrous beneath or sparsely pubescent.

Leaflets broadly rounded or truncate at base.....1. *C. palmeri*.

Leaflets, at least the upper ones, cuneate at base.....2. *C. repanda*.

Leaflets densely pilose beneath.

Lateral nerves of the leaflet 6 to 8 pairs.....3. *C. mollissima*.

Lateral nerves 12 to 17 pairs.....4. *C. engleriana*.

1. *Comocladia palmeri* Rose, sp. nov.

Colima and Guerrero; type from Acapulco (*Palmer* 450; U. S. Nat. Herb., no. 266344).

Leaflets 9 to 13, oblong-oval, 5 to 9 cm. long, glabrous above, glabrous or sparsely pubescent beneath, shallowly sinuate-dentate, with 7 to 12 pairs of lateral nerves; panicles 14 to 30 cm. long, hirtellous or glabrate.

2. *Comocladia repanda* Blake, Contr. Gray Herb. n. ser. 53: 58. 1918.

Oaxaca; type from Cafetal Concordia, Pochutla, altitude 600 meters.

Leaflets usually 9, cuneate-obovate, elliptic, or elliptic-oblong, 5 to 11 cm. long, obscurely sinuate or repand-dentate, soon glabrous on both surfaces; panicles about 30 cm. long; flowers 4-parted; petals 1.5 mm. long. "Tetlate," "tatatil," "tatatián" (from the Nahuatl, *tle-tlati*, "burning fire"); "hincha huevos."

3. *Comocladia mollissima* H. B. K. Nov. Gen. & Sp. 7: 17. pl. 607. 1825.

Guerrero to Chiapas; type collected between Acapulco and Venta del Exido.

Tree, about 4 meters high; leaflets 9 to 17, 1.5 to 2.5 cm. long, 1 to 1.5 cm. wide, obtusely dentate; panicles 10 to 25 cm. long, densely pubescent; flowers 4-parted.

4. *Comocladia engleriana* Loesener, Bull. Herb. Boiss. 3: 615. 1895.

Sinaloa to Morelos and Oaxaca; type from Morelos.

Leaflets 13 to 21, elliptic to broadly oval-oblong, 5 to 13 cm. long, sinuate or remotely repand-dentate; panicles 7 to 35 cm. long, densely pubescent; flowers 4-parted; petals 1.5 mm. long. "Teclatilla" (Morelos, *Seler*); "hincha huevos" (Sinaloa).

It is probable that this is only a form of *C. mollissima*. The specimens of *Comocladia* at hand are mostly imperfect and quite inadequate for a thorough investigation of the relationships of the species. *C. engleriana integra* Loes., described from Guatemala, is known by the vernacular names "chinil-té" and "pata de pava," according to *Seler*. It is said to have handsome red wood.

It is presumably one of the species of *Comocladia* which is described by Hernández² in his chapter entitled "De Tetlatia, seu urenti arbore."

¹ Prodr. 2: 65. 1825.

² Thesaurus 98. 1651.

10. **METOPIMUM** P. Br. Civ. Nat. Hist. Jam. 177. 1756.

- 1.
- Metopium brownei*
- (Jacq.) Urban, Symb. Antill. 5: 402. 1908.

Rhus metopium L. Syst. Nat. ed. 10. 2: 964. 1759.*Terebinthus brownei* Jacq. Enum. Pl. Carib. 18. 1760.

Veracruz and Yucatán. Greater Antilles.

Shrub or tree, sometimes 15 meters high, the bark thin, reddish brown; leaflets 3 to 7, long-petiolulate, suborbicular or obovate, 3 to 8 cm. long, usually rounded at apex, glabrous; flowers small, in large axillary panicles; sepals 5; petals 5, yellowish green; stamens 5; fruit a drupe, orange-yellow, about 1 cm. long; wood weak, dark brown, its specific gravity about 0.80. "Cochinilla" (Santo Domingo).

The tree is very poisonous, resembling *Rhus radicans* in its effects.

11. **MOSQUITOXYLUM** Krug & Urb. Notizbl. Bot. Gart. Berlin 1: 78. 1895.

- 1.
- Mosquitoxylum jamaicense*
- Krug & Urb. Notizbl. Bot. Gart. Berlin 1: 78. 1895.

Chiapas. Panama; Jamaica (type locality).

Tree; leaves alternate, persistent, pinnate; leaflets 11 to 17, petiolulate, obovate-elliptic or obovate-oblong, 5 to 7.5 cm. long, entire, rounded or obtuse at apex, minutely appressed-pilose beneath or glabrate; flowers dioecious, 5-parted, in large panicles; fruit drupelike, somewhat compressed, about 8 mm. long.

The fruit is described by Urban as capsular, but its dehiscence is not apparent in any of the several specimens seen by the writer. In Jamaica the wood, known as "mosquito-wood," is valued for building purposes.

12. **PSEUDOSMODINGIUM** Engl. Bot. Jahrb. Engler 1: 419. 1881.

Shrubs or small trees; leaves pinnate, the leaflets entire or toothed; flowers small, paniculate or subracemose, dioecious; calyx 5-lobed; petals 5, oblong-ovate, imbricate; stamens 5; fruit a drupe, sessile, compressed, subdidymous or reniform, glabrous.

Leaflets suborbicular to rounded-ovate or obovate, 1.5 to 4.5 cm. wide.

Leaflets sessile-----1. *P. virletii*.

Leaflets on petiolules 1 to 2.5 cm. long-----2. *P. perniciosum*.

Leaflets lanceolate or linear-lanceolate, 3 to 10 mm. wide.

Leaflets about 7 pairs-----3. *P. andrieuxii*.

Leaflets 11 to 15 pairs-----4. *P. multifolium*.

- 1.
- Pseudosmodingium virletii*
- (Baill.) Engl. Bot. Jahrb. Engler 1: 419. 1881.

Smodingium virletii Baill. Adansonia 11: 182. 1874.

Known only from the type locality, in the State of San Luis Potosí.

Leaflets 6 pairs, rhombic-obovate, 1.5 to 2 cm. long, rounded at apex; panicles nearly equaling the leaves; calyx glabrous.

- 2.
- Pseudosmodingium perniciosum*
- (H. B. K.) Engl. Bot. Jahrb. Engler 1: 420. 1881.

Rhus perniciosa H. B. K. Nov. Gen. & Sp. 7: 10. 1825.*Rhus pterocarpus* Sessé & Moc. Pl. Nov. Hisp. 47. 1887.

Michoacán and Guerrero; reported from Morelos and Querétaro; type from Santa Teresa and Tepecoacuilco, Guerrero.

Small tree, glabrous throughout; leaflets 9 to 11, 3 to 5.5 cm. long, rounded to abruptly acuminate at apex, pale green; panicles equaling or shorter than the leaves; petals 1.5 mm. long; fruit lustrous, about 8 mm. long and 10 mm.

broad. "Cuajote" (Michoacán, Morelos); "copaljiote" (Michoacán, Morelos); "cuajote blanco" (Morelos, Querétaro); "xiote" (*Sessé & Mocino*).

The plant is very poisonous, acting much like *Rhus radicans*. The gum which exudes from the trunk is said to have purgative properties, and it is also rubbed upon the skin to reduce the pain of scorpion stings. An excellent figure of the plant, but without description, is given by Hernández,¹ under the name "quauxiotl."

3. *Pseudosmodingium andrieuxii* (Baill.) Engl. Bot. Jahrb. Engler 1: 419. 1881.

Smodingium andrieuxii Baill. *Adansonia* 11: 182. 1874.

Described from southern Mexico, the locality not known.

Leaflets elongate-lanceolate, sessile, 3 to 3.5 cm. long, sharply serrate, glabrous; panicles half as long as the leaves; pedicels 6 to 7 mm. long; fruit 6 mm. long, 10 mm. wide.

4. *Pseudosmodingium multifolium* Rose, Contr. U. S. Nat. Herb. 5: 143. f. 6. 1897.

Hidalgo, Puebla, and Oaxaca; type from the city of Oaxaca.

Shrub or small tree, 2.5 to 6 meters high, glabrous; leaflets lanceolate, sessile, 1.5 to 3 cm. long, serrate to entire; panicles equaling or shorter than the leaves; fruit about 8 mm. long and 10 mm. broad. "Yaga-lache" (Oaxaca, Zapotec, *Reko*).

13. RHUS L. Sp. Pl. 265. 1753.

Shrubs or trees; leaves alternate, simple, trifoliate, or pinnate, the leaflets entire, toothed, or lobed; flowers small, polygamous, in large or small, axillary and terminal panicles; sepals 5, imbricate; petals 5, imbricate; stamens 5; fruit a drupe, glabrous or pubescent.

The genus is divided by some authors into several genera. *Rhus coriaria* L., of the Mediterranean region, is much used for tanning and dyeing. *R. vernicifera* DC. and *R. succedanea* L., of eastern Asia, exude from their stems a substance known as lac, which furnishes the most durable varnish known.

Rhus copallina L., a species of the eastern United States, has been reported erroneously from Mexico.

Leaves simple.

Fruit glabrous.....1. *R. laurina*.

Fruit pubescent.

Leaves with rounded lobes.....12. *R. trilobata*.

Leaves entire or with acute teeth.

Leaves pilose beneath with short spreading hairs.....2. *R. mollis*.

Leaves glabrous beneath, or the pubescence of appressed hairs.

Leaves acute, ovate, glabrous.....3. *R. ovata*.

Leaves obtuse or rounded at apex, not ovate.

Leaves mostly about as broad as long, densely covered beneath with minute white appressed hairs.....4. *R. lentii*.

Leaves much longer than broad, glabrous beneath or with sparse appressed hairs.....5. *R. integrifolia*.

Leaves compound.

Fruit glabrous.

Leaflets usually 11 or 13.....6. *R. juglandifolia*.

Leaflets 3.

Leaflets entire or dentate.....7. *R. radicans*.

Leaflets deeply lobed.....8. *R. eximia*.

¹ Thesaurus 406. 1651.

Fruit pilose.

Leaflets small, 5 to 10 mm. long-----9. *R. microphylla*.

Leaflets large, most of them more than 20 mm. long.

Bracts of the inflorescence lanceolate or ovate-lanceolate.

Leaflets pinnately lobed, densely tomentose beneath.

10. *R. potentillaefolia*.

Leaflets serrate, glabrous or nearly so beneath-----11. *R. glabra*.

Bracts orbicular or broadly ovate.

Leaves deciduous; leaflets always 3-----12. *R. trilobata*.

Leaves persistent; leaflets 5 or more in all or most of the leaves.

Leaflets thick-coriaceous, very lustrous on the upper surface.

Leaflets 5 or 7, rarely 9.

Leaflets acute or acuminate.

Lateral leaflets 2 to 3 cm. long-----13. *R. andrieuxii*.

Lateral leaflets 4 to 10 cm. long.

Leaflets copiously hirtellous beneath-----14. *R. oaxacana*.

Leaflets sparsely puberulent or glabrous beneath.

15. *R. ciliolata*.

Leaflets rounded to obtuse at apex, very rarely acute.

16. *R. virens*.

Leaflets 9 or more in all or most of the leaves.

Margins of the leaflets strongly revolute--17. *P. pachyrrhachis*.

Margins of the leaflets not revolute or scarcely so.

18. *R. schiedeana*.

Leaflets comparatively thin, dull on the upper surface or scarcely lustrous.

Lateral leaflets short-petiolulate or nearly sessile.

19. *R. terebinthifolia*.

Lateral leaflets long-petiolulate.

Leaflets usually 11 to 15, 1.5 to 2.5 cm. long--20. *R. jaliscana*.

Leaflets 7 or 9, 3.5 to 7 cm. long-----21. *R. barclayi*.

1. *Rhus laurina* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 219. 1838.

Lithraea laurina Walp. Repert. Bot. 1: 551. 1842.

Baja California. Southern California; type from Santa Barbara.

Shrub or small tree, sometimes 4.5 meters high, with a broad top, glabrous throughout; leaves evergreen, long-petiolate, oblong or lanceolate, 7 to 12 cm. long, mucronate, rounded or cordate at base, pale beneath; flowers white or yellowish, in large terminal panicles; fruit 3 to 4 mm. long, whitish.

The plant has the odor of bitter almonds. The seeds yield a pungent oil.

2. *Rhus mollis* H. B. K. Nov. Gen. & Sp. 7: 10. pl. 602. 1825.

Querétaro, Hidalgo, Puebla, and Oaxaca; type from Querétaro.

Shrub or small tree, 1.5 to 4.5 meters high; leaves nearly sessile, thick-coriaceous, broadly ovate or oval, 3 to 7 cm. long, rounded at apex, usually cordate at base, densely velutinous on the upper surface; inflorescence short and dense; petals 4 mm. long; fruit 7 to 8 mm. in diameter. "Zumaque" (Oaxaca, Querétaro, Hidalgo); "tnu-ndé," "yucu-caya" "sumaco," "sumaco cimarrón" (Oaxaca, Seler).

3. *Rhus ovata* S. Wats. Proc. Amer. Acad. 20: 358. 1885.

Neostyphonia ovata Abrams, Bull. N. Y. Bot. Gard. 6: 403. 1910.

Northern Baja California. California and southern Arizona.

Shrub; leaves petiolate, thick-coriaceous, broadly ovate, 5 to 8 cm. long, lustrous, entire; inflorescence short and dense, puberulent; flowers pink or white; fruit about 8 mm. in diameter.

The fruit is covered by a sweet waxy exudate which was used by some of the Indians as a substitute for sugar. The flowers are said to yield a good quality of honey. The flower clusters were boiled and eaten by the Coahuilla Indians of California, and a decoction of the leaves was employed as a remedy for coughs and for pains in the chest.

4. *Rhus lentii* Kellogg, Proc. Calif. Acad. 2: 16. 1863.

Coast of Baja California, and on the adjacent islands; type from Cedros Island.

Shrub, 1.5 to 2 meters high; leaves thick-coriaceous, short-petiolate, orbicular or rounded-ovate, 2 to 5 cm. long, pale on both surfaces, rounded or subcordate at base; inflorescence rather lax, finely puberulent; flowers white or crimson; fruit about 1 cm. in diameter, appearing as if covered with icing.

5. *Rhus integrifolia* (Nutt.) Benth. & Hook.; S. Wats. in Wheeler, Rep. U. S. Surv. 100th Merid. 6: 84. 1878.

Styphonia integrifolia Nutt.; Torr. & Gray, Fl. N. Amer. 1: 220. 1838.

Rhus hindsiana Engl. in DC. Monogr. Phan. 4: 388. 1883.

Neostyphonia integrifolia Shafer in Britton, N. Amer. Trees 612. 1908.

Baja California. Southern California; type from San Diego.

Shrub or tree, sometimes 10 meters high, with a trunk a meter in diameter, but usually much smaller; leaves coriaceous, short-petiolate, oval, 5 to 8 cm. long, obtuse or rounded at base, entire or spinose-dentate; inflorescence short and dense; flowers pink; fruit 1 to 1.5 cm. long, covered with short red hairs; wood hard, bright red, its specific gravity about 0.78.

Sometimes known in California as "lemonade-berry," the fruit being used in the preparation of a cooling drink. The shrub forms dense thickets along coastal cliffs, but it grows inland also. The wood is used for fuel. The fruit is covered with an icy-appearing white substance, and has a pleasant flavor.

6. *Rhus juglandifolia* Willd.; Roem. & Schult. Syst. Veg. 6: 649. 1820.

Rhus lindeniana Turcz. Bull. Soc. Nat. Moscou 31¹: 468. 1858.

Rhus juglandifolia lindeniana Engl. in DC. Monogr. Phan. 4: 401. 1883.

Veracruz, Oaxaca, and Chiapas. Central America to Venezuela and Peru; type from Colombia.

Tree or large shrub; leaflets 11 to 15, oblong or narrowly oblong, 7 to 15 cm. long, acute or cuspidate-acuminate, thin, pubescent or glabrous beneath; panicles 15 to 30 cm. long; petals 2 to 3 mm. long, white; fruit about 8 mm. in diameter. "Yagalache" (Oaxaca, Zapotec); "hinchador" (Costa Rica); "birringo," "Pedro Hernández," "fresno," "alicito," "manzanillo," "caspi" (Colombia).

Painful swelling and blistering of the skin is caused by contact with the plant. In Colombia the remedy employed for this is yuca starch, applied as a poultice to the parts affected. This is presumably the species reported by Sessé and Mociño¹ as *R. succedanea*.

7. *Rhus radicans* L. Sp. Pl. 266. 1753.

Rhus toxicodendron L. Sp. Pl. 266. 1753.

Toxicodendron vulgare Mill. Gard. Dict. ed. 8. *Toxicodendron* no. 1. 1768.

Rhus tridentata Sessé & Moc. Pl. Nov. Hisp. 47. 1887.

Toxicodendron radicans Kuntze, Rev. Gen. Pl. 1: 153. 1891.

Toxicodendron divaricatum Greene, Leaflets 1: 122. 1905.

Baja California to Nuevo León, Veracruz, Yucatán, and Oaxaca. United States and Canada; eastern Asia.

¹ Pl. Nov. Hisp. 47. 1887.

Low shrub or often a large woody vine, the stems clinging to trees by aerial roots; leaves deciduous, the 3 leaflets ovate or rhombic, 5 to 12 cm. long, acute or acuminate, entire or irregularly dentate, pubescent or nearly glabrous; flowers green, in loose axillary panicles; fruit globose, 3 to 5 mm. in diameter. "Chechen" (Yucatán, *Urbina*); "hiedra" (Sinaloa, Nuevo León, Tamaulipas, Durango); "mala mujer" (Veracruz, Jalisco, San Luis Potosí); "mexye" (Otomí, *Buelna*); "guardalagua" (Jalisco); "hincha-huevos" (Veracruz); "bemberecua" (Michoacán, Tarascan); "guau" (*Ramírez*); "hiedra mala" (Michoacán). The English name is "poison ivy."

The species is a variable one, as might be expected from its wide range, and many segregates have been described, but it is impossible to determine their value until the group has been studied more critically than has been attempted heretofore. Both the dwarf and the scandent forms occur in Mexico.

Poison ivy and its effects are well known throughout the range of the plant. All parts contain a nonvolatile oil, toxicodendrol, which is the active principle. Contact with the plant, or even one's presence in its vicinity if it is covered with dew, produces painful swelling of the parts affected and an eruption of the skin. Some persons are very susceptible to the poisonous effects of the plant, while others are not affected at all. Those who are immune may, it is said, later become susceptible to it. Poisoning by the plant is painful and often dangerous, especially if the eyes are affected. Many remedies have been suggested, the most widely used, perhaps, being the application of an alcoholic solution of lead acetate. An extract of *Grindelia* (family Asteraceae) has been used successfully. In Mexico various remedies are reported, among them being a decoction of *Heimia salicifolia* and *Lobelia fulgens* ("cresta de gallo").¹

The leaves were formerly official in the U. S. Pharmacopoeia. The juice is milky and turns black on exposure to air; upon linen it leaves an indelible stain. The plant has been used as a local irritant, but is no longer employed. A tincture is used by homeopathic practitioners as a remedy for rheumatism.

The plant is mentioned by Clavigero (*Historia de la California*, 1789) under the name "hiedra maligna."

8. *Rhus eximia* (Greene) Standl.

Toxicodendron eximium Greene, Leaflets 1: 123. 1905.

Durango, Nuevo León, and Tamaulipas; type collected near the city of Durango.

Low shrub; leaflets rhombic, 4 to 9 cm. long, usually 3-lobed, the lobes again shallowly lobed, densely pubescent beneath or glabrate. "Hiedra" (Tamaulipas).

Perhaps only an extreme form of *R. radicans*. The type is densely pubescent, and a Tamaulipas specimen referred here is glabrate. The latter may represent a distinct species.

9. *Rhus microphylla* Engelm.; A. Gray, Pl. Wright 1: 31. 1852.

Rhoeidium microphyllum Greene, Leaflets 1: 143. 1905.

Rhoeidium retusum Greene, Leaflets 1: 144. 1905.

Rhoeidium potosinum Greene, Leaflets 1: 144. 1905.

Rhoeidium cinereum Greene, Leaflets 1: 144. 1905.

¹ For a very full account of the poisonous properties of the plant and of the remedies which have been suggested (over 200 of them), see W. L. McAtee, An account of poisonous sumachs, *Rhus* poisoning, and remedies therefor, Medical Record (New York), May 8, 1920; see also E. P. Smith, Plant dermatitis, Journ. Bot. Brit. & For. 58: 130-135. 1920.

Sonora to Coahuila and Zacatecas. Western Texas to southern Arizona; type from Texas.

Densely branched shrub, 1 to 2 meters high; leaflets 5 to 9, oblong to oval, rounded or obtuse at apex, mucronulate, pilose-strigose; rachis winged; inflorescence short and dense; petals 3 mm. long; fruit 6 to 7 mm. in diameter, red. "Correosa" (Coahuila, Durango, Texas); "agritos" (Chihuahua; fruit); "agrillo" (Durango, *Patoni*).

The fruit is edible, but it is sour and not very palatable.

10. *Rhus potentillaefolia* Turcz. Bull. Soc. Nat. Moscou 31¹: 469. 1858.

Guerrero, Puebla, and Oaxaca; type from Oaxaca.

Shrub or tree, 4.5 to 7.5 meters high; leaflets 13 to 21, oblong or narrowly oblong, 1.5 to 7 cm. long, deeply sinuate-lobed, rugose, densely pubescent on both surfaces, sessile; panicles much shorter than the leaves; petals 2 mm. long; fruit about 6 mm. in diameter, covered with very long soft reddish hairs.

A plant of striking appearance, quite unlike any other species of the genus.

11. *Rhus glabra* L. Sp. Pl. 265. 1753.

Mountains of Chihuahua. Widely distributed in the United States and Canada.

Shrub, or sometimes a tree 6 or 7 meters high, with smooth gray bark; leaflets 11 to 31, oblong or lance-oblong, 5 to 10 cm. long, acuminate, glabrous, pale beneath; flowers greenish, in dense terminal panicles; fruit covered with short red hairs.

The white sumac is a handsome plant when loaded with ripe fruit. The leaves turn red in autumn. The bark and leaves are much used in the United States for tanning and dyeing, the leaves containing from 15 to 27 per cent of tannin. The roots also yield a yellow dye. The dried leaves were smoked by many of the Indians, alone or mixed with tobacco. The fruit is edible; it is acidulous and contains malic acid. The dried fruit is official in the U. S. Pharmacopoeia, its decoction or fluid extract being astringent and refrigerant and employed as a gargle for sore throat and for other purposes. The Pawnee Indians employed a decoction of the fruit for dysmenorrhoea and dysentery and a decoction of the roots for urinary troubles.

12. *Rhus trilobata* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 219. 1838.

Rhus schmidelioides Schlecht. Linnaea 16: 482. 1842.

?*Rhus crenatifolia* Schlecht. Linnaea 16: 483. 1842.

Schmaltzia trilobata Small, Fl. Southeast. U. S. 728. 1903.

Schmaltzia glauca Greene, Leaflets 1: 138. 1905.

Schmaltzia scaberula Greene, Leaflets 1: 138. 1905.

Schmaltzia ribifolia Greene, Leaflets 2: 156. 1911.

Baja California to Chihuahua, Guanajuato, Hidalgo, and Colima. Western United States.

Shrub, 1 to 2.5 meters high; leaflets mostly rhombic, 1.5 to 5 cm. long, irregularly lobed and crenate, beneath densely pubescent or glabrate, the leaflets all essentially sessile; inflorescence short and dense; flowers greenish yellow; fruit 5 to 6 mm. in diameter, bright red. "Agrillo" (Durango); "lemita" (New Mexico). The most common English name is "skunkbush."

The species is an extremely variable one in pubescence and leaf form, and many segregates have been proposed. Few, if any, of these can be recognized as species, for the characters seem to intergrade in every direction. The most remarkable form of the species is that with simple leaves, which, in Mexico, is known only from Baja California. Specimens from that region were named *Schmaltzia ribifolia* Greene, but the form has received several earlier names. Simple and trifoliate leaves are often found upon the same plant.

The wood was used by the Indians for bows. The dark red branches are a favorite article among many tribes for the manufacture of baskets. The fruit is sour and was eaten by the Indians, sometimes after having been preserved by drying. The fruit is often soaked in water with sugar to form a refreshing drink.

13. *Rhus andrieuxii* Engl. in DC. Monogr. Phan. 4: 389. 1883.

Oaxaca; described from southern Mexico, the localities not known.

Leaflets 5 or 7, broadly ovate, 1.5 to 2.5 cm. wide, pale and short-pubescent beneath; panicles slightly shorter than the leaves, the bracts ovate, acute.

14. *Rhus oaxacana* Loesener, Bull. Herb. Boiss. II. 6: 834. 1906.

Oaxaca; type collected between San Martin and Tlaxiaco.

Leaflets 3 to 7, ovate to lance-oblong, the lateral ones petiolulate, entire, pubescent on both surfaces; panicles terminal and axillary, dense; petals 4 mm. long; fruit red, 6 to 8 mm. in diameter.

This may be only a pubescent form of *R. ciliolata*.

15. *Rhus ciliolata* Turcz. Bull. Soc. Nat. Moscou 31¹: 470. 1858.

Puebla and Oaxaca.

Leaflets 3 or 5, long-petiolulate, ovate or oblong-ovate, nearly glabrous in age, paler beneath and conspicuously reticulate-veined; panicles axillary, lax, half as long as the leaves or shorter, the branches short-hirtellous.

16. *Rhus virens* Lindh.; A. Gray, Bost. Journ. Nat. Hist. 6: 159. 1850.

Rhus sempervirens Scheele, Linnaea 23: 556. 1850.

Sonora to Coahuila, San Luis Potosí, Zacatecas, and Durango; reported from Hidalgo; specimens from Puebla may belong here. Western Texas (type from New Braunfels) and southeastern New Mexico.

Shrub or small tree, 1 to 6 meters high; leaflets 5 or 7, short-petiolulate, oblong-elliptic, oblong-ovate, ovate, or obovate, 2 to 5 cm. long, glabrate, paler beneath; panicles axillary and terminal, usually shorter than the leaves; petals 3.5 mm. long; fruit red or orange, 6 to 8 mm. in diameter. "Capulín" (Durango, *Patoni*); "lambrisco" (San Luis Potosí, *Urbana*); "lantrisco" (Tamaulipas, *Palmer*; a corruption of "lentisco").

The leaves were smoked by the Indians of Texas, either alone or mixed with tobacco. It is probably this species (it may be *R. glabra*) of which Berlandier writes,¹ as follows: "The *Ayumé* abounded everywhere along the road, in the bottoms of the valleys, and along the beds of the arroyos; it is a small shrub 6 to 12 feet high; its appearance is that of the plants of the family Terebinthaceae. The inhabitants of Texas call it *Ayumé*, and the Comanches, who smoke it, know it under the name of *Temaichia*. The savages gather its leaves generally in the autumn, these being then red and very sharp; to preserve them they dry them by the fire or in the sun, and to smoke them they mix them with tobacco. The fruits are arranged in pyramidal racemes, rounded in form, red, oblong, and slightly acid. It is said that in Santa Fe, New Mexico, they make vinegar of the fruits of another species of *Ayumé*."

17. *Rhus pachyrrhachis* Hemsl. Biol. Centr. Amer. Bot. 1: 218. 1880.

San Luis Potosí.

Shrub or small tree; leaflets 7 to 13, oblong-oval to lance-oblong, 2 to 5 cm. long, rounded or obtuse at apex, sessile or nearly so, densely velutinous on both surfaces; panicles short, open; fruit red, 6 to 8 mm. in diameter. "Lantrisco" (*Palmer*).

¹ Diario de viage de la Comisión de Límites, p. 257. 1850.

18. *Rhus schiedeana* Schlecht. Linnaea 16: 480. 1842.

Baja California to San Luis Potosí, Puebla, and Chiapas; type from Barranca de Santa María, Hidalgo.

Leaflets 9 to 13, oblong, lance-oblong, or lanceolate, 2 to 7 cm. long, long-petiolulate, usually acute or acuminate, paler beneath, glabrate or densely pubescent; panicles lax or dense, 5 to 20 cm. long, puberulent; petals 3 mm. long; fruit 6 to 8 mm. in diameter.

The material at hand is variable, especially in pubescence, and may represent more than one species. The single Baja California specimen is rather imperfect, but it seems to belong here.

19. *Rhus terebinthifolia* Schlecht. & Cham. Linnaea 5: 600. 1830.

Rhus rubifolia Turcz. Bull. Soc. Nat. Moscou 31¹: 470. 1858.

Rhus subcordata Turcz. Bull. Soc. Nat. Moscou 31¹: 470. 1858.

Rhus palmeri Rose, Contr. U. S. Nat. Herb. 1: 95. 1891.

Sonora to Veracruz and Chiapas; type from Papantla, Veracruz. Guatemala.

Shrub, 1 to 2 meters high, or probably larger; leaflets 3 to 15, oblong to ovate or obovate, 2 to 6 cm. long, obtuse to acuminate, sparsely or densely puberulent or pilose beneath; panicles usually large and lax; petals 2 mm. long; fruit red or orange, 5 to 8 mm. in diameter. "Hierba de temazcal," "temazcal," "yaga-biche" (Oaxaca, Reko).

Reko reports that the Zapotecs of Oaxaca employ the plant in steam baths (*Temazcal*, a sweat-bath hut) as a remedy for rheumatism and syphilis, and as a preparation for parturition.

20. *Rhus jaliscana* Standl. Contr. U. S. Nat. Herb. 20: 219. 1919.

Jalisco; type from the barranca near Guadalajara.

Slender shrub, 3 to 4.5 meters high; leaflets elliptic or elliptic-oblong, usually obtuse, appressed-pilose beneath; panicles large and open; fruit 5 to 7 mm. in diameter.

21. *Rhus barclayi* (Hemsl.) Standl. Contr. U. S. Nat. Herb. 20: 218. 1919.

Rhus terebinthifolia barclayi Hemsl. Biol. Centr. Amer. Bot. 1: 219. 1880.

Tepic to Guerrero; type from Acapulco, Guerrero.

Slender shrub; leaflets ovate or oblong-ovate, acute or acuminate, hispid-pilose beneath with subappressed hairs; panicles large and open, the branches puberulent; fruit about 6 mm. in diameter.

DOUBTFUL SPECIES.

RHUS SAXATILIS DC. Prodr. 2: 71. 1825. Described from Mexico, the description based upon one of Sessé and Mocifio's plates. The plant belongs to some other family.

14. *PACHYCORMUS* Coville, Cent. Dict. rev. ed. 6708. 1911.**1. *Pachycormus discolor* (Benth.) Coville, Cent. Dict. rev. ed. 6708. 1911.**

Schinus discolor Benth. Bot. Voy. Sulph. 11. pl. 9. 1844.

Rhus veatchiana Kellogg, Proc. Calif. Acad. 2: 24. 1863.

Veatchia cedrosensis A. Gray, Proc. Amer. Acad. 20: 290. 1885.

Bursera pubescens S. Wats. Proc. Amer. Acad. 24: 44. 1889.

Veatchia discolor T. S. Brandeg. Proc. Calif. Acad. II. 2: 140. 1889.

On plains and mountain slopes, Baja California; type from Magdalena Bay.

Tree, 2 to 4.5 meters high, with very short trunk, the branches numerous, large and thick, usually very crooked and frequently lying upon the ground, often 6 meters long; bark thin, yellowish, peeling off in thin papery sheets, exposing the green under surface; leaves pinnate, soon deciduous; leaflets 3 to

15, 3 to 10 mm. long, oval or oblong, entire or crenate-lobate, puberulent; flowers dioecious, paniculate at the ends of the branches, yellowish, pink, or red; petals accrescent, 5 mm. long, acute; fruit shorter than the petals, pubescent. "Copalquín," "torote blanco."

A remarkable plant, the only species of the genus. It is leafless for most of the year. The wood is soft and porous and soon decays. The sap is milky and on exposure soon hardens into a gum or resin. Considerable quantities of the bark have been exported to Europe for use in tanning. For a more complete account of the tree, and illustrations, see Contr. U. S. Nat. Herb. 16: 344-345. *pl.* 118. 1916.

80. JULIANIACEAE. *Juliania* Family.

Only one other genus of the family is known, *Orthopterygium* Hemsl., represented by a single Peruvian species.

1. AMPHIPTERYGIUM Schiede; Schlecht. *Linnaea* 17: 635. 1843.

REFERENCES: Hemsley & Rose, Diagnoses specierum generis *Juliania*, Schlecht., *Americae tropicae*, *Annals of Botany* 17: 443-446. 1903; Hemsley, *Phil. Trans. Roy. Soc. London B.* 199: 169-197. *pl.* 18-24. 1907; Alcocer, *Las Julianáceas*, *Anal. Mus. Nac. Méx.* II. 4: 318-327. 1907.

Trees or shrubs; leaves alternate, deciduous, pinnate or rarely simple, the leaflets opposite, toothed; flowers dioecious, the staminate small, in axillary panicles, the perianth 6 to 8-parted; stamens as many as the perianth segments; pistillate flowers consisting of only a pistil, usually in groups of 4 on a receptacle; fruit indehiscent, hardened, the fruiting pedicels flat and wing-like, becoming very large; seed 1.

Leaflets glabrous beneath and glaucous.....1. *A. glaucum*.
Leaflets densely pubescent beneath, green.

Leaflets usually 7 or 9, gradually acute or acuminate....2. *A. amplifolium*.

Leaflets 1 to 7, rounded, obtuse, or abruptly short-pointed at apex.

Young leaflets densely villous.....3. *A. molle*.

Young leaflets thinly pilose or hirsute.

Leaves 3 to 7-foliolate.....4. *A. adstringens*.

Leaves all or mostly simple.....4a. *A. adstringens simplicifolium*.

1. *Amphipterygium glaucum* Hemsl. & Rose, *Annals of Botany* 17: 444. 1903.

Juliania glauca Hemsl. & Rose, *Annals of Botany* 17: 444. 1903.

Known only from the type locality, Jilotlán, Michoacán.

Leaflets 3 or 5, 3.5 to 7.5 cm. long, acute or abruptly acute, obtuse or cuneate at base, crenate; fruiting pedicels 3 to 5 cm. long, glaucous.

2. *Amphipterygium amplifolium* Hemsl. & Rose, *Annals of Botany* 17: 444. 1903.

Juliania amplifolia Hemsl. & Rose, *Annals of Botany* 17: 444. 1903.

Durango and Jalisco; type from barranca near Guadalajara, Jalisco.

Small tree; leaflets lanceolate or ovate-lanceolate, 5 to 11 cm. long, coarsely serrate or crenate-serrate, densely pilose or in age glabrate; fruit puberulent or glabrate, 4 to 5.5 cm. long, the pedicel nearly 3 cm. broad.

3. *Amphipterygium molle* (Hemsl.) Hemsl. & Rose, *Annals of Botany* 17: 444. 1903.

Juliania mollis Hemsl. in Hook. *Icon. Pl.* 28: *pl.* 2722. 1901.

Known only from the type locality, barranca near Guadalajara, Jalisco.

Leaflets 3 or 5, oblong to suborbicular, 2.5 to 5 cm. long, crenate-dentate or serrate.

4. *Amphipterygium adstringens* (Schlecht.) Schiede; Schlecht. *Linnaea* 17: 635. 1843.

Hypopterygium adstringens Schlecht. *Linnaea* 17: 635. 1843.

Juliania adstringens Schlecht. *Linnaea* 17: 746. 1843.

Michoacán to Morelos, Puebla, and Oaxaca; type from Morelos.

Tree, 4 to 6 meters high; leaflets sessile or nearly so, most of them broadly obovate, 2 to 7 cm. long, serrate or crenate above the middle or sometime also below, rounded to cuneate at base; fruit 2.5 to 5 cm. long, puberulent or glabrate. "Quetchalalatl" (Michoacán (*Lumholtz*); "cuachalala," "cuauchalalá," "cuauchalalote," "cuauchalalate," "cuauchalalatl" (Nahuatl); "matixeran" (Michoacán, Tarascan, *Lumholtz*); "volador" (Puebla).

The bark is astringent and contains tannin. Its decoction is used to harden the gums and to cure old wounds, and it is said to be employed also as a remedy for malaria. The bark yields a red dye. This plant has been listed in some Mexican works as *Rajania subsarmata*.

4a. *Amphipterygium adstringens simplicifolium* Standl., subsp. nov.

Oaxaca; type from Playa de Salina Cruz, Distrito de Tehuantepec (*Conzatti* 3672; U. S. Nat. Herb. no. 989553).

Leaves simple, petiolate, the blades oval or rounded-ovate, 4 to 6.5 cm. long, rounded or obtuse at apex, rounded or subcordate at base, coarsely crenate, glabrate above, densely short-pilose beneath; fruit about 3 cm. long.

This may be a distinct species, but it is more probably only a leaf form, analogous to the forms of certain species of *Rhus* and *Elaphrium*. Two other specimens seen by the writer have simple leaves on some of the branches. The finding of a simple-leaved form in this genus is a matter of considerable interest, for it would seem to indicate a relationship with the Anacardiaceae and Burseraceae, groups to which the genus has been referred by most authors. Hemsley, however, considers the relationship of the family to be rather with the Juglandaceae.

81. CYRILLACEAE. Cyrilla Family.

1. CYRILLA L. Mant. Pl. 1: 5. 1767.

1. *Cyrilla racemiflora* L. Mant. Pl. 1: 50. 1767.

Cyrilla antillana Michx. Fl. Bor. Amer. 1: 158. 1803.

Oaxaca. Southern United States, West Indies, Guianas, and Brazil.

Shrub or tree, 2 to 10 meters high, the trunk sometimes 30 cm. in diameter, the branches widely spreading; bark thin, pale brown, breaking up into large scales; leaves alternate, leathery, obovate or oblanceolate, 3 to 11 cm. long, obtuse or acute, short-petiolate, entire, glabrous; flowers, perfect, white or pinkish, in lateral racemes; sepals 5; petals 5, about 3 mm. long, acute; stamens 5; fruit a 2-celled capsule, about 2.5 mm. in diameter; wood heavy and hard but weak, reddish brown, close-grained, its specific gravity about 0.68.

The names used in the United States and the British West Indies are "leather-wood," "ironwood," "burnwood," "red titi," and "white titi." This family has not been reported previously from Mexico or Central America. The occurrence of the species in Oaxaca is rather remarkable, but it is probable that it will be found also in Veracruz. The Mexican plant is the form named by Michaux *C. antillana*. That is considered a distinct species by some authors, but Urban, correctly as it seems to the present writer, treats it as a synonym of *C. racemiflora*.

82. AQUIFOLIACEAE. Holly Family.

REFERENCE: Loesener, *Monographia Aquifoliacearum*, Nov. Act. Acad. Caes. Leop. Carol. 78. 1901; 89: 1-314. 1908.

1. **ILEX** L. Sp. Pl. 125, 1753.

Trees or shrubs; leaves alternate, usually serrate or crenate, thin or coriaceous, estipulate; flowers cymose or solitary in the axils, perfect or polygamous, small; petals 4 to 9, somewhat united at base, obtuse; stamens 4 to 9, adnate to base of corolla; fruit a berry-like drupe, containing 4 to 8 nutlets.

Ilex aquifolium L., of Europe, is the true holly, so frequently mentioned in literature. The American holly is *I. opaca* Ait., a native of the eastern United States, whose branches are extensively used for Christmas greens. Most species of the genus have showy red fruit, and those with evergreen leaves have very handsome foliage. The leaves of *I. vomitoria* Ait., of the southeastern United States, contain caffeine. From them the Indians of the Gulf States prepared their "black drink," which had purgative, vomitive, diuretic, and somewhat stimulant properties, and was used for ceremonial purification.

Leaves deciduous, thin-----1. **I. condensata**.
Leaves persistent, thick.

Inflorescences or flowers fasciculate in the leaf axils; leaves crenate or crenulate, the teeth never pointed. Flowers 4-parted.

Leaves puberulent, 2.5 to 6 cm. long-----2. **I. discolor**.
Leaves glabrous.

Leaves 5 to 12 cm. long-----3. **I. toluicana**.

Leaves 3 to 5 cm. long-----4. **I. socorroensis**.

Inflorescences solitary in the leaf axils, 1 to 3-flowered or cymose; teeth of the leaves usually with spinulose tips.

Flowers 5 to 7-parted.

Leaves hirsutulous beneath over nearly the whole surface, the venation prominent-----5. **I. brandegeana**.

Leaves glabrous beneath or puberulent along the costa, the lateral veins inconspicuous-----6. **I. pringlei**.

Flowers 4-parted.

Pistillate inflorescence usually 3-flowered-----7. **I. mexicana**.

Pistillate flowers solitary.

Leaves glabrous beneath-----8. **I. rubra**.

Leaves pubescent beneath on the veins-----9. **I. dugesii**.

1. **Ilex condensata** Turcz. Bull. Soc. Nat. Moscou 32¹: 277. 1859.

Ilex dubia condensata Loesener in Engl. & Prantl, Pflanzenfam. Nachtr. 1: 221. 1897.

Veracruz.

Shrub; leaves obovate or oblanceolate, 3 to 6 cm. long, petiolate, acute, serrulate, glabrous; flowers fasciculate, usually 4-parted; fruit globose, usually with 4 nutlets, 7 to 8 mm. long.

2. **Ilex discolor** Hemsl. Diag. Pl. Mex. 5. 1878.

Tepic to San Luis Potosí and Chiapas; type from Comitán, Chiapas.

Shrub or small tree with puberulent branchlets; leaves short-petiolate, obovate to elliptic-oblong, acute to rounded at apex, serrulate or crenate, puberulent, especially beneath, or in age glabrate; flowers greenish yellow; pedicels pubescent or glabrate.

The identification of the single Tepic specimen is doubtful.

3. **Ilex toluicana** Hemsl. Diag. Pl. Mex. 5. 1878.

Ilex californica T. S. Brandeg. Gard. & For. 7: 414. 1894.

Ilex toluicana bourgaeavi Loesener, Nov. Act. Acad. Caes. Leop. Carol. 78: 302. 1901.

Ilex toluhana liebmannii Loesener, Nov. Act. Acad. Caes. Leop. Carol. 78: 302. 1901.

Ilex toluhana californica Loesener, Nov. Act. Acad. Caes. Leop. Carol. 78: 302. 1901.

Veracruz, Mexico, Hidalgo, and Oaxaca; Baja California; type from Toluca, Hidalgo.

Glabrous shrub; leaves lanceolate or oblanceolate to oval, acute at base, obtuse at apex, serrulate or crenulate, lustrous; inflorescence glabrous; fruit globose, 4 to 6 mm. in diameter, with 4 nutlets, these 3-striate on the back. "Limoncillo" (Hidalgo).

The varieties described by Loesener differ only in leaf form. The writer has not seen sufficient material of the species to be able to judge of their systematic value.

This species is closely related to *I. paraguariensis* St. Hil., the Paraguay tea or mate of Argentina, Paraguay, and Brazil, whose leaves are widely used in South America for the preparation of a beverage, which largely replaces tea and coffee in those regions.

Ilex nitida (Vahl) Maxim. is reported from Veracruz by Loesener, but the writer has seen no specimens. It is closely related to *I. toluhana*, and the specimens reported may belong rather to the latter species.

4. *Ilex socorroensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 90. 1910.

Known only from Socorro Island, the type locality.

Leaves obovate, 2 to 3 cm. wide, rounded at apex, crenate-dentate, lustrous above; nutlets 4 or 5.

No material has been seen by the writer.

5. *Ilex brandegeana* Loesener, Nov. Act. Acad. Caes. Leop. Carol. 78: 148. 1901.

Ilex triflora T. S. Brandeg. Gard. & For. 7: 347. 1894. Not *I. triflora* Blume, 1826.

Baja California, Sinaloa, and Durango; type locality, La Chuparosa, Baja California.

Tree, 4.5 meters high, with hirsutulous branchlets; leaves elliptic or ovate-lanceolate, 3 to 8.5 cm. long, acute, appressed-serrulate, hirsutulous on the upper surface or glabrate; flowers 5 or 6-parted, sweet-scented; fruit 7 to 9 mm. in diameter. "Junco serrano" (Sinaloa).

6. *Ilex pringlei* Standl. sp. nov.

Hidalgo; type from Trinidad (*Pringle* 10003; U. S. Nat. Herb. No. 462069).

Branchlets puberulent or glabrate; leaves ovate or elliptic, 4 to 6.5 cm. long, rounded to acute at base, acuminate or abruptly acute at apex, lustrous, with a few appressed spinulose teeth or subentire; pistillate pedicels 5 to 9 mm. long; flowers 6 or 7-parted; fruit globose, 6 mm. in diameter; nutlets 6, strongly compressed, smooth.

Some of the inflorescences are fasciculate, but the upper ones are solitary. *Pringle's* 10004 from Trinidad is apparently of the same species. In it the pistillate pedicels are all solitary.

7. *Ilex mexicana* (Turcz.) Black; Hemsl. Biol. Centr. Amer. Bot. 1: 187. 1880.

Pileostegia mexicana Turcz. Bull. Soc. Nat. Moscou 32¹: 277. 1859.

Ilex cassine mexicana Loesener, Nov. Act. Acad. Caes. Leop. Carol. 78: 147. 1901.

Veracruz.

Small tree, nearly glabrous throughout; leaves lance-elliptic or oblong-elliptic, 6.5 to 9 cm. long, short-petiolate, acute or obtuse at base, abruptly short-acuminate at apex, conspicuously spinulose-serrate; fruit red, globose, 5 to 6 mm. in diameter, with 4 nutlets.

8. *Ilex rubra* S. Wats. Proc. Amer. Acad. 21: 422. 1886.

Mountains of Chihuahua; type from Norogachi.

Tree, 4 to 7 meters high, glabrous or nearly so; leaves oval, obovate, or oblong-lanceolate, 4.5 to 6 cm. long, acute, serrate, minutely puberulent above along the costa; fruit globose, red, 7 to 8 mm. in diameter; nutlets 4.

9. *Ilex dugesii* Fernald, Bot. Gaz. 20: 533. 1895.

Known only from the type locality, Sierra de Santa Rosa, near Guanajuato.

Leaves oblong, obovate-oblong, or oval-oblong, 3.5 to 6 cm. long, acute or obtuse at base, short-acuminate at apex, serrulate; fruit globose, 7 to 8 mm. in diameter, red; nutlets 4. "Naranjillo."

83. CELASTRACEAE. Bittersweet Family.

Shrubs or trees, sometimes scandent; leaves opposite or alternate, entire or toothed; stipules minute and caducous or wanting; flowers small, perfect, usually cymose; calyx 4 or 5-lobed; petals 4 or 5, small, spreading, sessile below the margin of the disk, imbricate; stamens 4 or 5, the anthers 2-celled; ovary 2 to 5-celled; fruit capsular, baccate, drupaceous, or samaroid.

Fruit a samara.

Fruit longitudinally 3-winged; leaves alternate-----1. **WIMMERIA.**

Fruit with a single terminal wing; leaves opposite-----2. **ZINOWIEWIA.**

Fruit a capsule, berry, or drupe.

Fruit a capsule.

Leaves opposite.

Capsule 1-celled-----3. **MICROTROPIS.**

Capsule 2 to 5-celled.

Capsule 3 to 5-celled-----4. **EUONYMUS.**

Capsule 2-celled-----5. **PACHYSTIMA.**

Leaves alternate.

Ovary free from the disk; ovules 2 in each cell-----6. **CELASTRUS.**

Ovary confluent with the disk; ovule 1 in each cell----7. **MAYTENUS.**

Fruit a berry, drupe, or indehiscent capsule.

Leaves all or most of them opposite.

Flowers dioecious; sepals distinct or nearly so-----8. **GYMINDA.**

Flowers perfect; sepals united below-----9. **RHACOMA.**

Leaves all alternate.

Stamens 10; petals ligulate or oblanceolate-----10. **FORSELLESIA.**

Stamens 4 or 5; petals broad.

Flowers 4-parted-----11. **SCHAEFFERIA.**

Flowers 5-parted.

Fruit dry.

Fruit 1-seeded; leaves entire-----12. **MORTONIA.**

Fruit 2-seeded; leaves glandular-serrate--13. **ORTHOSPHENIA.**

Fruit drupaceous or baccate.

Fruit 1-celled, 1-seeded; branches spinose, the leaves caducous.

14. **ACANTHOTHAMNUS.**

Fruit 2 or 3-celled, 2 to 6-seeded; branches not spinose, the leaves persistent.

Flowers paniculate; ovary free from the disk.

15. **PERROTTETIA.**

Flowers cymose; ovary confluent with the disk.

16. **ELAEODENDRON.**

1. **WIMMERIA** Schlecht. & Cham. *Linnaea* 6: 427. 1831.

Shrubs or trees; leaves alternate, serrate or crenate, estipulate; flowers small, in axillary cymes; calyx 5-lobed; petals 5; stamens 5; ovary 3-celled, with 6 to 8 ovules in each cell; fruit samaroid, 1-celled, 1 or 2-seeded, with 3 broad longitudinal wings.

Fruit evidently longer than broad, usually 2 to 3 cm. long-----1. *W. concolor*.
Fruit as broad as long or broader, rarely as much as 1.5 cm. long.

Petioles and leaf blades glabrous.

Leaves obtuse-----2. *W. pallida*.

Leaves acuminate or long-acuminate.

Leaves ovate; fruit shallowly notched at apex-----3. *W. persicifolia*.

Leaves lanceolate; fruit deeply notched at apex-----4. *W. lanceolata*.

Petioles, and usually the lower surface of leaves, pubescent.

Leaf blades glabrous-----5. *W. confusa*.

Leaf blades pubescent on one or both surfaces.

Fruit as long as broad; leaves sparsely puberulent beneath, glabrate above-----6. *W. pubescens*.

Fruit broader than long; leaves densely puberulent on both surfaces.

7. *W. microphylla*.

1. *Wimmeria concolor* Schlecht. & Cham. *Linnaea* 6: 428. 1831.

Wimmeria discolor Schlecht. & Cham. *Linnaea* 6: 428. 1831.

Tamaulipas, San Luis Potosí, and Veracruz; type from Colipa, Veracruz.

Shrub or tree, 1 to 12 meters high, the trunk sometimes 30 cm. in diameter; leaves ovate or lance-ovate, 4 to 6 cm. long, acute or acuminate, crenate-serrate or nearly entire, lustrous on the upper surface; petals 3 mm. long; fruit 1.5 to 2.5 cm. wide, often tinged with red. "Pimientilla" (Tamaulipas); "palo cadillo" (San Luis Potosí).

Palmer states that the wood is light-colored, and that it is used for railroad ties.

2. *Wimmeria pallida* Radlk. *Sitzungsb. Math. Phys. Akad. Wiss. München* 8: 379. 1878.

Guerrero; type probably from Acapulco.

Spreading glabrous shrub, 2.5 meters high; leaves ovate or lance-ovate, 5 to 8.5 cm. long, slender-petiolate, crenulate; fruit 1.5 to 2 cm. broad.

3. *Wimmeria persicifolia* Radlk. *Sitzungsb. Math. Phys. Akad. Wiss. München* 8: 379. 1878.

Guerrero, Morelos, and Oaxaca; type from Ejutla, Oaxaca.

Glabrous shrub or tree, 3 to 6 meters high; leaves slender-petiolate, 4 to 8.5 cm. long, finely crenate-serrate, long-acuminate; petals 4 to 5 mm. long; fruit 1.5 to 2 cm. wide. "Chapulizle" (Oaxaca, *Reko*).

4. *Wimmeria lanceolata* Rose, *Contr. U. S. Nat. Herb.* 12: 283. 1909.

Guerrero; type from Iguala.

Shrub, 3 to 5 meters high, glabrous throughout; leaves slender-petiolate, 5 to 11 cm. long, crenate-serrulate; petals cream-colored, 3 to 4 mm. long; fruit 1 to 2 cm. broad.

5. *Wimmeria confusa* Hemsl. *Diag. Pl. Mex.* 6. 1878.

Chihuahua, Sonora, Durango, Sinaloa, Jalisco, and Aguascalientes (type locality).

Shrub or tree, 2 to 8 meters high; leaves short-petiolate, lanceolate, oblanceolate, or obovate, 1 to 4 cm. long, obtuse or rounded at apex, crenulate or

subentire, pale green; petals 3 mm. long; fruit 1 to 1.5 cm. broad. "Algodoncillo," "cedilla," "acedilla" (Sinaloa).

The wood is used for various purposes and is reported to be durable if not exposed to too abundant moisture. The name "algoncillo" is said to refer to the white fiber of the bark.

6. *Wimmeria pubescens* Radlk. Sitzungsber. Math. Phys. Akad. Wiss. München 8: 378. 1878.

Veracruz; type from Consoquitla.

Large shrub or small tree; leaves obovate, 1 to 3 cm. long, short-petiolate or subsessile, rounded at apex, crenulate or subentire; petals 2.5 mm. long; fruit 1 to 1.5 cm. broad, tinged with purple.

7. *Wimmeria microphylla* Radlk. Bot. Centralbl. 15: 359. 1903.
Puebla.

Shrub, 1.5 to 3 meters high; leaves obovate or broadly obovate, 0.5 to 1.5 cm. long, sessile or short-petiolate, rounded at apex, entire or crenulate; petals 2.5 mm. long; fruit 1.5 cm. broad or less.

2. *ZINOWIEWIA* Turcz. Bull. Soc. Nat. Moscou 32¹: 275. 1859.

The genus consists of a single species.

1. *Zinowiewia integerrima* Turcz. Bull. Soc. Nat. Moscou 32¹: 275. 1859.
Morelos and Veracruz. Costa Rica.

Small tree, glabrous throughout; leaves opposite, petiolate, elliptic, ovate, or ovate-elliptic, 4.5 to 10 cm. long, acute or acuminate, entire; flowers very small, numerous, in axillary cymes; petals 5; stamens 5; fruit a samara, 1-seeded, about 2 cm. long, the wing apical, decurrent, obtuse; wood white. "Palo blanco" (Veracruz).

3. *MICROTROPIS* Wall. Numer. List 152. 1829.

Glabrous shrubs or trees; leaves opposite, petiolate, persistent, estipulate, entire; flowers in axillary cymes or fascicles, 5-parted; stamens 5; ovary 2 or 3-celled; capsule coriaceous, 1-celled, bivalvate, 1-seeded.

Cymes 4 to 7-flowered.....1. *M. occidentalis*.
Cymes 8 to 30-flowered.....2. *M. schiedeana*.

1. *Microtropis occidentalis* Loesener, Bot. Gaz. 24: 393. 1897.
Veracruz. Central America.

Leaves oblong or oval-oblong, 6 to 13 cm. long, 2 to 5 cm. wide, obtusely acuminate, cuneate at base, with about 6 pairs of lateral nerves; flowers 3 mm. broad, the petals whitish; fruit oblong, 12 to 13 mm. long.

2. *Microtropis schiedeana* Loesener, Bot. Jahrb. Engler 29: 98. 1900.
Type from Chiconquiaco, Veracruz.

Leaves oblong or oval-oblong, 6 to 13 cm. long, 2 to 5 cm. wide, obtuse or obtusely short-acuminate, acute at base, the lateral nerves 7 to 9 pairs.

4. *EUONYMUS* L. Sp. Pl. 197. 1753.

Trees or shrubs; leaves opposite, petiolate, persistent, entire or serrate; flowers perfect, in axillary cymes; calyx 4 or 5-lobed; petals 4 or 5, spreading; stamens 4 or 5; fruit a capsule, 3 to 5-celled, the cells 1 or 2-seeded; seeds each covered with an aril.

The writer has seen no material of either of the following species. Benthams original descriptions afford no distinguishing characters, and consequently only translations of the original descriptions are reproduced here.

1. *Euonymus mexicanus* Benth. Pl. Hartw. 36. 1840.

Type from mountains near Huasca, Hidalgo.

"Branches smooth, 4-costate; leaves short-petiolate, lanceolate, shallowly crenulate, thickish (persistent ?); peduncles 1 to 3-flowered; petals orbicular. —Shrub 2.4 to 3 meters high; leaves usually complicate, recurved, the margin undulate. Similar to *E. americanus*, but the crenations of the leaves more obtuse, the flowers smaller and usually 4-parted."

2. *Euonymus acuminatus* Benth. Pl. Hartw. 59. 1840.

Type from Llano Verde, Oaxaca.

"Branches smooth; leaves ovate-lanceolate or oblong, obtusely acuminate, lightly crenate; peduncles 3 to 5-flowered; petals suborbicular; capsule verrucose (?). —Shrub 1.8 to 3 meters high, related to *E. americanus*, but the leaves broader at base and more conspicuously acuminate at apex, the peduncles longer, and the flowers much larger and more numerous."

5. *PACHYSTIMA* Raf. Amer. Month. Mag. 2: 176. 1818.

Only one other species is known, a native of the mountains of Virginia and West Virginia.

1. *Pachystima myrsinites* (Pursh) Raf. Fl. Tellur. 42. 1838.

Ilex myrsinites Pursh, Fl. Amer. Sept. 119. 1814.

A single Mexican specimen seen, from the Sierra Madre south of Saltillo, Coahuila. The species ranges through the Rocky Mountains and westward to California and British Columbia.

Low shrub, sometimes prostrate; leaves opposite, persistent, oval to oblong or elliptic, 1 to 3 cm. long, dentate, glabrous, short-petiolate; flowers solitary or clustered in the leaf axils, green, minute; sepals 4; petals 4; fruit a capsule.

The Mexican specimens are noteworthy for their small leaves, and may represent a distinct species. They come from a locality far distant from any other station known for the species.

6. *CELASTRUS* L. Sp. Pl. 196. 1753.

Shrubs or small trees, usually scandent; leaves alternate, deciduous, short-petiolate; flowers small, usually 5-parted; stamens 5; capsule 3 or 4-celled, loculicidally dehiscent; seeds 2 in each cell, inclosed in an aril.

Leaves serrulate; capsule 3-celled.....1. *C. pringlei*.
Leaves entire; capsule 4-celled.....2. *C. tetramerus*.

1. *Celastrus pringlei* Rose, Contr. U. S. Nat. Herb. 5: 195. 1899.

Morelos; type from Cuernavaca.

Scandent shrub, 6 meters long, glabrous throughout; leaves short-petiolate, narrowly lance-oblong, 7 to 10 cm. long, acute; flowers in axillary racemes 2.5 to 5 cm. long; sepals 5; petals 5, white; capsule terete, obovoid, 12 mm. long; seeds each covered with a yellow aril.

2. *Celastrus tetramerus* Standl., sp. nov.

Vicinity of Iguala, Guerrero (type, *Pringle* 10319; U. S. Nat. Herb. no. 462573).

Small tree, glabrous; petioles about 5 mm. long; leaf blades lance-oblong, 8 to 11 cm. long, 2.5 to 3.5 cm. wide, acuminate, acute at base, thin, entire, paler beneath; flowers axillary, fasciculate or in short racemes, the pedicels in fruit about 1 cm. long; calyx 4-lobate, the lobes obtuse; fruit globose or depressed-globose, 8 mm. broad, 4-celled; stigma 4-lobate.

DOUBTFUL SPECIES.

CELASTRUS MEXICANUS DC. Prodr. 2: 8. 1825. Described from Mexico, the description based upon one of Sessé and Mociño's drawings.

7. MAYTENUS Molina, Sagg. Stor. Nat. Chil. 177. 1782.

Trees or shrubs; leaves alternate, persistent, entire or toothed; stipules minute, deciduous; flowers polygamous, paniculate or solitary, axillary; calyx 5-parted; petals 5, spreading; stamens 5; capsule coriaceous, 1 to 3-celled; seed covered with a fleshy aril.

Leaves pale green, very thick and fleshy, usually entire; flowers fasciculate.

1. M. phyllanthoides.

Leaves bright green, not fleshy, crenate or serrate; flowers cymose or paniculate.

Leaves oblong-lanceolate, acute at base-----**2. M. repandus.**

Leaves oblong-elliptic to elliptic-oval, rounded or very obtuse at base.

3. M. trichotomus.**1. Maytenus phyllanthoides** Benth. Bot. Voy. Sulph. 54. 1844.

Tricerna crassifolium Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 98. 1854.

Baja California and Sonora to Yucatán and Puebla; type from Magdalena Bay, Baja California. Southern Florida; Cuba.

Shrub or small tree, 1 to 7.5 meters high, glabrous; leaves mostly obovate or broadly obovate, 2 to 4 cm. long, acute or obtuse at base, rounded at apex, the venation obscure; flowers pedicellate; petals 1.5 mm. long; fruit obovoid, 7 to 9 mm. long; seeds 1 or 2, covered with a red aril. "Mangle dulce" (Baja California); "mangle" (Sonora); "aguabola," "mangle aguabola" (Sinaloa, Puebla, Seler).

The plant usually, but not always, grows along sea beaches, in places that are submerged at high tide. The wood is used for fuel. Seler states that the leaves are employed as a remedy for scurvy and toothache.

2. Maytenus repandus Turcz. Bull. Soc. Nat. Moscou 31¹: 450. 1858.

Oaxaca, Chiapas, and perhaps Veracruz; type from Tolutla, Chiapas.

Glabrous; leaves petiolate, 3 to 7 cm. long, acuminate, crenate-serrate; inflorescence few or many-flowered.

3. Maytenus trichotomus Turcz. Bull. Soc. Nat. Moscou 31¹: 451. 1858.

Veracruz, Oaxaca, and Chiapas; type from Jitatole, Chiapas.

Shrub (scandent); leaves short-petiolate, 5.5 to 10 cm. long, abruptly acuminate, glabrous, crenate-serrate or nearly entire; panicles half as long as the leaves or shorter; fruit subglobose, 1 cm. long.

8. GYMINDA Sarg. Gard. & For. 4: 4. 1891.**1. Gyminda latifolia** (Swartz) Urban, Symb. Antill. 5: 80. 1904.

Myginda latifolia Swartz, Prodr. Veg. Ind. Occ. 39. 1788.

Tamaulipas and Veracruz. Florida; West Indies.

Glabrous tree, sometimes 9 meters high, with a trunk 20 cm. in diameter; bark thin, reddish brown; leaves opposite, persistent, short-petiolate, usually obovate or broadly obovate, 2 to 6 cm. long, obtuse or rounded at apex, entire or crenulate; flowers greenish, dioecious, in axillary cymes; calyx 4-parted; petals 4, 1.5 to 2 cm. long; fruit a black drupe, 5 to 8 mm. long; wood dense, very dark brown, its specific gravity about 0.90. "Mala mujer," "cocorroncito" (Porto Rico).

The English name is "false boxwood."

9. RHACOMA L. Syst. Nat. ed. 10. 896. 1759.

Trees or shrubs; leaves opposite, or some of them alternate, entire or toothed; stipules small; flowers minute, cymose, axillary; calyx usually

4-lobate; petals usually 4, reflexed or spreading; stamens 4; ovary 2 to 4-celled; fruit drupaceous, 1-celled.

Inflorescences nearly sessile; leaves all linear or lance-linear, less than 3 mm. wide-----1. *R. managuatillo*.

Inflorescences long-pedunculate; leaves lanceolate or broader, most of them more than 1 cm. wide.

Branchlets sharply angled.

Leaves densely pubescent, obtuse or rounded at apex; calyx pubescent.

2. *R. uragoga*.

Leaves glabrous, acuminate; calyx glabrous-----3. *R. scoparia*.
Branchlets terete or nearly so.

Leaves glabrous beneath; fruit 10 to 12 mm. long-----4. *R. oxyphylla*.

Leaves puberulent beneath along the veins; fruit about 15 mm. long.

5. *R. macrocarpa*.

1. *Rhacoma managuatillo* Loesener, Repert. Sp. Nov. Fedde 8: 294. 1910.

Michoacán; type from Panda.

Shrub; branchlets slender, sharply quadrangular, glabrous or when young short-pilose; leaves 4 to 17 mm. long, entire or obscurely crenulate, sessile, glabrous; inflorescence few-flowered, short-pilose, the flowers green; fruit red, 8 to 10 mm. long, long-pedicellate. "Managuatillo."

2. *Rhacoma uragoga* (Jacq.) Baill. Hist. Pl. 8: 27. 1877.

Myginda uragoga Jacq. Enum. Pl. Carib. 12. 1760.

Myginda coccinea Turcz. Bull. Soc. Nat. Moscou 36¹: 604. 1863.

Veracruz and Oaxaca. Cuba; Colombia.

Slender shrub, the branchlets densely short-pilose; leaves short-petiolate, ovate to rounded-ovate, 1.5 to 5 cm. long, irregularly serrate or subentire; inflorescence short, few or many-flowered, the flowers dark red; petals 1.5 mm. long; fruit red, 5 to 7 mm. long. "Hierba maravedí" (Cuba).

3. *Rhacoma scoparia* (Hook. & Arn.) Standl.

Myginda scoparia Hook. & Arn. Bot. Beechey Voy. 283. 1841.

Known only from the vicinity of Acapulco, the type locality.

Slender shrub, glabrous throughout; leaves short-petiolate, lanceolate or ovate, 2 to 4 cm. long, those of the flowering branches often much reduced, serrulate; inflorescence few-flowered; flowers deep red; fruit red, about 6 mm. long.

4. *Rhacoma oxyphylla* (Blake) Standl.

Myginda oxyphylla Blake, Contr. Gray Herb. n. ser. 53: 60. 1918.

Oaxaca; type from Cafetal Nueva Esperanza, Pochutla, altitude 800 meters.

Leaves short-petiolate, lanceolate or elliptic-lanceolate, 4 to 7.5 cm. long, 1.2 to 2.5 cm. wide, acuminate, crenate-serrulate; panicles 7.5 cm. long or shorter, slender-pedunculate; petals purplish, 1.5 mm. long.

5. *Rhacoma macrocarpa* (T. S. Brandeg.) Standl.

Myginda macrocarpa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 56. 1914.

Known only from the type locality, Finca Mexiquito, Chiapas.

Shrub; leaves oblong-ovate or elliptic, 9 cm. long and 4 cm. wide or smaller, acuminate, obscurely crenate-serrulate, short-petiolate.

10. **FORSELLESIA** Greene, Erythea 1: 206. 1893.

1. *Forsellesia spinescens* (A. Gray) Greene, Erythea 1: 206. 1893.

Glossopetalon spinescens A. Gray, Pl. Wright. 2: 29. pl. 12. f. B. 1853.

Northern Chihuahua. Oklahoma and western Texas to southern California; type from Frontera, Texas.

Densely branched shrub, a meter high or less, the branches angulate, usually glabrous; leaves alternate, short-petiolate, 4 to 8 mm. long, oblanceolate, acute, glaucous, entire, soon deciduous; flowers subsolitary, axillary, short-pedicellate; petals 5, white, oblanceolate or ligulate, 3 to 4 mm. long; stamens 10; fruit coriaceous, ovoid, asymmetric, acute, about 5 mm. long.

11. SCHAEFFERIA Jacq. Enum. Pl. Carib. 10. 1760.

Shrubs or trees, glabrous; leaves alternate or fasciculate, entire, coriaceous, estipulate; flowers sessile or pedicellate in the axils, dioecious; calyx 4-parted; petals 4; fruit a dry or nearly dry drupe, 2-celled.

Leaves densely pilose-----1. *S. pilosa*.
Leaves glabrous.

Leaves mostly 1.5 to 2.5 cm. wide, not fasciculate-----2. *S. frutescens*.

Leaves 2 to 8 mm. wide, chiefly fasciculate.

Leaves obovate-spatulate, pinnate-nerved-----3. *S. cuneifolia*.

Leaves linear-spatulate, the nerves parallel, extending from base to apex of the blade-----4. *S. stenophylla*.

1. Schaefferia pilosa Standl., sp. nov.

Type collected near Huajuapam, Oaxaca, altitude 1,680 to 1,950 meters (Nelson 1965; U. S. Nat. Herb. no. 569292).

Branches grayish, puberulent when young; leaves mostly fasciculate on short lateral spurs, rounded-spatulate or ovate-spatulate, 1.5 to 2.5 cm. long, obtuse or rounded at apex, cuneate at base and decurrent into a short petiole, thin, yellowish green, rather densely short-pilose on both surfaces, pinnately nerved; flowers axillary, the pedicels stout, 2 to 3 mm. long, glabrous; calyx lobes about 0.5 mm. long, obtuse, glabrous; fruit fleshy, 4 to 5 mm. long, pubescent.

2. Schaefferia frutescens Jacq. Enum. Pl. Carib. 33. 1760.

? *Schaefferia viridescens* DC. Prodr. 2: 41. 1825.

Reported from Veracruz. Florida, West Indies, and Colombia.

Shrub or tree, sometimes 12 meters high, with a trunk 30 cm. in diameter; bark thin, light gray, slightly grooved; leaves short-petiolate, lanceolate, elliptic, or oval, acute or acuminate; flowers pedicellate; petals 3.5 to 4 mm. long; fruit 4 to 6 mm. long, bright red, with unpleasant taste; wood yellow, dense, the specific gravity about 0.77. "Cabra" (Santo Domingo).

Known as "Florida boxwood" or "yellow-wood."

3. Schaefferia cuneifolia A. Gray, Pl. Wright. 1: 35. 1852.

Coahuila. Western Texas; type from "high prairies of the San Felipe, and on the San Pedro."

Shrub, about 1 meter high, densely branched, the branchlets often spinose; leaves cuneate-obovate, sessile, rounded, or notched at apex; flowers sessile, greenish; fruit red, 4 mm. long. "Capul" (Texas).

The roots are said to be used as a remedy for venereal diseases.

4. Schaefferia stenophylla Standl., sp. nov.

Vicinity of Tehuacán, Puebla (type, Pringle 7503; U. S. Nat. Herb. no. 316732).

Shrub, about 1 meter high, glabrous; leaves fasciculate on short stout lateral spurs, linear-spatulate, 7 to 20 mm. long, 2 to 4 mm. wide, obtuse to truncate at apex, mucronulate, gradually attenuate to base, sessile, bright green, subcoriaceous, parallel-nerved; pedicels short and stout, glabrous; fruit 3.5 to 5 mm. long and often as broad, rarely 1-celled.

12. MORTONIA. A. Gray, Pl. Wright. 1: 35. 1852.REFERENCE: Trelease in A. Gray, Syn. Fl. 1¹: 400. 1897.

Low shrubs; leaves alternate, persistent, entire, 1-nerved, usually very thick, the margins often revolute; flowers small, white, cymose, the cymes borne in the upper axils and forming a terminal panicle; calyx tube 10-angled, 5-lobed; petals 5, erose-dentate; stamens 5; ovary imperfectly 5-celled; fruit dry, indehiscent, 1-celled, 1-seeded.

Leaves suborbicular or oval-----1. *M. scabrella*.

Leaves spatulate to linear-oblongate.

Leaves linear-oblongate, scarcely broadened toward the apex.

2. *M. palmeri*.

Leaves spatulate or oblongate, much broader toward the apex.

Leaves thin, glabrous, the margins thin, not revolute-----3. *M. greggii*.

Leaves very thick, the margins strongly thickened, revolute.

Leaves glabrous-----4. *M. diffusa*.

Leaves scaberulous on the upper surface-----5. *M. hidalgensis*.

1. *Mortonia scabrella* A. Gray, Pl. Wright. 2: 28. 1853.

Chihuahua and northern Sonora; type from San Pedro, Sonora. Southern Arizona to western Texas.

Shrub, 1.5 to 2.5 meters high, densely branched; leaves short-petiolate, 5 to 9 mm. long, rounded at apex, scaberulous on the upper surface, very thick, with revolute margins; calyx hirtellous; petals 2 mm. long; fruit 4 to 5 mm. long.

2. *Mortonia palmeri* Hemsl. Diag. Pl. Mex. 24. 1879.

Coahuila, San Luis Potosí, and Zacatecas; type from the region of San Luis Potosí.

Branches puberulent; leaves 1 to 2 cm. long, obtuse or acute, glabrous, very thick, the margins strongly revolute; calyx glabrous; petals suborbicular, 2 mm. long; fruit 4 to 5 mm. long. "Afinador" (Zacatecas).

3. *Mortonia greggii* A. Gray, Pl. Wright, 1: 35. 1852.

Mortonia effusa Turcz. Bull. Soc. Nat. Moscou 31¹: 453.

Coahuila and Nuevo León; type from Rinconada.

Branches puberulent; leaves 1.5 to 2.5 cm. long, acute or obtuse, mucronate, bright green; calyx glabrous; petals 2 mm. long; fruit 4 to 5 mm. long. "Afinador" (Coahuila).

4. *Mortonia diffusa* Rose & Standl., sp. nov.

Puebla; type from Tehuacán (*Pringle* 8569; U. S. Nat. Herb. No. 461507).

Shrub, 1 to 1.15 meters high, the branches brown, hirtellous; leaves short-petiolate, 1 to 1.5 cm. long, obtuse or rounded at apex, mucronate, bright green; inflorescence comparatively large and lax; calyx glabrous; petals suborbicular, 2 mm. long.

Collected also at San Luis Tultilanapa by Purpus (no. 2700).

5. *Mortonia hidalgensis* Standl., sp. nov.

Hidalgo; type from Zimapán (*Ehrenberg* 1038; U. S. Nat. Herb. no. 617127).

Branches densely hirtellous; leaves short-petiolate, 1 to 1.5 cm. long, oblongate or obovate, rounded at apex, mucronate, bright green, glabrous beneath; inflorescence small and dense; calyx hirtellous; petals orbicular, 2 mm. long; fruit 4 mm. long.

Collected also at Ixmiquilpan by Rose, Painter, and Rose (no. 9047).

13. ORTHOSPHENIA Standl., gen. nov.

Erect shrub; leaves alternate, coriaceous, glandular-serrate, short-petiolate; stipules minute, subulate, persistent; flowers minute, solitary or fasciculate in the leaf axils, nearly sessile; calyx deeply 5-lobate, the lobes obtuse, thickened, persistent; petals 5; stamens 5; stigma nearly sessile, shallowly bilobate; fruit apparently dry and indehiscent, thin-walled, 1-celled; seeds 2, basilar, erect, without endosperm.

1. Orthosphenia mexicana Standl., sp. nov.

Type collected between Miquihuana and Doctor Arroyo, along the boundary between Tamaulipas and Nuevo León (*Nelson* 4509; U. S. Nat. Herb. no. 332538).

Branches terete, grayish, glabrous or nearly so; leaves approximate, erect and subappressed, subimbricate, cuneate-obovate, 5 to 8 mm. long, rounded at apex, cuneate at base, on a very short thick petiole, very thick, glabrous or nearly so, coarsely glandular-serrate, the venation nearly obsolete; flowers 1 to 3 in each axil, about 1.5 mm. long in bud, glabrous; fruit oval-globose, 3 mm. long, green, smooth and glabrous; seeds semiglobose, blackish, 2.5 mm. long.

The type specimen consists of a fruiting branch. The writer has seen one other specimen of the plant, collected by Berlandier and labeled "Matamoros?" It consists of a single branch bearing flower buds. Each tooth of the leaves ends in a pore from which there is a copious exudate of wax. When the leaves are boiled in water the wax melts and rises to the surface.

14. ACANTHOTHAMNUS T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 383. 1909.**1. Acanthothamnus aphyllus** (Schlecht.) Standl.

Celastrus aphyllus Schlecht. *Linnaea* 15: 458. 1841.

Acanthothamnus viridis T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 383. 1909.

Scandivepres mexicanus Loesener, Repert. Sp. Nov. Fedde 8: 292. 1910.

Puebla and perhaps elsewhere; type from Jacualtepán.

Densely branched glabrous shrub, 1 meter high, with green alternate branches; leaves alternate, caducous, narrowly spatulate, 5 mm. long; stipules glandlike; flowers axillary, pedicellate; calyx 5-lobate; petals 5, suborbicular, 2 to 3 mm. long; stamens 5; ovary 2-celled; fruit ovoid, red, 5 mm. long, the exocarp thin, fleshy, 1-celled; seed 1.

In general appearance the plant suggests *Koeberlinia*. There is little doubt that the names given by Schlechtendal and Brandeggee apply to the same plant.

15. PERROTTETIA H. B. K. Nov. Gen. & Sp. 7: 73. 1825.

Shrubs or trees; leaves alternate, short-petiolate; flowers minute, polygamodioecious, in axillary panicles; calyx 5-lobate; petals 5, valvate or obscurely imbricate; stamens 5; ovary 2-celled; fruit baccate, 2-celled, 2 to 4-seeded.

Leaves broadly rounded at base; panicle branches glabrous-----1. *P. ovata*.

Leaves obtuse or broadly cuneate at base; panicle branches minutely puberulent.

2. *P. longistylis*.

1. Perrottetia ovata Hemsl. Diag. Pl. Mex. 6. 1878.

Perrottetia glabrata Rose, Contr. U. S. Nat. Herb. 5: 110. 1897.

Veracruz; type from Jalapa.

Tree, 4.5 to 6 meters high, glabrous throughout or nearly so; leaves broadly ovate, 7 to 13 cm. long, 4 to 6 cm. wide, long-acuminate, serrulate; panicles lax and open, long-pedunculate, equaling or shorter than the leaves.

2. Perrottetia longistylis Rose, Contr. U. S. Nat. Herb. 5: 110. 1897.

Veracruz, Oaxaca, and Chiapas; type from Izhuatlancillo, near Orizaba, Veracruz. Guatemala.

Leaves oblong or oblong-ovate, 7 to 20 cm. long, 3 to 8 cm. wide, acuminate, serrulate, finely puberulent beneath or glabrate; panicles equaling or shorter than the leaves.

Reported by Hemsley as *P. quindiuensis* H. B. K.

16. ELAEODENDRON Jacq. Nov. Act. Helv. Phys. Math. 1: 36. 1787.**1. Elaeodendron xylocarpum** (Vent.) DC. Prodr. 2: 11. 1825.

Cassine xylocarpa Vent. Choix Pl. Cels 23. pl. 23. 1803.

Elaeodendron xylocarpum continentale Harms & Loes. Bot. Jahrb. Engler 29: 98. 1900.

Veracruz; Tres Marias Islands (?). West Indies; Mujeres Island.

Shrub or tree, sometimes 10 meters high, glabrous throughout; leaves short-petiolate, obovate to elliptic-oblong or rounded, 4 to 13 cm. long, acute or obtuse, acute to rounded at base, coriaceous, obscurely serrulate or crenulate, often pale; petals white, about 3 mm. long; fruit globose or obovate, 1 to 3 cm. long, yellow or orange. "Guayarrote," "coscorrón," "cocorrón" (Porto Rico); "piñipiñi," "pinipiniche" (Cuba).

The vernacular name of the Tres Marias Islands plant is given as "mano de león."

84. HIPPOCRATEACEAE. Hippocratea Family.**1. HIPPOCRATEA** L. Sp. Pl. 1191. 1753.

REFERENCE: Miers, On the Hippocrateaceae of South America, Trans. Linn. Soc. Bot. 28: 319-432. pl. 16-32. 1872.

Trees or shrubs, often scandent; leaves opposite, persistent, petiolate, entire or toothed; stipules small, caducous; flowers small, greenish, in axillary cymes or panicles; calyx 5-parted; petals usually 5, spreading, valvate or imbricate; stamens 3; fruit a large capsule, strongly compressed vertically, 3-lobed or of 3-carpels, the carpels coriaceous, bivalvate along the middle; seeds 2 to 6 in each cell, large, compressed, broadly winged.

Hippocratea volubilis L. (*H. ovata* Lam.; *H. scandens* Jacq.) has been reported from Mexico, but no specimens have been seen by the writer. It is a West Indian species, with edible seeds. The seeds yield an odorless colorless oil. The plant is reputed to have pectoral properties, and it is one of the West Indian remedies for snake bites.

Branches of the inflorescence glabrous or very sparsely and obscurely puberulent, slender; inflorescence long, much branched, many-flowered; branchlets glabrous.

Leaves mostly elliptic or oblong-elliptic, 3 to 7 cm. wide, broadest about the middle, usually acute or short-acuminate; cymes much shorter than the leaves-----**1. H. celastroides.**

Leaves obovate-oblong or oblanceolate-oblong, 1 to 3.5 cm. wide, broadest toward the apex, usually rounded or obtuse at apex; cymes often longer than the leaves-----**2. H. acapulcensis.**

Branches of the inflorescence densely puberulent or tomentulose, stout inflorescence short and comparatively few-flowered; branchlets often densely puberulent.

Leaves scaberulous on the upper surface, pubescent beneath, at least when young-----**3. H. uniflora.**

Leaves smooth, glabrous.

Leaves rounded or very obtuse at base.

Capsule lobes rounded at apex; leaves crenate-serrate-----4. *H. utilis*.

Capsule lobes deeply notched; leaves entire-----5. *H. chiapensis*.

Leaves acute at base.

Panicles scarcely longer than the petioles, few-flowered; leaves 10 to 15 cm. long-----6. *H. rovirosae*.

Panicles half as long as the leaves or longer; leaves usually less than 10 cm. long.

Branches of the inflorescence hirtellous-----7. *H. excelsa*.

Branches of the inflorescence tomentulose.

Flowers 6 to 7 mm. broad-----8. *H. elliptica*.

Flowers 4 mm. broad-----9. *H. acutiflora*.

1. *Hippocratea celastroides* H. B. K. Nov. Gen. & Sp. 5: 136. 1821.

Oaxaca, Veracruz, and Yucatán; type from Venta de Estola. Guatemala.

Glabrous scandent shrub; leaves slender-petiolate, 4 to 14 cm. long, bright green, entire or crenate-serrulate, acute or obtuse at base; flowers greenish yellow; capsule lobes rounded-obovate, rounded at apex. "Tulubalam" (Yucatán, Maya).

Specimens of this species from Yucatán were determined by Radlkofer as *H. grisebachii* Loes. That is a South American species, and perhaps synonymous with *H. celastroides*.

2. *Hippocratea acapulcensis* H. B. K. Nov. Gen. & Sp. 5: 137. 1821.

Pristimera tenella Miers, Trans. Linn. Soc. Bot. 28: 365. 1872.

Tontelea hookeriana Miers, Trans. Linn. Soc. Bot. 28: 388. 1872.

Hippocratea pauciflora Rose, Contr. U. S. Nat. Herb. 5: 197. 1899.

Sinaloa to Morelos and Oaxaca; type from Acapulco, Guerrero.

Scandent shrub, 3 to 4.5 meters long or more, glabrous throughout or nearly so; leaves 5 to 10 cm. long, bright green or gray-green, entire or crenulate; flowers green; sepals usually lacerate-dentate; petals glabrous, often denticulate; capsule lobes oblong to rounded-obovate, 3.5 to 7 cm. long, rounded or shallowly notched at apex. "Hierba del puyo" (Michoacán, Guerrero); "cuanabichi" (Oaxaca, Zapotec, *Reko*); "mata-piojo," "hierba del piojo," "bejuco de piojo," "pepitas de piojo" (seeds), "semillas de piojo" (Oaxaca).

A paste or tincture of the seeds is used to kill parasites upon the human body. A specimen from Michoacán (*Nelson* 6922) is remarkable for its narrow and very long (16 to 19 cm.) leaves, but it is probably not specifically different.

3. *Hippocratea uniflora* DC. Prodr. 1: 567. 1824.

Hippocratea mexicana Miers, Trans. Linn. Soc. Bot. 28: 352. 1872.

Hippocratea seleriana Loesener, Bull. Herb. Boiss. 7: 561. 1899.

Durango to Oaxaca; original description based upon one of Sessé and Mocino's plates. Guatemala.

Erect shrub or tree with gray branches; leaves obovate-oblong or broadly obovate, 3.5 to 7 cm. long, 2 to 4 cm. wide, rounded or obtuse at base, broadly rounded at apex, gray-green, very thick, short-petiolate, entire or nearly so; flowers about 7 mm. broad; capsule lobes rounded-obovate, about 5.5 cm. long and 4.5 cm. wide, deeply notched at apex.

4. *Hippocratea utilis* Rose, Contr. U. S. Nat. Herb. 5: 197. 1899.

Mountains of Sinaloa; type from Colomas.

High-climbing shrub; leaves elliptic or broadly elliptic, 5 to 8.5 cm. long, 3 to 5 cm. wide, bright green, crenate, petiolate, obtuse to short-acuminate

at apex; capsule lobes elliptic-oblong, 3 to 4.5 cm. long, 2.5 cm. wide, rounded at apex. "Bejuco colorado."

The tough stems are used for binding fences, the framework of houses, and similar purposes.

5. *Hippocratea chiapensis* Standl., sp. nov.

Type from San Vicente, Chiapas (*Goldman* 888; U. S. Nat. Herb. no. 470689).

Erect shrub or tree; leaves oval or oval-elliptic, 4.5 to 7 cm. long, 3 to 4.5 cm. wide, rounded at apex and sometimes very shortly pointed, coriaceous, bright green, short-petiolate; branches of the inflorescence tomentulose; flowers 8 mm. broad, the disk and petals glabrous; capsule glabrous, the lobes broadly obovate, about 6.5 cm. long and 5 cm. wide.

6. *Hippocratea rovirosae* Standl., sp. nov.

Type from Mayito, Tabasco (*Rovirosa* 411; U. S. Nat. Herb. no. 935856).

Probably scandent, the branchlets slender, brown; leaves short-petiolate, oblong-obovate or narrowly elliptic-oblong, 3 to 5.5 cm. wide, short-acuminate at apex, rather coarsely crenate, bright green; panicles few-flowered, tomentulose; flowers 5 mm. broad, the petals obtuse, barbate within.

7. *Hippocratea excelsa* H. B. K. Nov. Gen. & Sp. 5: 138. 1821.

Type collected between Acapulco and Mazatlán, Guerrero. Reported from Panama.

Tall tree; leaves short-petiolate, elliptic-oblong, 7 to 7.5 cm. long, 3.5 cm. wide, acuminate, undulate-crenate; panicles many-flowered.

8. *Hippocratea elliptica* H. B. K. Nov. Gen. & Sp. 5: 138. 1821.

Hippocratea meizantha Blake, Contr. Gray Herb. 52: 72, 1917.

Guerrero and Morelos; type collected between Taxco and Tepecoacuilco, Guerrero.

Scandent shrub; leaves short-petiolate, elliptic or oval-elliptic, 5 to 9 cm. long, 2.5 to 4 cm. wide, obtuse or acute, obscurely crenate-serrulate, bright green; petals barbate within.

9. *Hippocratea acutiflora* DC. Prodr. 1: 568. 1824.

Described from Mexico, the locality not known.

Scandent shrub; leaves elongate-elliptic, 5 to 6.5 cm. long, 1.5 to 2 cm. wide, acute, subserrate, bright green; panicles 2.5 to 6.5 cm. long; capsule lobes obovate.

85. STAPHYLEACEAE. Bladdernut Family.

Trees or erect shrubs; leaves opposite, usually pinnately compound, stipulate; flowers perfect, in terminal or axillary racemes or panicles; sepals 5; stamens 5; ovary usually 3-celled; fruit 3-celled, capsular or leathery and indehiscent.

Fruit thin, inflated and bladder-like; ovary 3-parted.....1. **STAPHYLEA.**
Fruit leathery, indehiscent; ovary 3-lobed.....2. **TURPINIA.**

1. STAPHYLEA L. Sp. Pl. 270. 1753.

1. *Staphylea pringlei* S. Wats. Proc. Amer. Acad. 25: 146. 1890.

Nuevo León to Hidalgo; type from the Sierra Madre, near Monterrey, Nuevo León.

Large shrub or small tree, 4.5 to 6 meters high; leaflets 3, oval-elliptic, 5 to 10 cm. long, 3 to 6 cm. wide, cuspidate-acuminate, finely serrulate, villosulous beneath when young but soon glabrate; flowers white, the panicles often

longer than the leaves; petals 7 mm. long; fruit about 5 cm. long and 3.5 cm. broad, thin, 3-lobed at apex.

Doubtless through a slip of the pen, this species was listed by Pax¹ as "*S. mexicana* Watson."

2. *TURPINIA* Vent. Choix Pl. Cels. 31. 1803.

Glabrous trees or shrubs; leaves with 1 or more leaflets; flowers perfect, in terminal panicles; petals orbicular or nearly so; fruit subglobose, fleshy or coriaceous, few or many-seeded.

Leaves 1-foliolate-----1. *T. insignis*.
Leaves 3 to 9-foliolate-----2. *T. occidentalis*.

1. *Turpinia insignis* (H. B. K.) Tulasne, Ann. Sci. Nat. III. 7: 296. 1847.

Lacpedea insignis H. B. K. Nov. Gen. & Sp. 5: 143. pl. 444. 1821.

Veracruz; type from Jalapa.

Shrub or small tree; leaves persistent, petiolate, the leaflet elliptic or elliptic-oblong, 7 to 15 cm. long, abruptly short-acuminate at apex, entire or obscurely crenate-serrulate; panicles about as long as the leaves; flowers white, 5 mm. long.

2. *Turpinia occidentalis* (Swartz) Don, Hist. Diehl. Pl. 2: 3. 1832.

Staphylea occidentalis Swartz, Prodr. Veg. Ind. Occ. 55. 1788.

? *Lacpedea pinnata* Schlecht. Linnaea 10: 240. 1835.

Veracruz and Puebla. West Indies and Central America.

Shrub or small tree; leaflets elliptic-lanceolate, elliptic-oblong, or ovate-lanceolate, 4 to 10 cm. long, acuminate or long-acuminate, crenate-serrate; panicles usually large but few-flowered; flowers 5 to 7 mm. long, white; fruit 1 to 1.5 cm. in diameter.

Schlechtendal's species was based upon fruiting material, but it is probably synonymous with *T. occidentalis*. *Turpinia paniculata* Vent. has been reported from Mexico, and may perhaps occur there, since it is found in Central America. It is distinguished by its smaller flowers.

DOUBTFUL SPECIES.

TURPINIA ? *TOMENTOSA* Llave & Lex. Nov. Veg. Descr. 1: 24. 1824.

86. ICACINACEAE. Icacina Family.

Shrubs or trees; leaves chiefly alternate, usually entire, estipulate; flowers small, perfect or unisexual; calyx inferior, 4 or 5-lobate, the lobes commonly imbricate; petals 4 or 5, sometimes united below, valvate; stamens as many as the petals and alternate with them; ovary usually 1-celled; fruit drupaceous, 1-celled, 1-seeded.

Flowers 4-parted-----1. *CALATOLA*.

Flowers 5-parted.

Petals hairy inside-----2. *MAPPIA*.

Petals glabrous-----3. *OECOPETALUM*.

1. *CALATOLA* Standl., gen. nov.

Trees; leaves alternate, petiolate, entire or sinuate-serrate; flowers dioecious, the staminate bracteate, in long slender solitary axillary spikes, the pistillate axillary, solitary and pedunculate or in few-flowered spikelike inflorescences; staminate calyx 4-lobate, the corolla 4-parted, the lobes concave, valvate; stamens 4, alternate with the corolla lobes, erect, basifixed, the filaments very

¹ In Engl. & Prantl, Pflanzenfam. 3^b: 261. 1893.

short, adnate to the corolla, the anthers oblong, 2-celled, dehiscent by lateral slits; pistillate calyx 4-lobate; ovary 1-celled; fruit drupaceous, large, globose or ovoid, with thin flesh, the putamen osseous, bicristate and with numerous irregular dentate crests over the whole surface.

One other species is known, a native of Costa Rica.

Leaves densely pubescent beneath-----1. *C. mollis*.
Leaves glabrous beneath or nearly so-----2. *C. laevigata*.

1. *Calatola mollis* Standl., sp. nov.

Puebla; type from Zacatlán (*F. Salazar*, April 3, 1913).

Tree, about 20 meters high; leaves oval-elliptic to oblong-obovate, 20 to 30 cm. long, acute or abruptly short-acuminate, obtuse or rounded at base; staminate spikes 8 to 20 cm. long; corolla 2 mm. long; fruit 5 to 5.5 cm. long, 4 to 4.5 cm. thick, densely tomentose. "Nuez de calatola," "calatolazno" (tree), "colas de ratas" (spikes).

The seeds are said to have vomitive-purgative properties.

2. *Calatola laevigata* Standl., sp. nov.

Oaxaca; type from Cafetal San Carlos, Cerro Espino, altitude 800 meters (*Reko* 3440; U. S. Nat. Herb. no. 988705).

Leaves oblong or elliptic-oblong, 11 to 16 cm. long, acute, obtuse or acute at base; staminate spikes 4 to 6 cm. long or larger; pistillate flowers in short dense spikes; young fruit glabrate. "Palo de tinta."

2. **MAPPIA** Jacq. Pl. Hort. Schoenbr. 1: 22. 1797.

1. *Mappia mexicana* Robins & Greenm. Amer. Journ. Sci. 50: 150. 1895.

Tamaulipas and San Luis Potosí; type from Micos, San Luis Potosí.

Shrub, 1.5 to 3 meters high; leaves short-petiolate, oblanceolate or oblong-obovate, 7.5 to 10.5 cm. long, obtuse, cuneate at base, glabrous; flowers in long-pedunculate cymose panicles; calyx minutely pubescent; petals 2.5 mm. long; fruit black, 1.5 cm. long.

3. **OECOPETALUM** Greenm. & Thomps. Ann. Mo. Bot. Gard. 1: 408. 1914.

A single species is known.

1. *Oecopetalum mexicanum* Greenm. & Thomps. Ann. Mo. Bot. Gard. 1: 408. pl. 25. 194.

Type from mountains near Misantla, Veracruz.

Leaves short-petiolate, oblong or elliptic-oblong, 10 to 25 cm. long, short-acuminate, acute at base, entire, glabrous or nearly so; flowers in axillary pedunculate pubescent cymes; calyx tomentose, the lobes ovate, obtuse; petals 8 mm. long; ovary glabrous.

87. **ACERACEAE.** Maple Family.

1. **ACER** L. Sp. Pl. 1054. 1753.

Trees or shrubs; leaves opposite, simple or pinnate, deciduous, petiolate; flowers unisexual, dioecious or polygamo-dioecious; calyx 4 or 5-lobed or parted; petals as many as the calyx lobes or none; stamens 4 to 12; fruit of 2 large united samaras.

Some of the maples make excellent shade trees and they are often cultivated for this purpose. One European species, *A. pseudoplatanus* L. ("sicomoro"), the sycamore maple, is said to be grown in Mexico. In most of the American species of the genus the sap is sweet, and by evaporation this yields maple sugar, an article well known to the Indians of North America, and still harvested in large quantities in the United States each year.

Leaves pinnate.

Young branchlets densely pubescent-----1. *A. serratum*.

Young branchlets glabrous-----2. *A. orizabense*.

Leaves simple, lobed.

Leaves truncate or rounded at base-----3. *A. mexicanum*.

Leaves cordate at base-----4. *A. brachypterum*.

1. *Acer serratum* Pax, Bot. Pahr. Engler 6: 296. 1885.

Negundo mexicanum DC. Prodr. 1: 545. 1824.

Acer mexicanum Pax, Bot. Jahrb. Engler 7: 212. 1886. Not *A. mexicanum* A. Gray, 1862.

Tlaxcala, Mexico, Puebla, and Chiapas, and probably elsewhere. Guatemala.

Tree; leaflets 3, lanceolate to broadly ovate, 6 to 12 cm. long, long-acuminate, coarsely and irregularly serrate, densely pubescent beneath; flowers dioecious; petals none; samaras about 3 cm. long, pubescent. "Acezintle," "acecincle" (Mexico); "arce."

2. *Acer orizabense* (Rydb.) Standl.

Negundo orizabense Rydb. Bull. Torrey Club 40: 55. 1913.

Veracruz, Mexico, and Michoacán; type from Orizaba, Veracruz.

Tree, the young branches green; leaflets 3, lanceolate, ovate, or rhombic-oval, 5 to 15 cm. long, acute or acuminate, serrate, soon glabrate beneath; petals none; samaras 3.5 to 4 cm. long.

This is closely related to *A. negundo* L., the box-elder of the United States, and may not be distinct.

3. *Acer mexicanum* A. Gray, Proc. Amer. Acad. 5: 176. 1862.

Described from Nuevo León.

Leaves dilatate-cuneate and 3-lobed or 5-lobed, about 5 cm. broad, the lobes sinuate, glabrate; flowers polygamous; samaras glabrate, the wing 1.5 to 2 cm. long.

4. *Acer brachypterum* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 146. 1913.

Mountains of Chihuahua and Sonora; type from San Luis Mountains. Southern New Mexico.

Tree, 18 meters high or less, the trunk sometimes 70 cm. in diameter, with spreading crown; leaves 5-lobed, 6 to 8 cm. wide, paler beneath and velutinous, the lobes sinuate or entire; samaras glabrate, the wings about 1.5 cm. long.

This is closely related to *A. grandidentatum* Nutt., of the western United States and may be only a form of that species. The leaves turn red in autumn.

88. AESCULACEAE. Horse-chestnut Family.

Trees or shrubs; leaves opposite, estipulate, digitately 3 to 9-foliolate, the leaflets serrate or entire; flowers paniculate or racemose, terminal, polygamous, irregular; calyx 5-lobed; petals 4 or 5, unequal, clawed; stamens 5 to 8; fruit a coriaceous capsule, subglobose or 3-lobate, usually 3-celled; seeds one in each cell.

Calyx lobed nearly to the base; leaves persistent; leaflets 3-----1. **BILLIA**.

Calyx lobed to the middle or less deeply; leaves deciduous; leaflets usually 5 or 7-----2. **AESCULUS**.

1. **BILLIA** Peyr. Bot. Zeit. 16: 153. 1858.

1. *Billia hippocastanum* Peyr. Bot. Zeit. 16: 153. 1858.

Aesculus mexicana Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 1: 212. 1880.

Veracruz and Oaxaca; type from Oaxaca.

Tree; leaves long-petiolate, the leaflets long-stalked, lanceolate or oblong-lanceolate, 7 to 20 cm. long, long-acuminate, entire or nearly so, lustrous, glabrous; panicles shorter than the leaves; calyx 8 to 10 mm. long, puberulent; petals deep red, 1.5 to 2 cm. long.

One other species of the genus is known, *B. columbiana* Planch. & Lind., ranging from Guatemala to Colombia.

2. *AESCULUS* L. Sp. Pl. 344. 1753.

The species which grow in the United States are known by the names "horse-chestnut" and "buckeye." They are mostly large trees and are often planted for shade. Ramírez reports that *Aesculus hippocastanum* L. is planted in Mexico and is known as "castaño de Indias." The seeds of this species are bitter and poisonous. They contain much starch, and the bitter principle can be removed by alcohol or other agents and the starch extracted in an innocuous condition. The leaves contain a bitter principle, esculin. An extract of the wood is employed for dyeing silk black. The seeds of *Aesculus californica* Nutt. were used as food by the Indians of California, after having been roasted and the poisonous principle washed from the kernels with water. In the southern United States the seeds of various species have been used for stupefying fish, being first ground and mixed with flour, then thrown into the water. The roots also have been used as a substitute for soap in washing woolen and cotton goods.

1. *Aesculus parryi* A. Gray, Proc. Amer. Acad. 17: 200. 1882.

Northern Baja California.

Shrub, 1 to 2.5 meters high; leaflets obovate or oblong-obovate, 4 to 11 cm. long, sessile or short-stalked, obtuse, entire or nearly so, tomentulose beneath; panicles narrow, 8 to 20 cm. long; calyx 7 to 8 mm. long, tomentose; fruit tomentose and somewhat tuberculate.

89. SAPINDACEAE. Soapberry Family.

Tree or shrubs, rarely herbs, often scandent and tendril-bearing; leaves usually alternate, compound or sometimes simple, usually persistent; flowers small, usually polygamo-dioecious; sepals 4 or 5, free or connate; petals 3 to 5, or absent; stamens usually 8; fruit capsular, drupaceous, baccate, or samaroid, 1 to 4-celled.

Leaves with a terminal leaflet, or sometimes simple.

Plants scandent; leaves often twice compound.

Fruit a 3-winged capsule or of 3 samaras.

Fruit of 3 samaras, the seeds borne above the middle of the samara.

1. *SERJANIA*.

Fruit a 3-winged papery capsule, the seeds borne at the middle of the cell.

2. *URVILLEA*.

Fruit not winged, capsular.

Fruit thin and inflated, the cells loculicidal_____3. *CARDIOSPERMUM*.

Fruit thick and hard, not inflated, the cells septicidal.

4. *PAULLINIA*.

Plants erect; leaves simple or once pinnate.

Fruit not winged.

Fruit indehiscent; flowers small, white or greenish___5. *ALLOPHYLUS*.

Fruit dehiscent; flowers large, purplish pink-----6. *UNGNADIA*.

Fruit winged.

Leaves compound-----7. **THOUINIA**.

Leaves simple.

Fruit 3-celled-----8. **DODONAEA**.

Fruit 1-celled-----9. **NEOPRINGLEA**.

Leaves pinnate, the terminal leaflet absent.

Seeds 2 in each cell-----10. **EXOTHEA**.

Seeds 1 in each cell.

Fruit dehiscent.

Sepals distinct-----11. **CUPANIA**.

Sepals united-----12. **MATAYBA**.

Fruit indehiscent.

Fruit of usually 3 samaras-----13. **THOUINIDIUM**.

Fruit baccate or drupaceous.

Fruit pubescent, not lobed; leaflets 4-----14. **TALISIA**.

Fruit glabrous, usually deeply 2-lobed but only one of the carpels developing; leaflets usually more than 4-----15. **SAPINDUS**.

1. **SERJANIA** Schumach. Skrivt. Naturh. Selsk. (Kjøbenhavn) 3¹: 125. 1794.

REFERENCES: Radlkofer, Monographie der Sapindaceen-Gattung *Serjania*, pp. 1-392. 1875; Radlkofer, Ergänzungen zur Monographie der Sapindaceen-Gattung *Serjania*, pp. 1-195. 1886.

Scandent shrubs; leaves trifoliolate, 2 or 3 times ternate, pinnate, or bipinnate; flowers polygamous, in axillary racemes, white or whitish; sepals 5, the outer ones smaller; petals 4; stamens 8; fruit of 3 samaras, these seed-bearing at the apex.

The stems of some species are used in Central America for making coarse baskets. All the species are believed to possess narcotic poisonous properties of varying intensity, and some of them are employed for stupefying fish.

Partition walls (dissepiments) of the fruit broad, nearly as broad as the fertile portion of the cell, the cells therefore firmly united.

Woody portion of the stem simple, of a single central body.

Leaves trifoliolate-----1. **S. trifoliolata**.

Leaves triternate or bipinnate.

Leaves 3 or 4 times ternate; stems glabrate-----2. **S. cambessediana**.

Leaves bipinnate; stems hirsute-----3. **S. adiantoides**.

Woody portion of the stem compound, consisting of a large central portion and 3 to 5 small outer ones.

Leaves trifoliolate-----4. **S. heterocarpa**.

Leaves triternate, pinnate, or bipinnate.

Outer woody bodies of the stem strongly complanate, contiguous. Leaves biternate-----5. **S. insignis**.

Outer woody bodies subterete.

Branches acutely angulate, canaliculate; outer fascicles of the wood not immersed in the central body.

Leaves biternate; branches pilose throughout-----6. **S. impressa**.

Leaves 2 or 3 times pinnate; branches pilose only on the angles.

7. **S. trachygona**.

Branches subterete or obtusely angulate, the outer fascicles more or less immersed in the central body.

Branches glabrous or the younger ones slightly pubescent. Leaves biternate, glabrous or nearly so-----8. **S. brachystachya**.

Branches densely tomentose or pilosulous with yellowish or sordid hairs.

Branches very densely tomentose; leaves pinnate.

9. *S. schiedeana*.

Branches finely tomentulose or pilose; leaves biternate.

Leaflets soft-pilose beneath.

Mature fruit about 2 cm. long-----10. *S. triquetra*.

Mature fruit about 1 cm. long-----11. *S. oaxacana*.

Leaflets subglabrous-----12. *S. goniocarpa*.

Partition walls of the fruit narrow, less than half as broad as the fertile portion, the cells lightly coherent.

Cells of the fruit strongly compressed. Leaves 3-folliolate.

13. *S. cardiospermoides*.

Cells not or scarcely compressed.

Woody portion of the stem compound, with small separate outer fascicles; cells of the fruit sulcate or scrobiculate between the nerves.

Leaves 3-folliolate.

Leaflets densely pubescent beneath; fruit pubescent----14. *S. plicata*.

Leaflets glabrous-----15. *S. rekoii*.

Leaves biternate.

Outer sepals glabrous; leaflets subcoriaceous, mostly lance-oblong.

16. *S. caracasana*.

Outer sepals puberulent or tomentulose; leaflets broader.

Petals 3 mm. long-----17. *S. brachylopha*.

Petals 3.5 to 5 mm. long.

Outer woody fascicles subterete; branches deeply sulcate; terminal leaflet obovate or subrhombic-----18. *S. paniculata*.

Outer fascicles all or partly appanate; branches lightly striate; terminal leaflet oblong-----19. *S. scatens*.

Woody portion of the stem simple, without outer fascicles; cells of the fruit not sulcate or scrobiculate.

Cells of the fruit lenticular; sepals densely white-tomentose. Leaves biternate.

Branches deeply 5-sulcate, usually aculeolate; scales of the upper petals with short emarginate crests-----20. *S. mexicana*.

Branches 5-angulate, unarmed; scales of the upper petals large, bicorniculate-bifid-----21. *S. brachycarpa*.

Cells inflated, more or less produced beyond the axis; sepals glabrous or variously pubescent.

Branches 8 to 10-striate or 8 to 10-costate.

Terminal leaflet about 5 cm. long, ovate, elliptic, or subrhombic, sharply serrate-----22. *S. vesicosa*.

Terminal leaflet rarely more than 2 cm. long, oblong, ovate-oblong or spatulate-obovate, coarsely crenate or entire.

Leaflets mostly oblong-lanceolate or oblong-ovate, densely puberulent beneath-----23. *S. palmeri*.

Leaflets mostly spatulate-obovate, glabrate-----24. *S. rutaefolia*.

Branches 5 or 6-sulcate.

Leaves all or chiefly trifolliolate.

Terminal leaflet 1.5 to 2 cm. long-----25. *S. albida*.

Terminal leaflet 4 to 8 cm. long.

Leaflets serrate or dentate-----26. *S. grosii*.

Leaflets entire, or with a small lobe on each side at the base.

27. *S. emarginata*.

Leaves biternate or bipinnate.

Leaflets entire.

Leaflets glabrous except along the costa-----28. *S. flaviflora*.

Leaflets pubescent on one or both surfaces.

Leaflets ovate-lanceolate or ovate, very acute.

29. *S. subtriplinervis*.

Leaflets elliptic or elliptic-ovate, obtuse, the upper ones short-cuspidate.

Cells of the fruit glabrate-----30. *S. fuscopunctata*.

Cells of the fruit densely pubescent-----31. *S. sordida*.

Leaflets serrate or dentate.

Leaves biternate.

Plants subherbaceous; fruit suborbicular--32. *S. macrococca*.

Plants fruticose; fruit much longer than broad.

Leaflets with few serrations; branches canaliculate-sulcate, obtusely angulate-----33. *S. racemosa*.

Leaflets closely subduplicate-serrate; branches striate-sulcate, subterete-----34. *S. polystachya*.

Leaves pinnate or bipinnate.

Leaflets glabrous-----35. *S. californica*.

Leaflets pubescent beneath.

Fruit broadest toward the apex.

Cells of the fruit longer than broad-----36. *S. incisa*.

Cells of the fruit broader than long--37. *S. sphenocarpa*.

Fruit broadest at the base.

Mature fruit 10 to 12 mm. long; leaflets conspicuously crenate or lobate-----38. *S. cystocarpa*.

Mature fruit 20 mm. long; leaflets with only a few remote teeth-----39. *S. pacifica*.

1. *Serjania trifoliolata* Radlk. Contr. U. S. Nat. Herb. 1: 317. 1895.

Sinaloa to Guerrero; type from Manzanillo, Colima.

Stems glabrous, 6-costate; leaflets ovate-rhombic to suborbicular, 3 to 8 cm. long, obtuse to acuminate, coarsely serrate-dentate, thin, glabrous; sepals glabrate; petals 2.5 mm. long; fruit about 1.5 cm. long, glabrous.

2. *Serjania cambessediana* Schlecht. & Cham. Linnaea 5: 214. 1830.

Veracruz and Oaxaca; type from Jalapa, Veracruz.

Stems glabrate, obtusely 6-angulate; leaflets ovate-lanceolate, elliptic, ovate, or rhombic, 0.5 to 4 cm. long, obtuse to acuminate, serrate-dentate, glabrous or nearly so; outer sepals subglabrous, the inner tomentulose; petals 2.5 mm. long; fruit 2.2 cm. long, glabrate.

3. *Serjania adiantoides* Radlk. Field Mus. Bot. 1: 403. 1898.

Known only from the type locality, Buenavista Xbac, Yucatán.

Stems subherbaceous, hirsute on the angles; leaves subbipinnate, the pinnae 4 pairs. "Bui."

4. *Serjania heterocarpa* Standl., sp. nov.

Type from Monte Alban, Oaxaca (*Pringle* 5835; U. S. Nat. Herb. no. 316723).

Stems pilosulous, obtusely 5-angulate, the woody portion with 3 obtusely trigonous outer fascicles; leaves trifoliolate, the leaflets ovate-elliptic or broadly rhombic, 1.5 to 3 cm. long, acute or obtuse, duplicate-dentate, pilosulous on both surfaces; fruit about 12 mm. long and 17 mm. broad, densely puberulent, the cells inflated, the wing 2.5 to 4 mm. wide.

The fruit is very different from that of any of the Mexican species seen by the writer, in its general appearance suggesting that of the genus *Paullinia*.

5. *Serjania insignis* Radlk. Monogr. Serjan. 331. 1875.

Reported from Mexico, without definite locality. Panama.

Stems puberulent; leaflets elliptic, 9 cm. long or less, shortly obtuse-acuminate, obscurely dentate, hirtellous on the nerves; outer sepals pubescent, the inner densely tomentulose; petals 3 mm. long; fruit 2 cm. long, 1.6 cm. wide, the cells hirtellous or glabrate.

6. *Serjania impressa* Radlk. Monogr. Serjan. 323. 1875.

Known only from the type locality, Valley of Córdoba, Veracruz.

Stems 6-sulcate; leaflets elliptic, 7 cm. long or less, acute or obtuse, crenate-dentate, pubescent beneath; outer sepals tomentulose; fruit 3 to 3.5 cm. long, 2.8 cm. wide, the cells pilose.

7. *Serjania trachygona* Radlk. Monogr. Serjan. 327. 1875.

Campeche. Panama.

Stems acutely 6-angulate; leaflets ovate, oblong, or rhombic, 0.5 to 3.5 cm. long, obtuse or acuminate, incised-dentate or lobate, setulose-pilose on the nerves; outer sepals hirtellous, the inner tomentulose; petals 3.5 to 4 mm. long.

8. *Serjania brachystachya* Radlk. Monogr. Serjan. 310. 1875.

Colima to Oaxaca; type from San Agustín, Oaxaca.

Stems 6-striate; leaflets rhombic-ovate to rhombic-elliptic, 2 to 5 cm. long, obtuse to short-acuminate, coarsely crenate-dentate, glabrous or nearly so; outer sepals glabrate, the inner tomentulose; petals 3.5 mm. long; fruit about 2 cm. long and nearly as broad, the cells puberulent.

9. *Serjania schiedeana* Schlecht. Linnaea 18: 44. 1844.

Jalisco and Morelos and probably elsewhere; type locality not known.

Stems obtusely trigonous; leaflets 5, broadly rhombic to elliptic-oblong, 3 to 5.5 cm. long, obtuse or short-acuminate, coarsely crenate, densely pubescent on both surfaces; sepals tomentose; petals 4 mm. long; fruit about 2.5 cm. long and 2 cm. wide, densely pubescent.

10. *Serjania triquetra* Radlk. Monogr. Serjan. 305. 1875.

Morelos, Veracruz, Oaxaca, and Chiapas. Central America.

Stems trigonous or terete, 6-sulcate; leaflets ovate, elliptic, or rhombic, 3 to 8 cm. long, obtuse to acuminate, coarsely incised-dentate, sometimes lobate, densely pubescent, especially beneath; petals 4 mm. long; fruit about 2 cm. long and 1.5 cm. broad. "Carretilla" (Oaxaca, Guatemala, *Seler*).

11. *Serjania oaxacana* Standl., sp. nov.

Type from San Gerónimo, Oaxaca (*Purpus* 6689; U. S. Nat. Herb. no. 567063).

Branches obtusely trigonous, tomentulose; leaves biternate, the leaflets rhombic or rhombic-ovate, 1.5 to 4.5 cm. long, acute or acuminate, coarsely incised-crenate and often lobate, glabrate above, densely puberulent beneath; outer sepals glabrate, the inner tomentulose; petals 2.5 mm. long; fruit 9 to 12 mm. long, 14 mm. broad, appressed-pilosulous, densely so on the cells.

12. *Serjania goniocarpa* Radlk. Monogr. Serjan. 309. 1875.

Veracruz; type from Mirador.

Stems puberulent, trigonous; leaflets ovate, 10 cm. long or smaller, subobtuse, coarsely serrate-dentate, puberulent or glabrate; sepals tomentulose; petals 3 mm. long; fruit 2.5 to 3 cm. long and nearly as broad, puberulent, the cells tomentose.

13. *Serjania cardiospermoides* Schlecht. & Cham. Linnaea 6: 418. 1831.

Veracruz and Hidalgo; type collected near Papantla, Veracruz. Central America.

Stems slender, sulcate; leaflets ovate or rhombic, 4 to 8 cm. long, the terminal one very long-petiolulate, acuminate, with 1 to 3 coarse teeth on each side, thin, densely puberulent or glabrate; sepals puberulent; fruit glabrate.

14. *Serjania plicata* Radlk. Monogr. Serjan. 167. 1875.

Known only from the original collection, from Yucatán or Tabasco.

Stems obtusely trigonous, pubescent; leaflets ovate, 8 cm. long or less, crenate-dentate, soft-pubescent beneath; fruit 4 cm. long, 2.4 cm. wide, short-pubescent, the cells subtomentose.

15. *Serjania rekoi* Standl., sp. nov.

Type from Las Pilas (Cerro Espino), Oaxaca, altitude 400 meters (*Reko* 3509; U. S. Nat. Herb. no. 842577).

Sap milky; stems glabrous, acutely trigonous, 6-sulcate, the 3 outer fascicles of wood subterete; leaflets ovate or oblong-ovate, 5 to 7.5 cm. long, acuminate, coarsely sinuate-serrate, subcoriaceous, lustrous, glabrous; outer sepals glabrous; petals 3 mm. long; fruit about 2 cm. long and nearly as broad, glabrous, the cells subglobose.

16. *Serjania caracasana* (Jacq.) Willd. Sp. Pl. 2: 465. 1799.

Paullinia caracasana Jacq. Pl. Hort. Schönbr. 1: 52. pl. 99. 1797.

Guerrero. Central America and South America; type from Caracas, Venezuela.

Stems glabrous, 6 to 8-striate; leaflets mostly lance-oblong, 6 to 15 cm. long, acuminate, remotely serrate-dentate, subcoriaceous, lustrous, glabrous; petals 4 to 5 mm. long; fruit 2.5 cm. long and nearly as broad, glabrous.

17. *Serjania brachylopha* Radlk. Contr. U. S. Nat. Herb. 1: 367. 1895.

Known only from the type locality, Tequila, Jalisco.

Stems sparsely pilose, 6-sulcate; leaflets ovate-oblong to broadly rhombic, 3 to 5 cm. long, acute, subduplicate-serrate, thin, glabrous or nearly so; outer sepals puberulent, the inner tomentulose.

18. *Serjania paniculata* H. B. K. Nov. Gen. & Sp. 5: 86. 1821.

Guerrero. Northern South America; type from Venezuela.

Stems glabrate, 6 to 8-costate; leaflets elliptic to subrhombic, 4 to 7 cm. long, short-acuminate, coarsely crenate-serrate, thin, barbate beneath in the axils of the veins; sepals tomentulose; petals 4 to 5 mm. long; fruit about 2 cm. long and 1.5 cm. wide, the cells densely pilosulous.

19. *Serjania scatens* Radlk. Monogr. Serjan. 213. 1875.

Reported by Radlkofer from Yucatán or Tabasco. Central America, Venezuela, and Cuba.

Stems subterete, puberulent or glabrate; leaflets oblong, obtuse to acuminate, distantly crenate, thin, glabrous; sepals tomentulose; cells of the fruit subtomentose.

20. *Serjania mexicana* (L.) Willd. Sp. Pl. 2: 465. 1799.

Paullinia mexicana L. Sp. Pl. 366. 1753.

Sonora to Veracruz and Oaxaca. Central America, Jamaica, and northern South America.

Stems usually aculeate, glabrous or pubescent; leaflets oblong to elliptic, ovate, or obovate, 4 to 13 cm. long, acuminate to retuse, entire or remotely dentate, thick, usually glabrous; sepals white-tomentulose; petals 3 mm. long; fruit 2 to 2.5 cm. long and nearly as broad, commonly glabrous. "Quirote culebra" (Sonora, *Palmer*); "barbasco" (Sinaloa, Guatemala, Honduras); "sierrilla" (Jalisco); "diente de culebra" (Sonora); "cuauhmeatl,"

"cuamecatl" (Nahuatl; sometimes written "quaumecatl"); "turizo," "bejuco espinoso" (Costa Rica).

The flowers are white and fragrant. The stems are used as a substitute for rope. The plant is employed in some localities for stupefying fish, and it is used in Mexico as a remedy for rheumatism and syphilitic affections.

This species or a related one is figured by Hernández¹ and described in a chapter entitled "De Quauhmecatl Zarsaparilla II. & III." The people of "Yamguitlan" (Yauhuitlán, Oaxaca?), he says, call the plant "Cozticuizti palancapatli," and those of Michoacán "ychuanitzoz." He states that its properties are similar to those of sarsaparilla (*Smilax* spp.).

21. *Serjania brachycarpa* A. Gray; Radlk. Monogr. Serjan. 259. 1875.

Type from Victoria, Tamaulipas. Western Texas.

Stems subhirsute; leaflets ovate-lanceolate or ovate, 1.5 to 3.5 cm. long, mucronulate, remotely serrate, villous-tomentose beneath, thin; sepals subtomentose; petals 2.5 mm. long; fruit about 1 cm. long and broad, the cells puberulent or glabrate.

22. *Serjania vesicosa* Radlk. Monogr. Serjan. 277. 1875.

Known only from Querétaro, the type locality.

Stems ferruginous-tomentose; leaflets ovate, elliptic, or subrhombic, 5 cm. long or less, acuminate, sharply serrate, tomentose beneath; sepals tomentose-pilose; petals 3 mm. long; fruit 1.5 to 1.8 cm long, 1.3 cm wide, glabrous.

23. *Serjania palmeri* S. Wats Proc. Amer. Acad. 24: 45. 1889.

Known only from the type locality, Guaymas, Sonora.

Stems densely tomentulose; leaflets 0.5 to 2.5 cm. long, acute or acutish, mostly entire, finely puberulent on the upper surface; sepals tomentulose; fruit 1.5 to 2 cm. long, puberulent.

24. *Serjania rutaefolia* Radlk. Contr. U. S. Nat. Herb. 1: 316. 1895.

Known only from the type locality, Agiabampo, Sonora.

Stems gray-puberulent, terete; leaflets 1 to 2.5 cm. long, obtuse or retuse, entire or incised-dentate, puberulent at first; sepals tomentulose; petals 4.5 mm. long.

25. *Serjania albida* Radlk. Contr. U. S. Nat. Herb. 1: 367. 1895.

Known only from the type locality, Santa Agueda, Baja California.

Stems 6-angulate, glabrous; leaflets ovate, 1.5 cm. long or less, obtuse, subtrilobate, pale green, glabrous; sepals puberulent.

The fruit is not known, and the generic position of the plant is doubtful.

26. *Serjania grosii* Schlecht. Linnaea 18: 42. 1844.

Oaxaca and perhaps elsewhere; described from Mexico, the exact locality not known. Central America.

Stems sparsely pilose or glabrous, 5 or 6-sulcate; leaflets ovate or rhombic, 5 to 8 cm. long, acute or acuminate, glabrous or pilosulous beneath; sepals tomentulose or the outer ones glabrate; petals 1.5 to 2 mm. long; fruit glabrous or nearly so.

The specific name is given incorrectly by Hemsley² as "*grayii*."

27. *Serjania emarginata* H. B. K. Nov. Gen. & Sp. 5: 84. 1821.

Serjania acapulcensis H. B. K. Nov. Gen. & Sp. 5: 84. 1821.

Guerrero; type from mountains near La Venta de Tierra Colorada.

Stems glabrous, 5 or 6-sulcate; leaflets ovate, 3 to 4 cm. long, obtuse, glabrous; sepals tomentulose; petals 1.8 mm. long; fruit 1.5 cm. long and wide, glabrous.

¹ Thesaurus 289. 1651.

² Biol. Centr. Amer. Bot. 1: 206. 1880.

28. *Serjania flaviflora* Radlk. Bull. Herb. Boiss. II. 3: 211. 1903.

Known only from the type locality, Monte Alban, Oaxaca.

Stems glabrous or nearly so; leaflets ovate-lanceolate, 5 cm. long or less, acute or acuminate; outer sepals puberulent, the inner tomentulose; petals 4 mm. long.

29. *Serjania subtriplinervis* Radlk. Monogr. Serjan. 273. 1875.

Michoacán to Oaxaca; type from Tanetze, Oaxaca.

Stems tomentulose; leaflets ovate to lance-oblong, 2 to 6.5 cm. long, densely pubescent beneath; sepals tomentose; fruit densely pilose when young.

30. *Serjania fuscopunctata* Radlk. Contr. U. S. Nat. Herb. 1: 315. 1895.

Known only from the type locality, Manzanillo, Colima.

Stems pilosulous or glabrate; leaflets ovate or elliptic-ovate, 3 to 4.5 cm. long; pubescent; sepals canescent-tomentulose; sepals 4 mm. long; fruit 2.7 cm. long, 2 cm. wide.

31. *Serjania sordida* Radlk. Monogr. Serjan. 272. 1875.

Veracruz. Costa Rica.

Stems pilosulous or tomentulose; leaflets elliptic or elliptic-ovate, 4 to 10 cm. long, rounded or obtuse at apex, often abruptly short-acuminate, glabrate above, pilosulous beneath; sepals tomentulose; petals 2.5 mm. long; fruit about 2.5 cm. long and 2 cm. wide.

32. *Serjania macrococca* Radlk. Monogr. Serjan. 270. 1875.

Oaxaca.

Stems hirtellous, 5 or 6-sulcate; leaflets ovate or rhombic, 1 to 3 cm. long, acute or obtuse, serrate-dentate, hispid-tomentose beneath; outer sepals pilosulous, the inner tomentulose; petals 4 mm. long; fruit about 2 cm. long and broad, sparsely pilose.

33. *Serjania racemosa* Schumacher, Skrivt. Naturh.-Selsk. (Kjøbenhavn) 3^a: 127. pl. 12, f. 3. 1794.

Nuevo León to Michoacán, Oaxaca, and Veracruz; type from Veracruz. Central America.

Stems glabrous or pubescent, 5 or 6-sulcate; leaflets ovate to elliptic, 2 to 7 cm. long, acute or acuminate, coarsely serrate, pubescent or nearly glabrous beneath; sepals glabrous or tomentulose; petals 2.5 to 3 mm. long; fruit 1.5 to 2.3 cm. long, 1 to 2 cm. wide, glabrous or nearly so. "Nueve hojas," "contra ranilla de bestias," "cuaumecate" (Veracruz, *Urbina*); "tlatlanquaya" (Puebla, *Seler*).

34. *Serjania polystachya* (Turcz.) Radlk. Monogr. Serjan. 276. 1875.

Paullinia polystachya Turcz. Bull. Soc. Nat. Moscou 32¹: 268. 1859.

Oaxaca; type from Talea. Guatemala.

Stems tomentulose or glabrate; leaflets ovate, elliptic, or rhombic, 4 to 8 cm. long, obtuse to acuminate, thinly tomentose beneath; sepals tomentulose; petals 3.5 mm. long; fruit 2 to 2.8 cm. long, 2 cm. wide, the cells densely puberulent.

35. *Serjania californica* Radlk. Sitzungsab. Akad. Wiss. München 8: 222. 1878.

Known only from the type locality, Cape San Lucas, Baja California.

Stems glabrous, 6-sulcate; leaflets rhombic or ovate-rhombic, about 1 cm. long, obtuse, lobate-dentate; sepals glabrate.

The fruit is not known, and the generic position of the plant is doubtful.

36. *Serjania incisa* Torr. U. S. & Mex. Bound. Bot. 47. 1859.

Type from Santa Rosa, Coahuila. Western Texas.

Stems hirtellous or glabrate; leaflets ovate-rhombic, 1 to 3 cm. long, acute, incised-dentate, puberulent; outer sepals glabrate, the inner puberulent; petals 4 mm. long; fruit 3.5 cm. long, 2 cm. wide, subacute at apex, glabrate.

37. *Serjania sphenocarpa* Radlk. Monogr. Serjan. 269. 1875.

Known only from the original collection, this probably from Sonora.

Stems pubescent; leaflets lanceolate, 1.5 to 3 cm. long, acute, remotely incised-dentate, pubescent; sepals puberulent; fruit 1.5 cm. long, 8 to 9 mm. wide, pubescent.

38. *Serjania cystocarpa* Radlk. Ergänz. Monogr. Serjan. 136. 1886.

Serjania inflata S. Wats. Proc. Amer. Acad. 17: 373. 1882. Not *S. inflata* Poepp. & Endl. 1844.

Coahuila, Nuevo León, and San Luis Potosí; type from Caracol Mountains, near Monclova, Coahuila.

Stems puberulent; leaflets lance-ovate to ovate-elliptic, 1 to 3.5 cm. long, obtuse or acute, crenate or incised-dentate, pilosulous; sepals puberulent; fruit pilosulous when young, becoming glabrate.

39. *Serjania pacifica* Standl., sp. nov.

Sinaloa and Tepic; type from Acaponeta, Tepic (*Rose, Standley & Russell* 14189; U. S. Nat. Herb. no. 637046).

Stems pilosulous, 5-sulcate; leaves bipinnate, the 2 lower pinnae trifoliate, the 2 upper pairs of leaflets and the terminal one simple; leaflets oblong-ovate, ovate, or oblong-oval, 2 to 6 cm. long, obtuse or acute, puberulent beneath, remotely crenate-serrate or subentire; sepals puberulent; petals 2.5 mm. long; fruit reddish, 10 to 12 mm. broad, the wings glabrous, the cells thinly hirtellous or glabrate.

2. *URVILLEA* H. B. K. Nov. Gen. & Sp. 5: 105. 1821.

Scandent shrubs, often with tendrils in the inflorescence and leaf axils; leaves trifoliate or biternate, the leaflets toothed and lobed; flowers whitish, in axillary racemes, irregular, polygamo-dioecious; sepals 5, the 2 outer ones small; petals 4; stamens 8; fruit thin, 3-angled, the angles winged; seed 1 in each cell.

Leaves trifoliate ----- 1. *U. ulmacea*.
Leaves biternate ----- 2. *U. biternata*.

1. *Urvillea ulmacea* H. B. K. Nov. Gen. & Sp. 5: 105. *pl.* 440. 1821.

Urvillea mexicana A. Gray, Pl. Wright. 1: 38. 1852.

Nuevo León to Yucatán, Oaxaca, and Tepic. Western Texas; Central America and northern South America; type from Caracas, Venezuela.

Large scandent shrub; leaflets ovate, rhombic-ovate, or deltoid, 3 to 7.5 cm. long, acute or acuminate, densely pubescent or tomentose beneath, crenate and often lobate; racemes long-pedunculate, longer than the leaves; fruit elliptic, 2 to 3 cm. long, narrowed at each end, pubescent or glabrate. "Apaac" (Yucatán, Maya).

2. *Urvillea biternata* Weatherby, Proc. Amer. Acad. 45: 425. 1910.

Known only from the vicinity of the type locality, Iguala Canyon, Guerrero.

Erect (?) shrub, 1 to 2 meters high; leaflets elliptic, acuminate, nearly glabrous; racemes shorter than the leaves; fruit glabrous, 2.5 to 3 cm. long, 2 to 2.5 cm. wide.

3. **CARDIOSPERMUM** L. Sp. Pl. 366. 1753.

Vines, the stems herbaceous or fruticose; leaves estipulate, biternate or compound, the leaflets coarsely toothed or lobed; flowers racemose or corymbose, axillary, the peduncle with 2 tendrils; flowers irregular, polygamodioecious, white or yellowish white; sepals 4 or 5, the 2 outer ones small; petals 4; stamens 8; fruit inflated, bladder-like, thin, 3-angled.

The species are sometimes cultivated for ornament under the name "balloon-vine."

Tendrils reduced to short spines-----1. *C. spinosum*.

Tendrils well developed, colling.

Sepals 5.

Leaflets crenate or crenate-lobate; fruit obtusely angled--2. *C. tortuosum*.

Leaflets dissected into narrow lobes; fruit with thin compressed angles.

4. *C. dissectum*.

Sepals 4-----3. *C. halicacabum*.

1. *Cardiospermum spinosum* Radlk. Contr. U. S. Nat. Herb. 1: 368. 1895.

Baja California; type from La Paz.

Stems fruticose; leaflets few, 5 to 15 mm. long, lobed or crenate, glabrate; petals 4 mm. long.

2. *Cardiospermum tortuosum* Benth. Bot. Voy. Sulph. 9. 1844.

Paullinia tortuosa T. S. Brandeg. Zoe 2: 74. 1891.

Baja California; type from Magdalena Bay.

Stems suffrutescent; leaflets rhombic, crenate or lobate, densely pubescent or glabrate; petals 4 to 6 mm. long; fruit 2 to 3 cm. in diameter.

3. *Cardiospermum halicacabum* L. Sp. Pl. 366. 1753.

Cardiospermum corindum L. Sp. Pl. ed. 2. 526. 1762.

Cardiospermum pubescens Lag. Gen. & Sp. Nov. 14. 1816.

Cardiospermum colutoides H. B. K. Nov. Gen. & Sp. 5: 100. 1821.

Cardiospermum hispidum H. B. K. Nov. Gen. & Sp. 5: 101. 1821.

Cardiospermum molle H. B. K. Nov. Gen. & Sp. 5: 103. 1821.

Cardiospermum microcarpum H. B. K. Nov. Gen. & Sp. 5: 104. 1821.

Nearly throughout Mexico, at low and middle altitudes. Widely distributed in tropical regions of both hemispheres.

Stems herbaceous or suffruticose; leaflets very variable in form and pubescence, densely pubescent to glabrous, 1 to 6 cm. long; flowers 4 to 6 mm. long; fruit 1.5 to 4.5 cm. in diameter, glabrous or pubescent. "Hierba de chivato" (Tamaulipas); "huevo de gato" (Durango); "munditos" (Oaxaca).

The roots are said to have diuretic and sudorific properties. This species is an extremely variable one and many attempts have been made to segregate the forms as species, but there seem to be no definite characters by which the forms can be recognized. Radlkofer considers *C. corindum* a distinct species, but the characters by which he separates it from *C. halicacabum* are neither constant nor important. The writer is doubtful of the validity of *C. tortuosum* and *C. spinosum*.

4. *Cardiospermum dissectum* (S. Wats.) Radlk. in Engl. & Prantl, Pflanzenfam. 3^b: 308. 1895.

Urvillea dissecta S. Wats. Proc. Amer. Acad. 21: 447. 1886.

Chihuahua; type collected near the city of Chihuahua.

Stems chiefly herbaceous; leaflets small, thinly hispidulous; inflorescence few-flowered; fruit about 3 cm. broad, lustrous.

The seeds are much larger than in the other species.

4. *PAULLINIA* L. Sp. Pl. 365. 1753.

REFERENCE: Radlkofer, Monographie der Sapindaceengattung *Paullinia*, Abh. Akad. Wiss. München 19: 71-381. 1896.

Scandent shrubs; leaves pinnate or ternately compound, the leaflets usually dentate or lobate; flowers polygamo-dioecious, whitish, in axillary, usually tendril-bearing racemes; sepals 5, unequal; petals 4; stamens 8; fruit capsular, 3-angled or 3-winged, 1 to 3-celled, 1 to 3-seeded.

The crushed seeds of *P. cupana* Kunth and other South American species are official in the United States Pharmacopoeia under the name "guarana." They contain about 5 per cent of an alkaloid, guaranine, which is believed to be identical with caffeine. This is used in medicine for chronic diarrhea. The Indians of Brazil prepare from the seeds a beverage, which they use like coffee. They also prepare a fermented drink from the guarana seeds, cassava, and water. In Jamaica the juice of the leaves of some species was used as a remedy for heartburn, and the bruised leaves were applied to wounds.

The crushed plants of various species of *Paullinia* and of related genera are often thrown in streams to stupefy fish. It is probably to a plant of this family that Wells refers¹ in the following account, which is quoted here as an excellent description of the procedure followed in tropical America in catching fish by the aid of narcotic plants, a very common and widely spread practice:

"A few days after my arrival at Lepaguare, I rode with Don Toribio to a place near the junction of the Almendarez and Guayape, where a *chilpate* fishing was to take place. On arriving at the river, we found a small party of natives collected on the banks of the smaller stream, engaged in spreading withes and a network of branches below a little series of falls or rapids above which the fish were known to exist in great quantities, especially the *cuyamel*, weighing often fifteen pounds when full grown.

"The preparations completed, a few women entered the river about fifty yards above the rapids, bearing with them a common *batea* containing a decoction of a vine pounded to a pulp, and known as the *chilpate* (possibly the *Sapindus saponaria*), and which may be gathered in any required quantity in the plains and along the banks of the streams. This possesses the singular quality, when mixed with the waters of a running stream, of stupefying the fish, causing them to float helplessly on the surface. When carried down the stream, they are taken by hand from the network below. The signal being given, this novel fishing apparatus was directed against the inhabitants of Almendarez.

"As the pale discoloration extended with the influence of the gentle current, my companion shouted to me to watch its effects. All eyes were riveted upon the water. In a few minutes a commotion was visible beneath the surface, and frequent flaps from the tails of sundry inebriated fish indicated the working of the drug.

"The natives now ran below the falls to catch the victims who came floating down, some with fins or tails feebly wagging above the water, others 'half-seas over,' 'regularly laid out' on their backs, and others as if under the effects of a systematic 'drunk,' struggling against the liquor, and apparently determined to keep on their fins to the last gasp. There were fish of all sizes, from the *cuyamel* down to minnows. It was the most ludicrous, and, at the same time, strange scene I had witnessed in Olancho, and seemed an unpardonable corruption of respectable fish from their original teetotal habits."

¹ W. V. Wells, Explorations and adventures in Honduras, p. 417. 1857.

Fruit winged.

Inflorescences glomerate in the axils; leaflets acuminate or long-acuminate.

1. *P. glomerulosa*.

Inflorescence solitary; leaflets mostly obtuse-----2. *P. fuscescens*.

Fruit not winged.

Mesocarp of the fruit much thickened, fibrous-spongy.

Leaflets 3 -----3. *P. cururu*.

Leaflets 5 to 7.

Stems composed of a central woody body and of 1 to 3 smaller outer ones.

4. *P. pinnata*.

Stems of a single central woody body, without separate outer ones.

Flowers pedicellate; leaf rachis narrowly winged-----5. *P. clavigera*.

Flowers sessile; rachis broadly winged-----6. *P. sessiliflora*.

Mesocarp of the fruit thin, not spongy-thickened.

Capsule sessile or subsessile-----7. *P. tomentosa*.

Capsule stipitate.

Leaves pinnate, the leaflets entire-----8. *P. costata*.

Leaves biternate, or the leaflets lobed or parted.

Leaves biternate; leaflets mostly 3 to 8 cm. long-----9. *P. costaricensis*.

Leaves various, the lower ones merely ternate or trisect, the upper ones pinnate; leaflets mostly 1 to 2 cm. long-----10. *P. sonorensis*.

1. *Paullinia glomerulosa* Radlk. Abh. Akad. Wiss. München 19: 257. 1896.

Reported from Mexico by Radlkofer. Panama and Venezuela.

Leaves pinnate; leaflets 2 to 5 pairs, the lowest ones ternate or pinnate, mostly lanceolate, 3 to 6 cm. long, glabrate; flowers pedicellate; fruit broadly obovate, sessile, 1 cm. long, glabrate, the wings 2 to 3 mm. wide.

2. *Paullinia fuscescens* H. B. K. Nov. Gen. & Sp. 5: 93. 1821.

Paullinia velutina DC. Prodr. 1: 605. 1824.

Sinaloa to Tamaulipas, Yucatán, Campeche, and Oaxaca. Cuba, Central America, and northern South America; type from the Amazon River.

Leaves biternate, the leaflets rhombic or oval to lanceolate, 3 to 7 cm. long, obtusely serrate-dentate, glabrate above, tomentose to glabrate beneath; inflorescences 5 to 15 cm. long, pedunculate, densely pubescent or glabrate, the flowers white or yellowish; capsule broadly obovate, 1 to 1.5 cm. long, reddish, pubescent or glabrate. "Kexak" (Yucatán, Maya); "panoquera" (San Luis Potosí, Veracruz); "bejuco costillón" (Sinaloa); "campalaca" (Honduras); "bejuco de mulato" (Venezuela).

The tough stems are used for binding fences and the framework of huts. This species has been reported from Mexico as *P. barbadensis* Jacq.

3. *Paullinia cururu* L. Syst. Nat. ed. 10. 2: 1007. 1759.

Reported from Mexico by Radlkofer. West Indies, Central America, and South America.

Petiole winged; leaflets elliptic or elliptic-lanceolate, 7 to 15 cm. long, obtuse to acuminate, remotely serrate-dentate, barbate beneath in the axils of the veins but elsewhere glabrous; flowers white or greenish, pedicellate; fruit pyriform or clavate, glabrous. "Azucarito" (Venezuela); "chilmecate" (Nicaragua).

4. *Paullinia pinnata* L. Sp. Pl. 366. 1753.

Guerrero to Oaxaca and Tabasco. West Indies, Central America, South America, and Africa.

Large vine, nearly glabrous; leaves pinnate, the leaflets 5, ovate to oblong or lanceolate, 7 to 10 cm. long, usually acute, remotely serrate-dentate, coriaceous;

rachis broadly winged; inflorescences solitary; flowers pedicellate; fruit pyriform, glabrous, brown or red. "Barbasco" (Tabasco); "bejuquillo" (Oaxaca); "azucarito" (Cuba); "bejuco de costilla" (Porto Rico); "bejuco vaquero" (Guerrero).

Said to be known in the British West Indies as "bread-and-cheese." The plant is used in Tabasco and elsewhere for stupefying fish, and the stems are utilized as a substitute for rope. The bark has a musklike odor, and is said to contain an alkaloid, timbonine. The leaves have been applied as poultices for liver affections and the oil from the seeds as an anodyne liniment, while the plant has been used also as a remedy for gonorrhoea. Some of the Indians are said to have used the juice to poison their arrows, and it is reported that in the Antilles the negroes have made use of the seeds for criminal poisoning.

5. *Paullinia clavigera* Schlecht. Linnaea 10: 239. 1836.

Hidalgo and Veracruz; type from Hacienda de la Laguna, Veracruz. Honduras.

Large vine, nearly glabrous; leaflets 5, elliptic-lanceolate, 6 to 14 cm. long, acute or acuminate, entire or remotely serrate-dentate; inflorescences solitary; fruit pyriform, red, 3 to 4 cm. long, stipitate.

6. *Paullinia sessiliflora* Radlk. Contr. U. S. Nat. Herb. 1: 317. 1895.

Tepic and Colima; type from Colima.

Leaflets 5, oblong or ovate-oblong, 5 to 13 cm. long, obtuse or acute, remotely repand-dentate, glabrate or beneath densely pubescent; inflorescences solitary, tomentulose; fruit pyriform, about 3 cm. long, stipitate, glabrate.

7. *Paullinia tomentosa* Jacq. Enum. Pl. Carib. 37. 1760.

Paullinia pteropoda DC. Prodr. 1: 605. 1824.

Sinaloa to Tamaulipas, Veracruz, Tabasco, and Oaxaca; type from Veracruz. Guatemala.

Leaflets 5, the terminal and basal ones sometimes trilobate, ovate to broadly elliptic, 3 to 10 cm. long, obtuse or acute, thin, coarsely crenate, tomentose beneath; inflorescences solitary; capsule trigonous-globose, 1 to 1.5 cm. long, tomentose; seeds black. "Barbasquillo" (Jalisco); "barbasco" (Tabasco).

8. *Paullinia costata* Schlecht. & Cham. Linnaea 5: 216. 1830.

Veracruz, Tabasco, and Oaxaca; type from Hacienda de la Laguna, Veracruz. Costa Rica.

Leaflets 5, oblong, ovate, or oval, 6 to 15 cm. long, abruptly short-acuminate, often barbate beneath in the axils of the veins, elsewhere glabrous; racemes solitary, long-pedunculate; flowers white; fruit depressed-globose, 1 to 1.5 cm. long, tomentulose; seeds black. "Bejuco de agua" (Oaxaca).

9. *Paullinia costaricensis* Radlk. Ergänz. Monogr. Serj. 157. 1886.

Tabasco; reported from Veracruz by Radlkofer. Central America; type from Costa Rica.

Leaflets elliptic, lanceolate, or rhombic, obtuse, lobate-dentate, densely pubescent beneath or glabrate; racemes solitary, densely puberulent, 5 to 15 cm. long; capsule subglobose, about 1 cm. long, puberulent or glabrate; seeds black.

10. *Paullinia sonorensis* S. Wats. Proc. Amer. Acad. 24: 45. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Subscandent, 1 meter high or less; leaflets rhombic, ovate, or oblong-ovate, obtuse, coarsely dentate or lobate, thin, glabrate; racemes solitary, short, puberulent; capsule depressed-globose, tomentulose, about 1 cm. long.

5. ALLOPHYLUS L. Sp. Pl. 348. 1753.

Erect shrubs or trees; leaves alternate, persistent or deciduous, usually 3-foliolate, the leaflets toothed; flowers polygamo-dioecious, in simple or paniculate racemes; sepals 4; petals 4; stamens 8; ovary usually 2-celled; fruit usually of a single dry or fleshy, 1-seeded carpel.

Racemes rarely exceeding the petioles; leaflets large, 9 to 20 cm. long, thin.

1. A. occidentalis.

Racemes usually equaling or longer than the leaves; leaflets mostly 5 to 10 cm. long, thick -----

2. A. cominia.

- 1. *Allophylus occidentalis* (Swartz) Radlk.** Sitzungsber. Akad. Wiss. München 20: 230. 1890.

Schmidelia occidentalis Swartz, Fl. Ind. Occ. 2: 665. 1800.

Chiapas. Central America, West Indies, and northern South America.

Shrub; leaflets elliptic or oblanceolate, acuminate, irregularly sinuate-serrate, sparsely pubescent beneath; racemes pubescent; fruit red, 6 to 8 mm. long, obovoid, nearly dry. "Palo blanco," "quiebra-hacha" (Porto Rico).

- 2. *Allophylus cominia* (L.) Swartz,** Prodr. Veg. Ind. Occ. 62. 1788.

Rhus cominia L. Syst. Nat. Veg. ed. 10. 964. 1759.

Schmidelia cominia Swartz, Fl. Ind. Occ. 2: 697. 1800.

Tabasco. Cuba, Jamaica, and Hispaniola.

Shrub, or small tree; leaflets elliptic or obovate, serrulate, pubescent on both surfaces, densely so beneath, acute or short-acuminate; racemes branched, densely pubescent; fruit orange or red, 4 mm. long, subglobose, nearly dry.

6. UNGNADIA Endl. Atact. Bot. pl. 36. 1833.

A single species is known.

- 1. *Ungnadia speciosa* Endl.** Atact. Bot. pl. 36. 1833.

Chihuahua, Coahuila, and Nuevo León. Texas and southern New Mexico.

Shrub or tree, sometimes 10 meters high, with a trunk 20 cm. in diameter; bark thin, light gray; leaves alternate, deciduous, pinnate; leaflets 3 to 7, lanceolate or ovate, 5 to 12 cm. long, acuminate, pubescent beneath when young but soon glabrate; flowers purplish pink, in lateral clusters; calyx deeply 5-lobed; petals 4 or 5, obovate, clawed, nearly 1 cm. long; stamens 7 to 10; fruit a 3-lobed capsule, about 5 cm. thick, 3-valvate; seeds black and lustrous, 1 to 1.5 cm. in diameter. "Monillo" or "monilla" (Chihuahua, Nuevo León, Tamaulipas).

The flowers are sweet-scented. The seeds have a pleasant flavor, but they are poisonous. Havard states that an adult can eat one or two with impunity, but three or four produce giddiness and a sensation of heat and discomfort in the stomach. The seeds are sometimes used by boys as marbles. In Texas the plant is known as "Texas buckeye," "Spanish buckeye," or "Mexican buckeye."

7. THOUINIA Poit. Ann. Mus. Hist. Nat. 3: 70. 1804.

Erect trees or shrubs; leaves 3-foliolate, the leaflets serrate; flowers small, symmetric, in lateral panicles; sepals and petals each 4; stamens 8; fruit of 2 or 3 samaras, each of these 1-seeded.

Leaflets densely pubescent beneath, usually obtuse ----- **1. T. villosa.**

Leaflets glabrous beneath, except in the axils of the veins, acute or acuminate.

Fruit glabrous or nearly so; terminal leaflet long-stalked; leaflets closely crenate-serrate ----- **2. T. acuminata.**

Fruit finely pubescent; terminal leaflet nearly sessile; leaflets with a few irregular remote teeth ----- **3. T. paucidentata.**

1. *Thouinia villosa* DC. Prodr. 1: 612. 1824.*Thouinia pringlei* S. Wats. Proc. Amer. Acad. 25: 145. 1890.

Sonora to Guerrero and Puebla; type from Cuernavaca, Morelos.

Shrub or small tree, 3 to 5 meters high, leaflets ovate or rhombic-obovate, 3 to 9 cm long, sessile or nearly so, pubescent on both surfaces, irregularly serrate; panicles equaling or shorter than the leaves; samaras pubescent, about 1.5 cm. long.

The specimens referred here agree very well with Sessé & Mocifio's drawing of the species, and the writer has little doubt that the two names cited are synonymous.

2. *Thouinia acuminata* S. Wats. Proc. Amer. Acad. 25: 145. 1890.

Jalisco to Oaxaca; type from the barranca near Guadalajara, Jalisco. A form of the species (var. *pubicalyx* Radlk.) occurs in Guatemala.

Tree, 7.5 to 12 meters high; leaflets lanceolate or lance-elliptic, 4 to 10 cm. long, bright green; panicles about as long as the leaves; samaras 12 to 14 mm. long.

3. *Thouinia paucidentata* Radlk. Field Mus. Bot. 1: 403. 1898.

Yucatán and Campeche.

Tree, 9 meters high; leaves long-petiolate; leaflets lanceolate or lance-elliptic, 3 to 5 cm. long; panicles racemiform, shorter than the leaves; samaras 10 to 12 mm. long.

8. *DODONAEA* Jacq. Enum. Pl. Carib. 19. 1760.1. *Dodonaea viscosa* Jacq. Enum. Pl. Carib. 19. 1760.*Dodonaea schiedeana* Schlecht. Linnaea 18: 49. 1844.

Baja California to Chihuahua, Nuevo León, Mexico, and Chiapas. Widely distributed in tropical regions.

Shrub, 1 to 5 meters high; leaves linear to oblong-ob lanceolate, 4 to 12 cm. long, attenuate to the base, petiolate or sessile, acute to rounded at apex, pubescent or glabrous beneath, viscid; flowers yellowish, unisexual, dioecious, in small lateral corymbs; calyx 3 to 5-lobed; petals none; stamens 5 to 8; fruit a 3-winged capsule, 3-celled, 1.5 to 2.5 cm. broad, each cell unusually 1-seeded. "Ocotillo" (Guanajuato, Hidalgo); "chapuliztoli" or "chapulizle" (Nahuatl, from *chapul-ichtli*=grasshopper+fiber; it is said that the leaves are much eaten by grasshoppers); "pirimu" (Michoacán, Tarascan); "granadina" or "grenadina" (Baja California); "jarilla" (Oaxaca, Morelos); "hierba de la cucaracha" (Durango, Patoni); "cuerno de cabra" (Oaxaca, Seler); "ayuelo" (Colombia); "chamiso" (Porto Rico, Argentina, Uruguay); "gitarán" (Porto Rico); "varal," "munditos" (Hidalgo).

The species, as is to be expected from its wide range, is a variable one, especially in leaf form. The form with linear leaves, occurring in northern Mexico, is *D. viscosa angustifolia* (L. f.) Benth. The English name is "switch-sorrel"; in the Bahamas the name "candlewood" is used. The leaves are bitter and in various regions are used for fevers, colic, gout, rheumatism, and venereal diseases. The bark is employed in the preparation of astringent baths and fomentations, and the decoction of the wood is reported to have febrifuge properties. The seeds are said to be edible. In Australia the fruits, known as "native hops," were formerly much used as a substitute for true hops (*Humulus lupulus* L.) in making yeast and beer. The wood is described as brown, close-grained, and hard, and in India it has been utilized for engraving, turning, tool handles, and walking sticks.

9. NEOPRINGLEA ¹S. Wats. Proc. Amer. Acad. 26: 134. 1891.

Shrubs or small trees; leaves alternate, petiolate, entire or crenulate; stipules setaceous, deciduous; flowers dioecious, fasciculate and racemose, greenish; staminate flowers with 4 orbicular petals; stamens 12, in 3's opposite the petals; pistillate flowers apetalous; fruit 3-winged, 1-celled, 1-seeded.

The genus has been placed by some authors in the Celastraceae and by others in the Sapindaceae. Its proper position is doubtful.

Leaves conspicuously crenate-serrate, long-acuminate, soon glabrate beneath.

1. N. viscosa.

Leaves entire or nearly so, obtuse or acute, densely pubescent beneath.

2. N. integrifolia.**1. Neopringlea viscosa** (Liebm.) Rose, Contr. U. S. Nat. Herb. 12: 282. 1909.

Llavea viscosa Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1853: 96. 1854.

Dry hillsides, Puebla and Oaxaca.

Shrub, 3 to 4.5 meters high; leaves lanceolate, ovate, or elliptic, 3 to 7 cm. long, thinly pilose when young; staminate inflorescence equaling or shorter than the leaves; pistillate flowers fasciculate; fruit about 7 mm. long, glabrous, emarginate at apex.

2. Neopringlea integrifolia (Hemsl.) S. Wats. Proc. Amer. Acad. 26: 135. 1891.

Llavea integrifolia Hemsl. Diag. Pl. Mex. 6. 1878.

Coahuila to San Luis Potosí, Querétaro, and Hidalgo; type from Zimapán, Hidalgo.

Shrub or small tree, 1.5 to 6 meters high; leaves oblong or lance-oblong, 2 to 6 cm. long, pubescent on both surfaces, more densely so beneath; fruit glabrous, 7 to 9 mm. long. "Corba-gallina" (Tamaulipas, *Palmer*).

10. EXOTHEA Macfad. Fl. Jam. 1: 232. 1837.**1. Exothea copalillo** (Schlecht.) Radlk. in Engl. & Prantl. Pflanzenfam. 3⁶: 358. 1895.

Cyrtocarpa copalillo Schlecht. Linnaea 16: 485. 1842.

San Luis Potosí and Veracruz.

Small tree; leaves persistent; leaflets usually 4, oblong or elliptic-oblong, 6 to 13 cm. long, obtuse, barbate beneath in the axils of the nerves, otherwise glabrous; flowers polygamous, tomentulose, in terminal and lateral panicles; sepals 5; petals 5, 3 mm. long; stamens 8. "Copalillo" (Veracruz).

Only one other species is known, *E. paniculata* (Juss.) Radlk., the inkwood, which occurs in Florida, the West Indies, and Guatemala. *E. copalillo* is closely related and may not be distinct from that species.

11. OUPANIA L. Sp. Pl. 200. 1753.

Erect shrubs or trees; leaves alternate, even-pinnate or simple; flowers polygamous-dioecious, racemose or paniculate, white or greenish; sepals 5; petals 5;

¹The genus is named in honor of Cyrus G. Pringle (1838-1911), a native of Vermont, perhaps the best-known and most industrious of North American botanical collectors. It has been estimated that during his 35 years of field work he distributed to the herbaria of the world over 500,000 specimens, representing 20,000 species, 12 per cent of which were new to science. His work in Mexico began in 1882 and extended nearly to the time of his death, during which period he visited repeatedly nearly all States of the Republic. The specimens he prepared are noted for their superior quality, and are unequaled, probably, by those of any other collector.

stamens 8; fruit a capsule, coriaceous or somewhat fleshy, 2 to 4-lobed; seeds arillate.

The seeds of some species are edible, and are said to have a flavor like that of chestnuts. In Guadeloupe a fermented drink has been made from them. An infusion of the leaves has been employed in the West Indies as a remedy for affections of the bladder and intestines.

Leaflets 4 or 6, or the leaves simple; capsule thin, deeply lobed.

1. *C. macrophylla*.

Leaflets usually about 10; capsule thick, shallowly or scarcely at all lobed.

2. *C. glabra*.

1. *Cupania macrophylla* A. Rich. Ess. Fl. Cuba 291. 1845.

Tamaulipas and perhaps elsewhere. Cuba (type locality); Guatemala.

Shrub or small tree; leaflets oblong, oval-oblong, or obovate-oblong, 5 to 14 cm. long, obtuse or rounded at apex, entirely or nearly so, glabrous; racemes simple or paniculate, sparsely puberulent; fruit about 1.5 cm. long. "Guara macho," "guara colorada" (Cuba); "carbón colorado" (Guatemala, *Blake*).

The Tamaulipas specimens, determined by Radlkofer, are noteworthy because nearly all their leaves are simple.

2. *Cupania glabra* Swartz, Prodr. Veg. Ind. Occ. 61. 1788.

Sinaloa to Oaxaca and Veracruz. Southern Florida, Cuba, Jamaica, Porto Rico, and Costa Rica.

Shrub or tree, sometimes 12 meters high; leaflets mostly oblong, 7 to 16 cm. long, rounded at apex, entire or crenate-serrate, glabrous or at first sparsely pubescent beneath; panicles puberulent, often equaling or exceeding the leaves; capsule brown, 12 to 15 mm. long. "Guara blanca," "guara de costa" (Cuba); "huanchal" (Oaxaca).

The wood is said to be hard, compact, heavy, and red.

DOUBTFUL SPECIES.

CUPANIA AMERICANA L. Sp. Pl. 200. 1753. This has been reported from Tabasco and Veracruz, but the writer has seen no specimens. The plant is similar to *C. glabra*, but has copiously pubescent leaves. In Tabasco it is said to be known as "chichón colorado."

CUPANIA EXCELSA H. B. K. Nov. Gen. & Sp. 5: 125. 1821. Type collected between Mazatlán and Zumpango, Guerrero.

12. *MATAYBA* Aubl. Pl. Guian. 1: 331. 1775.

Erect shrubs or trees; leaves alternate or opposite, persistent, pinnate; flowers in terminal and lateral panicles; calyx 5-lobate; petals 5; stamens 8; fruit a capsule, acutely or obtusely 3-angulate.

Leaflets conspicuously crenate-serrate, rounded or retuse at apex; leaves alternate-----1. *M. scrobiculata*.

Leaflets entire or nearly so, usually narrowed at the apex; leaves mostly opposite-----2. *M. apetala*.

1. *Matayba scrobiculata* (H. B. K.) Radlk. Sitzungsab. Akad. Wiss. München 9: 627. 1879.

Cupania scrobiculata H. B. K. Nov. Gen. & Sp. 5: 127. 1821.

Colima and Guerrero. Central America, Colombia, and Venezuela; type from Turbaco, Colombia.

Tree, about 7.5 meters high; leaflets 4 to 8, oblong or obovate-oblong, 6 to 12 cm. long, coriaceous, glabrous; panicles equaling or longer than the leaves, minutely puberulent; flowers greenish yellow, sweet-scented.

The leaves are provided beneath with small shelters (for parasites?) in the axils of the nerves.

2. *Matayba apetala* (Macfad.) Radlk. Sitzungsab. Akad. Wiss. München 9: 535. 1879.

Cupania apetala Macfad. Fl. Jam. 1: 162. 1837.

Veracruz. Ruatán Island; Cuba and Jamaica (type locality).

Tree, sometimes 12 meters high; leaflets 4 to 8, oblong or elliptic-oblong, 5 to 10 cm. long, usually obtuse-acuminate, glabrous; panicles equaling or shorter than the leaves, puberulent; capsule stipitate, 1 to 1.5 cm. broad. "Doncella" (Porto Rico).

13. THOUINIDIUM Radlk. Sitzungsab. Akad. Wiss. München 8: 267. 1878.

Erect shrubs or trees; leaves even-pinnate, the leaflets coriaceous, entire or serrate; flowers small, regular, in terminal panicles; sepals and petals each 5; stamens 8 or 10; fruit of 2 or 3 laterally compressed, 1-seeded samaras.

Leaflets 6 to 14, serrate, acuminate, glabrous or nearly so----1. *T. decandrum*.
Leaflets 2 or 4, entire, rounded at apex velvety-pilose beneath----2. *T. insigne*.

1. *Thouinidium decandrum* (Humb. & Bonpl.) Radlk. Sitzungsab. Akad. Wiss. München 8: 284. 1878.

Thouinia decandra Humb. & Bonpl. Pl. Aequin. 1: 198. pl. 56. 1808.

Thouinia riparia T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 186. 1915.

Sinaloa to Oaxaca; type from Acapulco, Guerrero. Guatemala to Nicaragua.

Slender tree, 4.5 to 9 meters high; bark smooth, gray; leaflets coriaceous, linear-lanceolate, 6 to 12 cm. long, often subfalcate, finely reticulate-veined; flowers white, about 3 mm. long, in large broad panicles; samaras about 4 cm. long, glabrous. "Charapo" (Michoacán, Guerrero); "panalillo" (Sinaloa).

2. *Thouinidium insigne* (T. S. Brandeg.) Standl.

Thouinia insignis T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 384. 1909.

Known only from the type locality, Santa Lucía, Puebla.

Shrub or small tree, 4 to 5 meters high; leaflets oblong, 5 to 10 cm. long, coriaceous; panicles thyriform, 6 to 15 cm. long; petals yellowish white, 6 mm. long; samaras about 4.5 cm. long and 2 cm. wide, the wing shorter than the body.

14. TALISIA Aubl. Pl. Guian. 1: 349. 1775.

1. *Talisia olivaeformis* (H. B. K.) Radlk. Sitzungsab. Akad. Wiss. München 8: 342. 1878.

Melicocca olivaeformis H. B. K. Nov. Gen. & Sp. 5: 130. 1821.

Chiapas and Yucatán. Colombia; type from Turbaco.

Tree, 18 meters high; leaves persistent; leaflets 4, elliptic, 4 to 15 cm. long, acute or obtuse, glabrous; flowers paniculate, puberulent; sepals 5; petals 5; stamens 8; fruit elliptic, 1-celled, about 2 cm. long, pubescent. "Guayo" (Yucatán); "uayum" (Yucatán, Maya); "mamón de mico" (Colombia).

The fruit is edible.

15. SAPINDUS L. Sp. Pl. 367. 1753.

1. *Sapindus saponaria* L. Sp. Pl. 367. 1753.

Sapindus marginatus Willd. Enum. Pl. 432. 1809.

Sapindus inaequalis DC. Prodr. 1: 608. 1824.

Sapindus drummondii Hook. & Arn. Bot. Beechey Voy. 281. 1836-39.

Sapindus amolli Sessé & Moc. Pl. Nov. Hisp. 60. 1887.

Nearly throughout Mexico; at low and middle altitudes. Widely distributed in the warmer parts of the western hemisphere.

Tree, sometimes 16 meters high, with a trunk 60 cm. in diameter, the top broad and dense; bark gray, fissured and flaky; leaves pinnate; leaflets 5 to 17, linear-lanceolate to oblong, 5 to 18 cm. long, pubescent or glabrate, obtuse to long-acuminate; flowers whitish, about 4 mm. broad, dioecious or polygamous, in large terminal panicles; sepals and petals each 5; ovary 2-celled, only one of the cells developing; fruit a 1-seeded berry, 1 to 1.5 cm. in diameter, with yellow translucent pulp; seed brown; wood light brown, dense, the specific gravity about 0.80. "Jaboncillo" (Nuevo León, San Luis Potosí, Durango, Tamaulipas, Veracruz, Nicaragua, Costa Rica, Cuba, Porto Rico); "palo blanco" (Chihuahua); "matamuchacho" (Sonora); "tehuistle," "tehoitzli," "tehuixtle," or "tehuiztle" (Nahuatl); "jamoncillo" (Durango, a corruption of *jaboncillo*, *Patoni*); "amole de bolita" (various localities); "yamolli," "yamole" (Nahuatl; the fruit); "palo de cuentas," "pipe," "pipal" (Oaxaca); "amole" (Chihuahua); "bibí" (Oaxaca, Zapotec, *Reko*); "cholulo," "gualulo" (Oaxaca, *Reko*); "boliche" (Sinaloa); "devanador" (Veracruz, *Seler*); "para-para" (Venezuela); "palo jabón" (Argentina).

The fruits contain as much as 37 per cent of saponin, and when macerated in water they produce suds like soap. They are much used in Mexico and other regions for washing clothes. The seeds are used for necklaces and rosaries, and they are said to have been used in England as buttons on waistcoats. The wood is of little use except for fuel. The fruit has been used as a febrifuge and for rheumatism and kidney diseases. It is said to be used also for stupefying fish. The fruits of some of the African species are edible, but their seeds are reputed poisonous. The tree is described by Oviedo (Lib. IX, Cap. V), who calls the seeds "cuentas del xabón."

Sapindus saponaria is a variable species, and some writers would divide the Mexican material into two or more species. To the present writer none of the forms appear to be of specific value. In the typical form of the species the rachis is broadly winged, but in the more common Mexican form the rachis is exalate or narrowly marginate. The latter is *S. saponaria* f. *inaequalis* (DC.) Radlk.

90. SABIACEAE. *Sabia* Family.

1. *MELIOSMA* Blume, Cat. Gew. Buitenzorg 10. 1823.

REFERENCE: Urban, Symb. Antill. 1: 503-518. 1900.

Trees or shrubs; leaves alternate, simple or pinnate; flowers perfect or polygamo-dioecious, in compound racemes; sepals 5, rarely 3; petals 5, the 3 outer ones broad, imbricate, the 2 inner ones narrow; stamens 3, opposite the outer petals; fruit drupaceous, the stone osseous, 1-celled, 1-seeded.

Leaves pinnate; sepals 3.....1. *M. alba*.

Leaves simple; sepals 5.

Flowers pedicellate; leaves mostly 10 to 15 cm. long or smaller

Leaves serrate.....2. *M. dentata*.

Leaves entire.....3. *M. oaxacana*.

Flowers sessile; leaves 20 to 30 cm. long.....4. *M. grandifolia*.

1. *Meliosma alba* (Schlecht.) Walp. Repert. Bot. 2: 816. 1843.

Millingtonia alba Schlecht. Linnaea 16: 295. 1842.

Kingsboroughia alba Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 67. 1851.

Known only from the vicinity of the type locality, Jalapa, Veracruz.

Leaflets 5 to 13, opposite, ovate-oblong to elliptic-lanceolate, 10 cm. long or less, petiolulate, acuminate, serrate, pubescent at first, especially beneath; flowers pedicellate; petals 1.3 to 1.7 mm. long. "Palo blanco."

2. *Meliosma dentata* (Liebm.) Urban, Bericht. Deutsch. Bot. Ges. 13: 212. 1895.
Lorenzanea dentata Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 70. 1851.
 Jalisco to Oaxaca, Mexico, and Veracruz; type from Pico de Orizaba.

Tree, 7.5 to 12 meters high; leaves obovate-oblong to oblong-lanceolate, 2.5 to 6 cm. wide, acuminate, remotely spinulose-serrate, pubescent beneath at first, soon glabrate; petals 3 mm. long; fruit 9 to 10 mm. long.

3. *Meliosma oaxacana* Standl., sp. nov.

Type from Sierra San Felipe, Oaxaca, altitude 2,400 meters (*Pringle* 5720; U. S. Nat. Herb. no. 316725).

Small tree, the branchlets densely hirsutulous; petioles 5 to 8 mm. long; leaf blades narrowly lance-oblong, 4.5 to 10.5 cm. long, 1.3 to 2.5 cm. wide, acuminate, obtuse or acute at base, entire, coriaceous, puberulent above along the nerves, pale beneath, fulvous-hirsutulous along the prominent costa and nerves; panicles axillary and terminal, long-pedunculate, about equaling the leaves, brownish-hirtellous; pedicels stout, 1 to 2 mm. long; sepals 5, suborbicular, ciliate but otherwise glabrous.

4. *Meliosma grandifolia* (Liebm.) Urban, Bericht. Deutsch. Bot. Ges. 13: 211. 1895.

Lorenzanea grandifolia Liebm. Nat. For. Kjöbenhavn Vid. Medd. 1850: 73. 1851.

Known only from the type locality, near Cuesta de Teotalcingo, Distrito de Chinantla, Oaxaca, altitude 1,300 to 1,700 meters.

Leaves obovate-oblong, 8 to 11 cm. wide, short-acuminate, entire, pubescent, especially beneath; panicles axillary; fruit 21 to 24 mm. long, 18 to 22 mm. thick.

91. RHAMNACEAE. Buckthorn Family

Trees or shrubs, sometimes scandent, often armed with spines; leaves simple, usually stipulate, entire or toothed; flowers perfect or polygamo-dioecious, small, commonly greenish, usually in axillary cymes, calyx 4 or 5-lobate; petals 4 or 5 or none, cucullate or involute, sessile or clawed; stamens 4 or 5, opposite the petals; fruit 1 to 4-celled, capsular or drupaceous.

Plants with tendrils; ovary inferior; fruit longitudinally winged.

1. GOUANIA.

Plants without tendrils; ovary superior; fruit not winged.

Fruit drupaceous, with a single 1 to 4-celled stone.

Leaves triplinerved.....2. ZIZYPHUS.

Leaves pinnate-nerved, or at least not triplinerved.

Leaves alternate or fasciculate.

Margins of leaves strongly revolute.....3. MICRORHAMNUS.

Margins of leaves not revolute.....4. CONDALIA.

Leaves subopposite.....5. KARWINSKIA.

Fruit capsular, or drupaceous but containing 2 to 4 distinct or only slightly coherent stones.

Leaves minute and soon deciduous; branchlets spinose, opposite.

6. ADOLPHIA.

Leaves well developed, persistent; branchlets not spinose or, if so, alternate.

Leaves each with 2 glands on the lower side near the base of the blade.

7. CORMONEMA.

Leaves without glands.

Cells of the fruit dehiscent; leaves usually alternate.

Petals greenish or yellowish-----8. **COLUBRINA.**

Petals white, pink, or blue-----9. **CEANOTHUS.**

Cells of the fruit indehiscent; leaves opposite or subopposite.

Flowers sessile, in large panicles-----10. **SAGERETIA.**

Flowers pedicellate, solitary or umbellate in the leaf axils.

11. **RHAMNUS.**

1. **GOUANIA** Jacq. Stirp. Amer. 263. 1763.

Shrubs, usually scandent, with tendrils in the inflorescence; leaves alternate, petiolate, toothed, pinnate-nerved or triplinerved; flowers small, polygamous, in long, terminal and axillary racemes or spikes; calyx 5-lobate, adherent to the ovary; petals 5; stamens 5; fruit coriaceous, inferior, 3-winged, the 3 cocci indehiscent, separating from the axis.

Stipules persistent, reniform, large, leaflike; leaves glaucescent beneath, glabrous-----1. **G. stipularis.**

Stipules deciduous, linear or subulate; leaves not glaucescent beneath, hairy, at least on the nerves.

Leaves glabrous beneath except along the nerves-----2. **G. lupuloides.**

Leaves densely pubescent beneath, between as well as upon the nerves.

Mature fruit narrowly winged, the wings about 1 mm. wide.

3. **G. mexicana.**

Mature fruit broadly winged, the wings 5 mm. wide or larger.

Axis of the fruit about 3 mm. long-----4. **G. polygama.**

Axis of the fruit 5 to 6 mm. long-----5. **G. konzattii.**

1. **Gouania stipularis** DC. Prodr. 2: 39. 1825.

Phylica scandens Sessé & Moc. Pl. Nov. Hisp. 39. 1887.

Gouania mexicana Sessé & Moc. Fl. Mex. 259. 1896. Not *G. mexicana* Rose, 1895.

Guerrero; reported from Yucatán and Oaxaca.

Branches glabrous, glaucescent; leaves slender-petiolate, oblong-elliptic or elliptic-ovate, 9 to 13 cm. long, subcordate at base, obtuse-acuminate at apex, thin, nearly entire; flowers densely pilosulous.

Sessé and Mociño give the locality of *Phylica scandens* as Apatzingan, Guerrero, and that is doubtless the type locality also of *Gouania stipularis*.

2. **Gouania lupuloides** (L.) Urban, Symb. Antill. 4: 378. 1910.

Banisteria lupuloides L. Sp. Pl. 427. 1753.

Rhamnus domingensis Jacq. Enum. Pl. Carib. 17. 1760.

Gouania domingensis L. Sp. Pl. ed. 2. 1663. 1763.

Chihuahua to Tamaulipas, Veracruz, Yucatán, Chiapas, and Sinaloa. Southern Florida, West Indies, and Central America.

Stems 3 to 10 meters long, glabrous or nearly so; leaves short-petiolate, lance-oblong to broadly ovate-elliptic, 4.5 to 11 cm. long, acute or acuminate, rounded or subcordate at base, remotely and coarsely serrate or subentire; racemes 10 to 40 cm. long; flowers white or greenish white, densely pubescent; fruit 7 to 12 cm. broad, glabrous or nearly so. "Xomak" (Yucatán, Maya); "bejuco leñatero," "jaboncillo bejuco" (Cuba); "rabo de mono" (Nicaragua); "bejuco de indio" (Santo Domingo).

In the British West Indies the plant is known as "chewstick," pieces of the stem being sometimes chewed to heal and harden the gums and to cleanse the teeth. A decoction of the plant also is employed to harden the gums, and the

dried and powdered stems are employed in making dentifrices, having been exported to Europe for this purpose. The stems are bitter, and they were formerly used in Jamaica as a substitute for hops in brewing beer. The leaves have been employed for dropsy and affections of the stomach. The flowers are much frequented by bees.

3. *Gouania mexicana* Rose, Contr. U. S. Nat. Herb. 3: 314. 1895.

Sonora and Sinaloa; type from Culiacán, Sinaloa.

Slender scandent shrub with tomentulose branchlets; leaves slender-petiolate, ovate-oblong to oblong-elliptic or broadly ovate, 6 to 9 cm. long, acute, rounded or subcordate at base, densely pubescent on both surfaces, irregularly serrate; fruit 4 to 6 mm. broad, densely tomentose.

4. *Gouania polygama* (Jacq.) Urban, Symb. Antill. 4: 378. 1910.

Rhamnus polygama Jacq. Enum. Pl. Carib. 17. 1760.

Gouania tomentosa Jacq. Stirp. Amer. 263. 1763.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas. West Indies, Central America, and northern South America.

Stems densely tomentulose; leaves elliptic, broadly ovate, or ovate-elliptic, 5.5 to 11 cm. long, obtuse and abruptly short-acuminate, usually subcordate at base, coarsely crenate or serrate, thinly or densely tomentose beneath; fruit 10 to 12 mm. broad, tomentose or in age glabrate. "Jaboncillo" (Panama).

The bark is said to contain saponin.

5. *Gouania konzattii* Greenm. Field Mus. Bot. 2: 257. 1907.

Guerrero to Oaxaca and Puebla; type from Cerro de San Felipe, Oaxaca, altitude 1,700 meters.

Stems tomentulose or glabrate; leaves short-petiolate, ovate-elliptic, 5 to 9 cm. long, acute or short-acuminate, subcordate at base, thinly tomentulose beneath, irregularly crenate; fruit 8 to 13 mm. wide, glabrate. "Espumilla" (Guatemala); "enredadera" (Oaxaca, *Konzatti*).

Perhaps only a form of *G. polygama*.

2. *ZIZYPHUS* Adans. Fam. Pl. 2: 304. 1763.

Trees or shrubs; stipules often developing into spines; leaves alternate or opposite, 3-nerved, deciduous; flowers in axillary cymes; calyx 5-lobate; petals 5, cucullate; stamens 5; fruit drupaceous, the stone 1 to 3-celled.

Zizyphus sativa Gaertn. is cultivated in southern Europe for its edible fruit. *Z. jujuba* Lam., the jujube, also is cultivated for its fruit, from which is obtained the jujube paste used in confectionery.

Leaves cuspidate-acuminate-----4. *Z. acuminata*.
Leaves rounded or very obtuse at apex.

Inflorescence pubescent; leaf blades cordate or rounded at base; branches green-----1. *Z. sonorensis*.

Inflorescence glabrous; leaf blades often cuneate at base; branches brown.

Leaves 3 to 7 cm. long-----2. *Z. mexicana*.

Leaves 1 to 3 cm. long-----3. *Z. pedunculata*.

1. *Zizyphus sonorensis* S. Wats. Proc. Amer. Acad. 24: 44. 1889.

Zizyphus seleri Loesener, Verh. Bot. Ver. Brand. 51: 29. 1909.

Zizyphus endlichii Loesener, Repert. Sp. Nov. Fedde 8: 296. 1910.

Baja California and Sonora to Jalisco and Oaxaca; type from Guaymas, Sonora.

Shrub or small tree, 2 to 12 meters high, the younger branches green and often geniculate, armed with long stout spines; trunk bark grayish; leaves

ovate to orbicular-ovate, 3 to 5 cm. long, rounded or obtuse at apex, entire or remotely crenate, densely pubescent or nearly glabrous; cymes long-pedunculate, equaling or longer than the leaves; fruit globose, red, about 1 cm. in diameter. "Nanche de la costa" (Sinaloa); "amole dulce" (Oaxaca).

The fruit of this and the next species is used as a substitute for soap in washing clothes.

2. *Zizyphus mexicana* Rose, Contr. U. S. Nat. Herb. 1: 315 1895.

Colima to Oaxaca; type from Armeria, Colima.

Tree, 4.5 to 7.5 meters high, glabrous throughout; leaves mostly oblong, 3 to 7 cm. long, entire or crenate, reticulate-veined; cymes umbelliform, few-flowered, shorter than the leaves; fruit 12 to 15 mm. in diameter, globose. "Amole" (Colima).

3. *Zizyphus pedunculata* (T. S. Brandeg.) Standl.

Condalia pedunculata T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 384. 1909.

Type from Barranca de Tlacuilosto, San Luis Tultitlanapa, Puebla.

Spiny shrub with brown branches; leaves mostly opposite, short-petiolate, oblong to oval, bright green, rounded at apex, entire or nearly so, glabrate; inflorescence few-flowered; flowers about 5 mm. broad.

Condalia seleri Loesener,¹ described from Tecomavaca, Oaxaca, is apparently a synonym, and it may be that both names refer only to a small-leaved form of *Z. mexicana*.

4. *Zizyphus acuminata* Benth. Bot. Voy. Sulph. 78. 1844.

Type from Acapulco, Guerrero. Costa Rica.

Branches armed with short stout spines, brown; leaves elliptic or oblong-elliptic, 10 to 13 cm. long, serrate above, glabrous.

3. **MICRORHAMNUS** A. Gray, Pl. Wright. 1: 34. 1852.

1. *Microrhamnus ericoides* A. Gray, Pl. Wright, 1: 34. 1852.

Chihuahua, Coahuila, and Zacatecas. Western Texas; type from valley of Pecos River.

Densely branched shrub, 0.5 to 1.5 meters high, glabrous, the branchlets spinose; leaves alternate and fasciculate, linear or oblong, 3 to 6 mm. long, persistent, the margins strongly revolute; flowers yellow, pedicellate; calyx 5-lobate; petals 5, cucullate, clawed; fruit an ovoid drupe, 5 to 7 mm. long, 1-celled. "Abrojo" (Durango); "tecomplate" (Durango, Chihuahua).

4. **CONDALIA**² Cav. Anal. Cienc. Nat. 1: 39. 1799.

Shrubs or small trees, the branches usually spinose; leaves alternate, pinnate-nerved, coriaceous, deciduous; flowers axillary, solitary or fasciculate; calyx 5-lobate; petals 5 or none; stamens 5; fruit drupaceous, the stone 1-celled.

Petals none.

Leaves 5 to 15 mm. wide.....1. *C. obovata*.

Leaves less than 5 mm. wide.

Lateral nerves of the leaves very conspicuous beneath, broad and coarse.

2. *C. spathulata*.

Lateral nerves slender and inconspicuous.....3. *C. mexicana*.

¹ Repert. Sp. Nov. Fedde 9: 355. 1911.

² In honor of Antonio Condal, a native of Barcelona, who accompanied the scientific expedition, under the direction of the Swedish botanist, Peter Loeffling, sent by the Spanish Government to explore its South American possessions.

Petals present.

Inflorescence a sessile umbel, or the flowers solitary; fruit short-beaked.

Pedicels glabrous; leaves pale beneath.....4. *C. parryi*.

Pedicels pubescent; leaves green beneath.....5. *C. lloydii*.

Inflorescence a short-pedunculate umbel; fruit not beaked.

Leaves green beneath, somewhat 3-nerved at base.....6. *C. obtusifolia*.

Leaves pale beneath, pinnate-nerved.....7. *C. lycioides*.

1. *Condalia obovata* Hook. Icon. Pl. pl. 287. 1840.

Nuevo León and Tamaulipas. Western Texas.

Shrub or small tree, sometimes 10 meters high, with a trunk 20 cm. in diameter; bark thin, brown, ridged; leaves broadly spatulate, 1 to 2.5 cm. long, rounded at apex, petiolate, entire, glabrate; flowers green, solitary or fasciculate, nearly sessile; fruit dark blue or nearly black, 6 mm. long, with sweet flesh; wood hard and dense, red, its specific gravity about 1.20. "Brasil" (Tamaulipas, Texas); "capulín" (Nuevo León); "capul negro" (Texas).

The wood yields a blue dye. The fruit, like that of other species, is edible and is said to make good jelly.

The writer has seen no material of *C. obovata angustifolia* Loesener,¹ described from Sinaloa, where it is said to be known as "mezquitillo." It probably should be referred to some other species.

2. *Condalia spathulata* A. Gray, Pl. Wright. 1: 32. 1852.

Baja California to Sonora, Sinaloa, Zacatecas, Tamaulipas, and Coahuila. Western Texas to southern California; type collected in Texas on the Rio Grande.

Densely branched shrub, 1 to 2 meters high, with slender spinose branchlets; leaves narrowly spatulate, 5 to 10 mm. long, obtuse, petiolate, glabrous or pubescent; flowers pedicellate, solitary or fasciculate; fruit short-beaked, 4 to 5 mm. long, black or purplish, bitter. "Chamís" (Zacatecas); "abrojo," "tecomplate" (Durango).

3. *Condalia mexicana* Schlecht. Linnaea 15: 471. 1841.

Chihuahua and Coahuila to San Luis Potosí, Querétaro, Hidalgo, and Puebla; type from Zimapán, Hidalgo. Southern Arizona.

Shrub, 1 to 2 meters high, with stout spinose branches; leaves obovate or oblanceolate, 5 to 12 mm. long, rounded at apex, short-petiolate, entire, pubescent or glabrate; flowers nearly sessile in the axils; fruit 4 to 6 mm. long, short-beaked. "Bindó" (San Luis Potosí, Ramírez).

4. *Condalia parryi* (Torr.) Weberb. in Engl. & Prantl, Pflanzenfam. 3⁵: 404. 1895.

Zizyphus parryi Torr. U. S. & Mex. Bound. Bot. 46. 1859.

Baja California. Southern California; type from San Felipe.

Densely branched shrub, 0.5 to 4.5 meters high, densely armed with stout spines, glabrous throughout; leaves obovate or elliptic, 8 to 15 mm. long, short-petiolate, rounded at apex, entire; pedicels 4 to 6 mm. long; fruit ovoid, 1 to 1.5 cm. long, yellowish red.

The Coahuila Indians of southern California pounded the fruit into a coarse meal which was mixed with water to make atole.

5. *Condalia lloydii* Standl., sp. nov.

Type from foothills, Cedros, Zacatecas (Lloyd 71; U. S. Nat. Herb. no. 574037).

¹ Repert. Sp. Nov. Fedde 8: 297. 1910.

Shrub with stout spinose branchlets; leaves fasciculate, short-petiolate, the blades oblong or elliptic, 6 to 12 mm. long, rounded at base and apex, entire or nearly so, bright green and pubescent on both surfaces; flowers fasciculate, the slender pedicels 3 to 4 mm. long; calyx pubescent, the lobes deltoid; petals equaling the calyx lobes. "Garrapata."

6. *Condalia obtusifolia* (Hook.) Weberb. in Engl. & Prantl, Pflanzenfam. 3⁵: 404. 1895.

Rhamnus obtusifolia Hook.; Torr. & Gray, Fl. N. Amer. 1: 685. 1840.

Zizyphus obtusifolia A. Gray, Gen. Fl. Amer. 2: 170. 1849.

Tamaulipas. Western Texas.

Densely branched shrub with stout spinose branchlets, these covered with pruinose flaky epidermis; leaves short-petiolate, ovate or elliptic, 6 to 20 mm. long, obtuse or acute, thin, glabrate, entire or serrate; inflorescence villosulous; fruit subglobose, black, 8 mm. in diameter. "Abrojo," "chaparro prieto" (Tamaulipas).

The fruit is edible but of poor quality. The roots are employed in Tamaulipas as a substitute for soap, and a decoction of them is applied to sores on horses.

7. *Condalia lycioides* (A. Gray) Weberb. in Engl. & Prantl, Pflanzenfam. 3⁵: 404. 1895.

Zizyphus lycioides A. Gray, Bost. Journ. Nat. Hist. 6: 168. 1850.

Baja California to Chihuahua, Nuevo León, San Luis Potosí, and Zacatecas; type collected between Matamoros, Coahuila, and Mapimí, Durango. Western Texas to southern California.

Densely branched shrub, 1 to 2.5 meters high, the branchlets spinose, whitish; leaves oblong, oval, or ovate, 5 to 25 mm. long, obtuse or rounded at apex, entire or serrate, thin, pubescent or glabrate; fruit 6 to 8 mm. long, black. "Clepe" (Tamaulipas); "crucillo" (Tamaulipas, Coahuila); "garrapata" (Zacatecas); "barchatas" (Sonora); "garambullo" (Durango, *Patoni*).

The typical form is glabrate. *C. lycioides canescens* (A. Gray) Trel.¹ is a form with pubescent leaves. *C. lycioides microphylla* Loesener,² described from Coahuila, is a form with small narrow leaves. The fruit is edible. The root bark is used as a soap substitute. The Pimas of Arizona employed a decoction of the root as a remedy for sore eyes.

5. **KARWINSKIA**³ Zucc. Abh. Akad. Wiss. München 2: 349. 1832.

Shrubs or small trees; leaves subopposite, sessile or petiolate, entire, pinnate-nerved, pellucid-punctulate; flowers axillary, solitary or in cymes or umbels; calyx 5-lobate, the lobes acute; petals 5, cucullate; stamens 5; fruit drupaceous, apiculate, the stone 1 or 2-celled.

¹ In A. Gray, Syn. Fl. 1¹: 403. 1897. *Zizyphus lycioides canescens* A. Gray; Rothr. in Wheeler, Rep. U. S. Surv. 100th Merid. 6: 82. 1879.

² Repert. Sp. Nov. Fedde 8: 296. 1910.

³ The genus was named for Wilhelm Friedrich von Karwinski, a Bavarian, who spent many years in Brazil. In 1826 he was sent by a society at Düsseldorf to Mexico to collect objects of natural history. He remained five years in Mexico, most of the time in Oaxaca, although he collected also in Hidalgo and probably in Mexico. He forwarded to Europe many living plants, especially Cactaceae and Agaves. In 1840 he revisited Mexico on behalf of the Russian Government and obtained collections which were sent to St. Petersburg. He died at Munich in 1855.

Leaves sessile, cordate at base-----1. *K. umbellata*.

Leaves petiolate, rounded or obtuse at base.

Flowers densely pubescent; leaves pubescent beneath.

Nerves impressed on the upper surface of the leaf; leaves finely and densely puberulent above-----2. *K. mollis*.

Nerves not impressed; leaves glabrate above-----3. *K. pubescens*.

Flowers glabrous; leaves glabrous beneath.

Petioles 1 to 3 cm. long; leaves mostly 3 to 5.5 cm. wide, usually rounded and mucronate at apex-----4. *K. latifolia*.

Petioles less than 1 cm. long, usually less than 7 mm.; leaves mostly 1 to 2 cm. (rarely 3 cm.) wide, not conspicuously mucronate.

5. *K. humboldtiana*.

1. *Karwinskia umbellata* (Cav.) Schlecht. *Linnaea* 15: 460. 1841.

Rhamnus umbellata Cav. *Icon. Pl.* 6: 2. *pl.* 504. 1801.

Karwinskia sessilifolia Schlecht. *Linnaea* 15: 461. 1841.

Michoacán and Guerrero; type collected between Chilpancingo and Río Azul, Guerrero.

Glabrous shrub or small tree, 1 to 4.5 meters high; leaves elliptic-ovate, 4 to 8 cm. long, obtuse or rounded at apex, the transverse veins very prominent beneath; umbels pedunculate, few-flowered; flowers green; fruit 7 to 8 mm. in diameter.

2. *Karwinskia mollis* Schlecht. *Linnaea* 15: 461. 1841.

Querétaro, San Luis Potosí, and Veracruz; type from Barranca de Santa María.

Shrub; branches densely pilosulous; leaves short-petiolate, oblong to elliptic, 1.5 to 4.5 cm. long, obtuse or rounded at apex, finely and densely pubescent on both surfaces, the lateral nerves close and parallel, very prominent beneath; umbels usually sessile, often reduced to a single flower; fruit 7 to 9 mm. in diameter.

3. *Karwinskia pubescens* Standl., sp. nov.

Baja California and Sonora to Oaxaca, and Coahuila; type from Hermosillo, Sonora (*Maltby* 215; U. S. Nat. Herb. no. 314960). Western Texas.

Slender shrub, about 1 meter high, the branchlets puberulent; leaves short-petiolate, oblong to ovate or elliptic, 2 to 4.5 cm. long, obtuse or rounded at base and apex, thin, beneath puberulent or thinly pilosulous, glabrate above, the lateral nerves usually few and distant; umbels sessile or short-pedunculate, densely pubescent; fruit 5 to 7 mm. in diameter. "Coyotillo" (Texas).

This may be only a form of *K. humboldtiana*, but it appears fairly distinct.

4. *Karwinskia latifolia* Standl., sp. nov.

Sinaloa, Tepic, and Jalisco; type from Tepic (*Palmer* 1848; U. S. Nat. Herb. no. 305562).

Shrub or small tree, sometimes 6 meters high, glabrous throughout; leaves lance-oblong to broadly ovate-elliptic, 6 to 11 cm. long, rounded or obtuse at base, usually rounded at apex and mucronate, thin, pale beneath, the lateral nerves comparatively few and distant; umbels pedunculate; fruit 7 to 10 mm. long. "Margarita" (Jalisco).

This is the plant reported by Hooker and Arnott¹ as *Rhamnus biniflorus* var. ?, and referred doubtfully by Schlechtendal² to *K. affinis*. The leaves in some specimens are strikingly suggestive of those of certain species of *Cornus*.

¹ Bot. Beechey Voy. 283. 1836-39.

² *Linnaea* 15: 460. 1841.

5. *Karwinskia humboldtiana* (Roem. & Schult.) Zucc. Abh. Akad. Wiss. München 2: 351. 1832.

Rhamnus humboldtiana Roem. & Schult. Syst. Veg. 5: 295. 1819.

? *Rhamnus biniflorus* DC. Prodr. 2: 26. 1825.

Karwinskia glandulosa Zucc. Flora 7^a: Beibl. 71. 1832.

Karwinskia affinis Schlecht. Linnaea 15: 460. 1841.

? *Karwinskia biniflora* Schlecht. Linnaea 15: 460. 1841.

? *Karwinskia subcordata* Schlecht. Linnaea 15: 462. 1841.

Rhamnus maculata Sessé & Moc. Pl. Nov. Hisp. 38. 1887.

Karwinskia parvifolia Rose, Contr. U. S. Nat. Herb. 1: 315. 1895.

Baja California to Tamaulipas, Veracruz, Yucatán, and Oaxaca; type collected near Puente de la Madre de Dios, between Totonilco El Grande and Actopan, Veracruz. Western Texas.

Shrub or small tree, 1 to 8 meters high, the trunk sometimes 20 cm. in diameter; leaves oblong to oval or elliptic, 1 to 6.5 cm. long, rounded to acute at apex, paler beneath, with few or numerous pairs of nerves; umbels short-pedunculate, or some of them sessile; fruit 6 to 9 mm. long, blackish. "Coyotillo" (Tamaulipas, Texas); "tullidora" (Nuevo León, Querétaro); "tullidor" (Coahuila, Tamaulipas); "capulincillo" (Nuevo León, Querétaro, Oaxaca); "capulincillo cimarrón" (Valley of Mexico, Querétaro); "capulín" (Coahuila, Tamaulipas); "palo negrito" (Sinaloa); "margarita" (Tepic, Jalisco, Colima, Sinaloa, Durango); "cacachila china," "cacachila silvestre," "frutillo," "negrito" (Sinaloa); "cacachila" (Chihuahua); "cachila" (Baja California); "margarita del cerro" (Jalisco); "tlalcapolin" (Nahuatl).

The wood is said to be hard and strong. The fruit is sweet and edible, but the stones are harmful if swallowed. In people, especially children, paralysis, particularly of the lower limbs, is caused by eating stones, and similar effects are said to be produced in pigs and chickens. Palmer states that in Tamaulipas children thus paralyzed are taken to a slaughter pen, and stomachs of freshly killed cattle are wrapped about the parts affected, an outer covering being employed to retain the warmth. There is a prevalent belief that this mode of treatment is quite successful. The seeds are oily, and they contain some principle which paralyzes the motor nerves. They are employed in Mexico as an anticonvulsive, particularly in the case of tetanus. An infusion or decoction of the leaves and roots is used locally for fevers, and Palmer states that the hot tea is held in the mouth as a remedy for toothache and neuralgia.¹

This plant is illustrated by Hernández² and described in a chapter entitled "De Cacatzin, seu parva Cacatl," but little information is given concerning it. Clavigero (Historia de la California, 1789) also gives an account of the plant and of its harmful properties.

The only Yucatán specimen seen by the writer is noteworthy in having sparsely pubescent flowers. The species is somewhat variable, but none of the forms appear worthy of specific rank. *K. parvifolia*, a form of the Pacific coast, has very small leaves, but the leaves vary too greatly in size throughout the range of the plant to permit the use of this as a specific character.

6. *ADOLPHIA* Meisn. Pl. Vas. Gen. 70. 1837.

1. *Adolphia infesta* (H. B. K.) Meisn. Pl. Vas. Gen. 70. 1837.

Ceanothus infestus H. B. K. Nov. Gen. & Sp. 7: 61. pl. 614. 1825.

Colletia multiflora DC. Prodr. 2: 29. 1825.

¹ See also S. E. Sosa, Tullidora ó capulincillo, Estudio 2: 35.

² Thesaurus 308. 1651.

Baja California to Chihuahua, Zacatecas, Hidalgo, and Oaxaca; type from "Gasave." Western Texas.

Shrub, 1.5 to 2.5 meters high, densely branched, the branches green, spinose, glabrous or pubescent; stipules persistent; flowers small, fasciculate in the axils; calyx 5-lobate; petals 5, spatulate, cucullate; fruit drupaceous, coriaceous, 3-celled. "Junco" (Durango).

Adolphia californica S. Wats.¹ has been reported from Mexico and may occur in northern Baja California. It is not certain that it is specifically distinct from *A. infesta*.

7. CORMONEMA Reissek; Endl. Gen. Pl. 1098. 1840.

Shrubs or small trees, armed with spines; leaves alternate, entire, petiolate, the blade with 2 glands on the under surface near the base; flowers axillary, solitary or fasciculate, pedicellate; calyx 5-lobate; petals 5, cucullate, clawed; stamens 5; fruit drupaceous, 3-celled; the cocci crustaceous.

Leaves acuminate at apex, acute at base-----1. *C. mexicana*.
Leaves rounded or vary obtuse at apex and usually retuse, rounded or obtuse at base-----2. *C. biglandulosa*.

1. *Cormonema mexicana* Rose, Contr. U. S. Nat. Herb. 3: 315. 1895.

Known only from Tepic, the type locality.

Tree, 3.5 meters high, the trunk 12 cm. in diameter; leaves oblanceolate or oblanceolate-elliptic, 7 to 15 cm. long, nearly glabrous, the glands borne at the base of the blade adjacent to the petiole; fruit about 1 cm. in diameter.

2. *Cormonema biglandulosa* (Sessé & Moc.) Standl.

Rhamnus biglandulosa Sessé & Moc. Pl. Nov. Hisp. 38. 1887.

Cormonema nelsoni Rose, Contr. U. S. Nat. Herb. 3: 315. 1895.

Sinaloa to Guerrero; type from Apatzingan, Guerrero.

Shrub or tree, 2 to 7 meters high; leaves suborbicular to elliptic, 3 to 7.5 cm. long, glabrous or nearly so, the glands borne on the margin of the blade remote from the petiole; flowers greenish yellow, densely glomerate, pubescent; fruit 6 mm. in diameter. "Alezulla" (Sinaloa).

8. COLUBRINA L. Rich.; Brongn. Ann. Sci. Nat. 10: 368. 1827.

Shrubs or trees, unarmed; leaves alternate, petiolate, entire or serrate, usually 3-nerved; flowers axillary, cymose or fasciculate, greenish; calyx 5-lobate; petals 5, cucullate, clawed; stamens 5; fruit drupaceous, 3-coccos, the cocci membranaceous or crustaceous.

The bark of some the West Indian species is reported to be bitter and to have antiscorbutic, stomachic, tonic, laxative, febrifuge, and vermifuge properties.

Leaves entire, pinnate-nerved, all or most of them less than 2 cm. long.

1. *C. glabra*.

Leaves finely or coarsely serrate, 3-nerved at base, usually more than 2 cm. long.

Leaves coarsely, irregularly, and remotely serrate, the lower surface sometimes glabrous or glabrate.

Lower surface of leaves brown or ferruginous-tomentose--2. *C. ehrenbergii*.

Lower surface of leaves glabrous or glabrate-----3. *C. glomerata*.

Leaves finely, evenly, and closely serrulate, the lower surface tomentose or densely pubescent.

¹ Proc. Amer. Acad. 11: 126. 18776.

Leaves rounded or very obtuse at apex, rarely acute, the fruit then more than 1 cm. in diameter.

Leaves 4 to 10 mm. wide, pilose beneath or in age glabrate; fruit about 8 mm. in diameter-----4. *C. texensis*.

Leaves 1.5 to 7 cm. wide, tomentose beneath; fruit over 1 cm. in diameter.
5. *C. macrocarpa*.

Leaves acute or acuminate; fruit 8 mm. or less in diameter.

Leaves glabrous on the upper surface, in age glabrate beneath.

6. *C. celtidifolia*.

Leaves pubescent on the upper surface, densely tomentose or loosely sericeous beneath-----7. *C. greggii*.

1. *Colubrina glabra* S. Wats. Proc. Amer. Acad. 24: 44. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Densely branched shrub, 1.5 to 3.5 meters high; leaves mostly fasciculate, orbicular to oblong-ovate, obovate, or elliptic, rounded or retuse at apex, glabrous or pubescent; flowers yellowish green; fruit 4 to 6 mm. broad.

2. *Colubrina ehrenbergii* Schlecht. Linnaea 15: 469. 1841.

Jalisco, San Luis Potosí, and Veracruz; type collected between Ajuntas and Las Verdosas.

Shrub or small tree; leaves short-petiolate, oblong-ovate to broadly ovate, 4 to 8 cm. long, acutish, coriaceous, glabrous or nearly so on the upper surface; fruit 5 to 6 mm. in diameter.

3. *Colubrina glomerata* (Benth.) Hemsl. Biol. Centr. Amer. Bot. 1: 200. 1880.

Rhamnus glomerata Benth. Pl. Hartw. 9. 1839.

?*Zizyphus acuminata* Benth. Bot. Voy Sulph. 78. 1844.

Barcena guanajuatensis Duges, Rev. Clenc. Mex. 1: 8. 1879.

Colubrina arborea T. S. Brandeg. Zoe 4: 401. 1894.

Colubrina mexicana Rose, Contr. U. S. Nat. Herb. 3: 315. 1895.

Baja California to Chihuahua, Guanajuato, Puebla, and Oaxaca; type from Zacatecas.

Shrub or small tree, 2 to 6 meters high; leaves lanceolate to broadly ovate, 5 to 12 cm. long, acute to long-acuminate, obtuse or rounded at base, bright green; fruit 6 to 8 mm. in diameter.

The species is somewhat variable in leaf form, but the leaves vary about as much upon a single plant as in the whole series of specimens.

4. *Colubrina texensis* (Torr. & Gray) A. Gray, Bost. Journ. Nat. Hist. 6: 169. 1850.

Rhamnus texensis Torr. & Gray, Fl. N. Amer. 1: 263, 1838.

Coahuila and Nuevo León. Texas.

Shrub, 1 to 2 meters high, densely branched; leaves short-petiolate, elliptic or obovate, acute to rounded at base.

5. *Colubrina macrocarpa* (Cav.) Don, Hist. Dichl. Pl. 2: 36. 1832.

Ceanothus macrocarpus Cav. Icon. Pl. 3: 38. pl. 276. 1794.

Colubrina megacarpa Rose, Contr. U. S. Nat. Herb. 8: 50. pl. 11. 1903.

Colubrina lanulosa Blake, Contr. Gray Herb. 52: 74. 1917.

Michoacán, Guerrero, Querétaro, and Puebla.

Shrub or small tree, 2.5 to 4 meters high; leaves elliptic-oblong to rounded-ovate, 3 to 8 cm. long, rounded or rarely acutish at apex, rounded or cordate at base, densely pubescent on the upper surface. "Café cimarrón" (Querétaro).

Colubrina alamani DC.,¹ described from Mexico, is probably the same species, but it may be the same as *C. greggii*.

6. *Colubrina celtidifolia* (Schlecht. & Cham.) Schlecht. *Linnaea* 15: 471. 1841.
Ceanothus celtidifolius Schlecht. & Cham. *Linnaea* 5: 602. 1830.

Veracruz; type from Jalapa. Guatemala.

Leaves ovate or broadly elliptic-ovate, 7 to 11 cm. long, rounded or subcordate at base, bright green.

7. *Colubrina greggii* S. Wats. *Proc. Amer. Acad.* 17: 336. 1882.

Coahuila and Nuevo León to Veracruz and Yucatán; type from Monterrey, Nuevo León.

Shrub or small tree; leaves on long or short petioles, oblong-ovate to broadly ovate, 4 to 12 cm. long, obtuse to cordate at base. "Manzanita," "guayul" (Tamaulipas); "pimiento-ché," "yax-pukim," "yax-puken" (Yucatán, Maya).

This has been reported from Yucatán as *C. ferruginosa* Brongn., a West Indian species. The fruit is said to be edible. Palmer reports that in Tamaulipas the wood is used for shoe pegs.

9. CEANOTHUS L. Sp. Pl. 195. 1753.

Shrubs or small trees, often with spinose branchlets; leaves alternate or opposite, short-petiolate; entire or toothed, usually triplinerved; flowers perfect, in cymes or umbels, these usually forming panicles or thyrses; petals white, pink, or blue; calyx 5-lobate; petals 5; stamens 5; fruit dry, 3-coccos, longitudinally dehiscent.

Some of the species are showy when in flower. The blue-flowered ones are known on the Pacific coast of the United States as "California lilac." *Ceanothus americanus* L., of the United States is known as "New Jersey tea." The astringent roots contain over 6 per cent of tannin, and an alkaloid, ceanothine. They have been used in the treatment of syphilis, and are said to have purgative properties. The leaves were used by the Indians to make a beverage like tea, and during the Revolutionary War they were employed along the Atlantic coast as a substitute for Chinese tea. Gilmore² states that the flavor of the beverage made from them "is something like that of Asiatic tea and is much better than that of the South American yerba maté." The fresh flowers of some, and probably of all, of the species, when rubbed in water, gives a cleansing lather which is a good substitute for soap.

Stipules persistent, the bases corky or spongy; leaves opposite, except in one species; capsule usually with dorsal and apical horns as well as crests; flowers white, umbellate.

Leaves alternate-----1. *C. verrucosus*.

Leaves opposite.

Leaves coarsely dentate-----2. *C. goldmanii*.

Leaves entire, or rarely with 1 or 2 teeth.

Leaves cuneate-obovate or spatulate, the margins not revolute.

3. *C. cuneatus*.

Leaves oblong to oval, the margins revolute.

Tomentum of the lower surface of the leaf coarse and loose.

4. *C. lanuginosus*.

Tomentum very fine and closely appressed-----5. *C. greggii*.

¹ Prodr. 2: :31. 1825.

² Ann. Rep. Bur. Amer. Ethnol. 33: 102. 1919.

Stipules thin and deciduous; leaves alternate; capsule without horns; flowers blue or white, usually racemose.

Leaves glabrous beneath or with a few closely appressed, straight hairs; branchlets glaucous or glaucescent.

Leaves pinnate-nerved.....6. *C. spinosus*.

Leaves 3-nerved.....7. *C. divaricatus*.

Leaves copiously pubescent beneath, usually densely so, often tomentose; branchlets never glaucous.

Branchlets never spinose; petals usually blue; flowers mostly in elongate racemes.

Leaves 1 to 2 cm. long, densely and minutely sericeous beneath.

8. *C. tomentosus*.

Leaves mostly 3 to 8 cm. long, coarsely tomentose beneath.

9. *C. coeruleus*.

Branchlets spinose; petals white; flowers umbellate.

Leaves entire.....10. *C. huichagorare*.

Leaves finely serrulate.

Lower surface of the leaf finely white-sericeous between the nerves.

Leaves suborbicular, rounded at base, glabrate on the upper surface.

11. *C. pueblensis*.

Leaves oval-obovate to cuneate-obovate, obtuse or cuneate at base, sericeous on the upper surface.....12. *C. durangoinus*.

Lower surface of the leaf tomentose, or the pubescence consisting of long loose hairs, these all or chiefly confined to the nerves.

Capsule coarsely tuberculate and cristate.....13. *C. ferox*.

Capsule smooth.

Leaves sparsely or densely tomentose beneath, the hairs matted.

Leaves glabrous or nearly so on the upper surface, very sparsely tomentose beneath.....14. *C. depressus*.

Leaves densely pubescent on the upper surface or very tardily glabrate, densely tomentose beneath.....15. *C. endlichii*.

Leaves pilose beneath along the nerves with long straight hairs.

16. *C. buxifolius*.

1. *Ceanothus verrucosus* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Northern Baja California. Southern California; type from San Diego.

Low shrub with gray or brown branches; leaves cuneate-obovate or rounded-obovate, 4 to 12 mm. long, rounded or retuse at apex, entire or denticulate, minutely tomentulose beneath or glabrate; flowers white.

2. *Ceanothus goldmanii* Rose, Contr. U. S. Nat. Herb. 12: 284. 1909.

Mountains of Baja California; type from La Huerta.

Stout shrub, 2 to 4 meters high, often forming dense thickets; leaves cuneate-obovate to suborbicular, 7 to 14 mm. long, coarsely dentate, minutely tomentulose or glabrate beneath.

This has been reported from Baja California as *C. rigidus* Nutt.

3. *Ceanothus cuneatus* (Hook.) Nutt.; Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Rhamnus cuneata Hook. Fl. Bor. Amer. 1: 124. 1829.

Ceanothus submontanus Rose, Contr. U. S. Nat. Herb. 12: 284. 1909.

Baja California. California and Oregon.

Shrub, 1 to 3 meters high, with gray branches; leaves 6 to 15 mm. long, obtuse or rounded at apex, nearly sessile, minutely tomentulose beneath.

4. *Ceanothus lanuginosus* (Jones) Rose, Contr. U. S. Nat. Herb. 12: 284. 1909.

Ceanothus greggii lanuginosus Jones, Proc. Calif. Acad. II. 5: 620. 1895.

Chihuahua and Coahuila; type from Santa Eulalia Mountains, Chihuahua. Shrub with rigid grayish branches; leaves 7 to 15 mm. long, rounded at apex, densely tomentose beneath, tomentose above at first but soon glabrate.

5. *Ceanothus greggii* A. Gray, Pl. Wright. 2: 28. 1853.

Ceanothus australis Rose, Contr. U. S. Nat. Herb. 12: 283. 1909.

Chihuahua and Coahuila to San Luis Potosí, Hidalgo, Puebla, and Oaxaca; type from Buenavista, Coahuila. Western Texas to southern Utah.

Low shrub with intricate brown or grayish branches; leaves 6 to 15 mm. long, rounded or obtuse at apex, green and glabrate on the upper surface.

6. *Ceanothus spinosus* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 267. 1838.

Northern Baja California. Southern California; type from Santa Barbara.

Shrub or small tree, sometimes 7 meters high, with a trunk 15 cm. in diameter; bark red-brown, scaly; leaves elliptic to oblong-oval, 2 to 4 cm. long, rounded or retuse at apex, pale beneath; flowers blue.

7. *Ceanothus divaricatus* Nutt.; Torr. & Gray, Fl. N. Amer. 1: 266. 1838.

Baja California. California; type from Santa Barbara.

Tall shrub; leaves oblong-ovate to rounded-ovate, 1 to 3 cm. long, obtuse or rounded at apex, often subcordate at base, entire or serrulate; flowers pale blue.

Some of the Baja California specimens have been identified as *C. palmeri* Trel. and *C. cordulatus* Kellogg, but all seem to belong rather to *C. divaricatus*.

8. *Ceanothus tomentosus* Parry, Proc. Davenport Acad. 5: 190. 1889.

Baja California. California; type from Ione.

Shrub with slender, gray or reddish branches; leaves elliptic or oval-ovate, rounded at base and apex, serrulate, glabrate on the upper surface or minutely velutinous.

Baja California specimens have been determined as *C. sorediatus* Hook. & Arn.

9. *Ceanothus coeruleus* Lag. Gen. & Sp. Nov. 11. 1816.

Ceanothus azureus Desf. Cat. Pl. Paris. 232. 1815, nomen nudum.

Ceanothus bicolor Willd.; Roem. & Schult. Syst. Veg. 7: 65. 1829.

Ceanothus glandulosus Schlecht. Linnaea 15: 474. 1841.

Ceanothus azureus parvifolius S. Wats. Proc. Amer. Acad. 23: 270. 1888.

Ceanothus candolleanus Rose, Contr. U. S. Nat. Herb. 12: 283. 1909.

Ceanothus parvifolius Rose, Contr. U. S. Nat. Herb. 12: 284. 1909. Not *C. parvifolius* Trel. 1888.

Sinaloa to Chihuahua, Coahuila, Veracruz, and Chiapas. Guatemala.

Shrub or small tree, 1 to 7.5 meters high; leaves oblong-lanceolate to ovate, acute or obtuse, serrulate, green above and glabrate or sometimes densely pubescent, covered beneath with a rusty tomentum; flowers blue or nearly white. "Chaquira" (Oaxaca, Mexico); "chaquirilla"; "palo colorado"; "tlaxistle," "tnu-yocó" (Michoacán, Oaxaca, *Seler*); "sayolistle," "cuai-cuastle" (Mexico, *Harshberger*).

The bark is said to have tonic and febrifuge properties. A decoction of the leaves is used for sore throat, and the decoction of the roots for venereal diseases. The species was listed by Sessé and Mocino¹ as *C. americanus*.

¹ Pl. Nov. Hisp. 38. 1887.

The numerous specimens examined are remarkably uniform in their characters, the only exception being a few which are referable to *C. azureus parvifolius* S. Wats. This form is distinguished by its relatively small leaves and reduced inflorescence. Although raised to specific rank by Rose, there appears to be no character by which it can be separated definitely from *C. coeruleus*.

10. *Ceanothus huichagorare* Loesener, Repert. Sp. Nov. Fedde 8: 298. 1910.

Chihuahua, Coahuila, Sonora, and Jalisco; type from Baquiriachic, Chihuahua.

Low shrub with slender spinose branches; leaves elliptic or oval, 1 to 1.8 cm. long, obtuse or rounded at base and apex, green and glabrate above, appressed-pilose beneath along the nerves.

The specimens to be placed here have usually been determined as *C. buxifolius*. "Huichagorare" is the Tarahumare name of the plant.

11. *Ceanothus pueblensis* Standl., sp. nov.

Type from Esperanza, Puebla (*Purpus* 5821; U. S. Nat. Herb. no. 464452).

Shrub with short stiff spinose branchlets; leaves short-petiolate, 7 to 10 mm. long, 6 to 8 mm. wide, broadly rounded at each end, 3-nerved, green and glabrate above, densely whitish-sericeous beneath, glandular-serrulate; flowers white, the pedicels glabrous.

12. *Ceanothus durangoinus* Loesener, Repert. Sp. Nov. Fedde 8: 297. 1910.

Durango; type from Hacienda Santa Catalina, Sierra de Gamón, altitude 2,200 meters.

Low, densely branched shrub with gray or brownish branches; leaves short-petiolate, 0.8 to 1.7 cm. long, green above, gray beneath.

13. *Ceanothus ferox* Standl., sp. nov.

Type from mountains near Miquihuana, Tamaulipas (*Nelson* 4479; U. S. Nat. Herb. no. 332667).

Branchlets slender, brownish, spinose, puberulent; leaves short-petiolate, oval-elliptic to suborbicular, 5 to 10 mm. long and nearly as wide, rounded at each end, 3-nerved, glandular-serrulate, green and glabrous above, paler green beneath and appressed-pilose along the nerves; capsule 5 mm. broad, densely covered with irregular ridges and tubercles.

14. *Ceanothus depressus* Benth. Pl. Hartw. 8. 1839.

San Luis Potosí and Zacatecas; type from Zacatecas.

Shrub with stout spinose branches; leaves short-petiolate, oblong-elliptic or elliptic, 1 to 2 cm. long, obtuse or rounded at each end.

Specimens from San Luis Potosí are referred here upon the authority of Watson, but the writer does not feel certain that they are correctly determined.

15. *Ceanothus endlichii* Loesener, Repert. Sp. Nov. Fedde 8: 298. 1910.

Chihuahua and Sonora; type from Chihuahua, in the Sierra Madre between Basagote and Cerracahue, altitude 1,600 meters.

Low spiny shrub; leaves short-petiolate, oblong-elliptic to rounded-ovate, 1 to 3 cm. long, grayish, rounded at each end.

Some of the specimens have been determined previously as *C. fendleri venosus* Trel., and a Sonoran specimen has been reported as *C. buxifolius*.

16. *Ceanothus buxifolius* Willd.; Roem. & Schult. Syst. Veg. 5: 300. 1819.

Chihuahua, Durango, and Hidalgo; type from Real del Monte, Hidalgo.

Low spiny shrub; leaves elliptic-obovate to broadly elliptic, 8 to 16 mm. long, rounded to acutish at base, rounded at apex, petiolate.

It is possible that the material at hand represents two species, but the forms seem identical except in leaf shape.

DOUBTFUL SPECIES.

CEANOTHUS MOCINIANUS DC. Prodr. 2: 32. 1825.

CEANOTHUS PAUCIFLORUS DC. Prodr. 2: 33. 1825. Both this and the preceding were based upon plates of Sessé and Mocifio. It is doubtful whether they belong to the genus.

10. SAGERETIA Brongn. Ann. Sci. Nat. 10: 359. 1827.

Shrubs or small trees, the branchlets slender, often spinose; leaves subopposite, short-petiolate, pinnately nerved, entire or serrate; flowers minute, glomerate along the branches of the panicle; calyx 5-lobate; petals 5, cucullate, clawed; stamens 5; fruit drupaceous, juicy, the 3 nutlets coriaceous, indehiscent.

Many of the species have edible fruit. The leaves of *S. theezans* (L.) Brongn. are used in China as a substitute for tea.

Leaves obtuse or rounded at apex, obtuse at base, 1 to 2 cm. long.—1. *S. wrightii*.

Leaves acute or acuminate, rounded or subcordate at base, 3 to 6 cm. long.

2. *S. elegans*.

1. *Sageretia wrightii* S. Wats. Proc. Amer. Acad. 20: 358. 1885.

Sonora to Jalisco; type from Santa Cruz, Sonora. Western Texas and southern Arizona.

Densely branched shrub, 0.5 to 3 meters high, the branchlets spinose; leaves oblong to elliptic, obscurely serrulate or entire, lustrous, tomentulose when young but soon glabrate; inflorescence little exceeding the leaves.

This was reported by Hemsley as *S. michauxii* Brongn.

2. *Sageretia elegans* (H. B. K.) Brongn. Ann. Sci. Nat. 10: 359. 1827.

Rhamnus elegans H. B. K. Nov. Gen. & Sp. 7: 53. pl. 619. 1825.

Sinaloa to Veracruz and Chiapas. Central America, Colombia, and Peru.

Slender sarmentose shrub, 3 to 4.5 meters high; leaves lanceolate to ovate-elliptic, deciduous, serrulate, tomentulose beneath when young but soon glabrate; panicles very large and broad, tomentose, the flowers whitish; fruit 6 to 8 mm. in diameter.

Sageretia salamensis Loesener,¹ described from Guatemala, is probably not separable from this species.

11. RHAMNUS L. Sp. Pl. 193. 1753.

Unarmed trees or shrubs; leaves opposite, petiolate, persistent or deciduous, pinnate-nerved, entire or toothed; flowers green, perfect or polygamo-dioecious, axillary, solitary, fasciculate, or umbellate; calyx 4 or 5-lobate; petals 4 or 5 or none; stamens 4 or 5; fruit drupaceous, 2 to 4-celled, the nutlets osseous or cartilaginous.

The species are known by the English name "buckthorn." *R. cathartica* L., of Europe, yields a green dye, and the fruit and bark have purgative properties. The dried bark of *R. purshiana* DC., of the western United States, is an official drug, known as "cascara sagrada." The bark is yellow within, with a bitter and rather nauseous taste; its extract is used in medicine as a laxative. *R. californica* Eschsch. also has similar properties, and much of the drug of commerce is probably derived from this species.

¹ Verh. Bot. Ver. Brand. 51: 30. 1910.

Flowers all or mostly in pedunculate umbels.

Leaves covered beneath with a minute close white tomentum.

1. *R. tomentella*.

Leaves green beneath, short-pilose, glabrate, or with a loose coarse tomentum.

Leaves acuminate, long-petiolate-----2. *R. discolor*.

Leaves rounded or obtuse at apex or sometimes acute, short-petiolate.

Leaf blades broadly oval, less than twice as long as broad, densely vil-
lous-tomentose beneath-----3 *R. palmeri*.

Leaf blades oblong to elliptic, short-pilose or glabrate beneath.

4. *R. betulaeifolia*.

Flowers solitary in the axils or in sessile umbels.

Leaves entire, glabrous. Petals none-----5. *R. brandegeana*.

Leaves serrulate or dentate or if (rarely) entire, copiously pubescent.

Fruit normally dicoccous; leaves persistent, often pungent-dentate; sepals
usually 4.

Leaves linear-oblong, 3 mm. wide or less-----6. *R. stenophylla*.

Leaves elliptic-oblong to orbicular, 5 to 35 mm. wide.

Leaves acute or acutish-----7. *R. serrata*.

Leaves rounded or very obtuse at apex.

Leaves orbicular to rounded-obovate, 7 to 35 mm. wide.

8. *R. ilicifolia*.

Leaves oval to elliptic-oblong, 5 to 8 mm. wide----9. *R. microphylla*.

Fruit tricoccous; leaves mostly deciduous, not pungent-dentate; sepals 5.

Leaves rounded or very obtuse at apex.

Leaves densely pilose, 1.5 to 3 cm. wide-----10. *R. pringlei*.

Leaves nearly glabrous, less than 1 cm. wide-----11. *R. macrocarpa*.

Leaves acute or acuminate.

Leaves elliptic, abruptly short-acuminate-----12. *R. capreaefolia*.

Leaves mostly oblong or ovate-oblong, acute or acuminate.

13. *R. mucronata*.

1. *Rhamnus tomentella* Benth. Pl. Hartw. 303. 1848.

Rhamnus californica tomentella Brewer & Wats. Bot. Calif. 1: 101. 1876.

Northern Baja California. New Mexico to southern California.

Large shrub with tomentulose branchlets; leaves oblong, 3.5 to 6 cm. long, rounded to acute at apex, green on the upper surface and minutely puberulent, the lateral nerves very prominent beneath, the margins revolute, subentire; flowers 5-parted, puberulent; fruit usually dicoccous.

2. *Rhamnus discolor* (Donn. Smith) Rose, Contr. U. S. Nat. Herb. 5: 51. 1903.

Rhamnus capreaefolia discolor Donn. Smith, Bot. Gaz. 20: 200. 1893.

Oaxaca. Guatemala to Costa Rica; type from Cobán, Guatemala.

Small tree; leaves long-petiolate, deciduous, mostly elliptic or ovate-elliptic, 6 to 15 cm. long, pubescent beneath or finally glabrate, obscurely serrulate; umbels densely pubescent, some of them sessile and some pedunculate; flowers 5-parted, green; fruit usually tricoccous. "Duraznillo" (Costa Rica).

3. *Rhamnus palmeri* S. Wats. Proc. Amer. Acad. 22: 403. 1887.

Known only from the vicinity of Tequila, Jalisco, the type locality.

Shrub, 1 to 2 meters high, with tomentose branches; leaves very short-petiolate, 2 to 7 cm. long, broadly rounded at base and apex, coarsely or finely serrate, densely pilose on the upper surface; umbels partly sessile and partly pedunculate; fruit tricoccous.

4. *Rhamnus betulaeifolia* Greene, Pittonia 3: 16. 1896.

Rhamnus californica betulaeifolia Trel. in A. Gray, Syn. Fl. 1¹: 408. 1897.

Rhamnus revoluta Rose, Contr. U. S. Nat. Herb. 8: 51. 1903.

Rhamnus ellipsoidea Greene, Leaflets 2: 267. 1912.

Rhamnus confinis Greene, Leaflets 2: 267. 1912.

Chihuahua, Sonora, Durango, and Nuevo León. Western Texas to southern Arizona; type from Mogollon Mountains, New Mexico.

Large shrub; leaves short-petiolate, oblong to broadly elliptic, 4 to 10 cm. long, acute or obtuse, bright green, pubescent or glabrate on the upper surface; umbels puberulent; fruit tricocous.

5. *Rhamnus brandegeana* Standl.

Rhamnus purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 274. 1912. Not *R. purpusi* Schelle, 1903.

Tamaulipas and San Luis Potosí; type from Minas de San Rafael, San Luis Potosí.

Small tree, glabrous throughout or nearly so; leaves slender-petiolate, ovate or oblong-ovate, 4 to 8 cm. long, obtuse or acutish, bright green, the margins revolute; petals none.

The writer has seen four collections of this species, including one (without locality) obtained by Thomas Coulter, but all are without fruit. The generic position of the plant is uncertain.

6. *Rhamnus stenophylla* Standl., sp. nov.

Mountains of Tepic; type collected in the Sierra Madre (*Rose* 3464; U. S. Nat. Herb. no 302441).

Branches brown, puberulent; leaves short-petiolate, 6 to 12 mm. long, obtuse or rounded at apex, obscurely serrulate, sparsely pilosulous beneath when young but soon glabrate, the margins somewhat revolute; pedicels solitary or geminate, puberulent; calyx 5-lobate; petals much shorter than the sepals; fruit 5 mm. long, glabrous.

7. *Rhamnus serrata* Willd.; Roem. & Schult. Syst. Veg. 5: 295. 1819.

Rhamnus serrulata H. B. K. Nov. Gen. & Sp. 7: 51. pl. 607. 1825.

San Luis Potosí to Mexico; type from San Agustín de las Cuevas.

Shrub or small tree, sometimes 6 meters high; leaves short-petiolate, oblong or elliptic-oblong, 2 to 5.5 cm. long, acute or obtuse, coriaceous, sharply serrulate, yellowish beneath, at first minutely pilose but soon glabrate; umbels glabrous; fruit 6 to 7 mm. long. "Capulincillo" (San Luis Potosí); "tlalcapollin" (Nahuatl, *Urbina*).

8. *Rhamnus ilicifolia* Kellogg, Proc. Calif. Acad. 2: 37. 1863.

Rhamnus insularis Greene, Bull. Calif. Acad. II. 2: 392. 1887.

Rhamnus crocea insularis Sarg. Gard. & For. 2: 364. 1889.

Baja California. California and Arizona; type from Clear Lake, California.

Shrub or small tree, sometimes 7 meters high, with a trunk 20 cm. in diameter; bark thin, gray; leaves 1.5 to 5 cm. long, obtuse or rounded at apex, rigid, spinose-dentate, yellowish beneath, glabrous or nearly so; petals none; fruit red, 5 to 7 mm. long.

Sometimes known as "California holly." *R. insularis* is a form with large, less conspicuously toothed leaves. *R. ilicifolia* is closely related to *R. crocea* Nutt., and may not be specifically distinct. That species is said to have yellow fine-grained heavy wood. The fruit was eaten by the Indians of California. It is said to give a conspicuous red tinge to the body of one who eats it in quantity. The bark has an agreeable odor and is rather bitter; it has tonic and slightly laxative, or in large doses cathartic, properties.

9. *Rhamnus microphylla* Willd.; Roem. & Schult. Syst. Veg. 5: 295. 1819.

Coahuila, San Luis Potosí, and Hidalgo; type from Real del Monte, Hidalgo.

Low shrub with brown puberulent branches; leaves 7 to 15 mm. long, rounded at apex, serrulate, glabrate, often yellowish beneath; flowers glabrous; petals present; fruit 5 to 6 mm. long.

10. *Rhamnus pringlei* Rose, Contr. U. S. Nat. Herb. 8: 51. 1903.

Oaxaca; type from foothills of Sierra de San Felipe.

Small shrub; leaves short-petiolate, oblong-elliptic to suborbicular, 2 to 5.5 cm. long, irregularly serrulate; umbels densely pilose; fruit about 5 mm. long, glabrous.

11. *Rhamnus macrocarpa* Standl., sp. nov.

Type collected on hills near Pátzcuaro, Michoacán (*Pringle* 5331; U. S. Nat. Herb. no. 316795).

Branches brown, puberulent; leaves short-petiolate, oblong or narrowly elliptic-oblong, 1.2 to 3 cm. long, rounded or obtuse at apex, crenate-serrulate, green above, sparsely puberulent, yellowish beneath, puberulent along the nerves; pedicels puberulent; fruit 1 cm. broad.

12. *Rhamnus capreaefolia* Schlecht. Linnaea 15: 464. 1841.

Veracruz and Oaxaca; type from Malpais de Naolinco, Veracruz.

Tree, 4.5 to 6 meters high; leaves 4 to 14 cm. long, thin, green or yellowish beneath, obscurely serrulate, pubescent or glabrate beneath; flowers pilose; petals present; fruit 5 to 7 mm. in diameter, often pilose.

13. *Rhamnus mucronata* Schlecht. Linnaea 15: 465. 1841.

Rhamnus nelsoni Rose, Contr. U. S. Nat. Herb. 8: 50. 1903.

Rhamnus obliqua Rose, Contr. U. S. Nat. Herb. 8: 51. 1903.

Tepic to Zacatecas, Mexico, and Chiapas; type collected near Chantla and Angangueo, Michoacán.

Shrub or small tree, 1.5 to 4.5 meters high; leaves 4 to 11 cm. long, thin, bright green, often yellowish beneath, serrulate or subentire, pubescent or glabrate; flowers puberulent or short-pilose; petals present; fruit 5 to 7 mm. long, glabrous.

DOUBTFUL SPECIES.

RHAMNUS TERNIFLORA DC. Prodr. 2: 26. 1825. Based upon one of Sessé and Mocino's plates.

92. VITACEAE. Grape Family.

REFERENCE: Planchon, Monographie des Ampélidées vraies, in DC. Monogr. Phan. 5: 305-654. 1887.

Scandent shrubs or sometimes herbs, usually with tendrils; leaves alternate, simple or compound, petiolate; flowers small, perfect or polygamous, usually in cymes; calyx entire or 4 or 5-dentate; petals 4 or 5, valvate; stamens 4 or 5, opposite the petals; fruit a 1 to 4-celled berry.

Leaves digitately 5 to 7-foliolate.....1. **PARTHENOCISSUS.**

Leaves simple, trifoliolate, or ternately compound.

Petals coherent into a cap, caducous. Leaves simple.....2. **VITIS.**

Petals distinct, spreading.

Petals 4; disk 4-lobate.....3. **CISSUS.**

Petals usually 5; disk 5-lobate or 10-striate.

Disk annular, 10-striate.....4. **AMPELOCISSUS.**

Disk cupular, 5-lobate.....5. **AMPELOPSIS.**

1. **PARTHENOCISSUS** Planch. in DC. Monogr. Phan. 5: 447. 1887.1. **Parthenocissus quinquefolia** (L.) Planch. in DC. Monogr. Phan. 5: 448. 1887.*Hedera quinquefolia* L. Sp. Pl. 202. 1753.*Vitis quinquefolia* Lam. Tabl. Encycl. 2: 135. 1793.*Ampelopsis quinquefolia* Michx. Fl. Bor. Amer. 1: 160. 1803.

Nuevo León, Veracruz, Hidalgo, and Michoacán. Widely distributed in the United States and Canada, and in Cuba and the Bahamas.

Scandent shrub, usually glabrous throughout; leaflets 5, elliptic to oblanceolate, 5 to 15 cm. long, acute or acuminate, coarsely serrate-dentate; flowers perfect or polygamo-monoecious, green, in compound cymes; petals 5, spreading; fruit blue, 8 to 9 mm. in diameter, 2 or 3-seeded.

A handsome vine, often planted for ornamental purposes. Known in the United States as "Virginia creeper." The leaves turn red in autumn. The bark has been used in domestic medicinal practice as an alterative, tonic, and expectorant, and for dropsy. The crushed leaves applied to the skin are said to produce blisters. The fruit is not edible.

Parthenocissus quinquefolia hirsuta (Donn) Planch. (*Ampelopsis hirsuta* Donn; *Parthenocissus hirsuta* Small; *Ampelopsis pubescens* Schlecht.) is a form with leaflets sparsely pilose beneath. Specimens from Nuevo León and Veracruz belong here.

2. **VITIS** L. Sp. Pl. 202. 1753.

Climbing shrubs; leaves long-petiolate, simple, toothed or lobed; flowers mostly dioecious or polygamo-dioecious, cymose-paniculate; petals caducous; ovary 2-celled; fruit a globose berry, pulpy, edible.

The Mexican native grapes, like those of the United States, are difficult of separation, and their characters poorly marked.

The cultivated grapes of Mexico are chiefly of the Old World type, being derived from *Vitis vinifera* L. The cultivated grapes of the eastern United States are derived from the native species. European grapes ("vid," the plant; "uva," "parra," the fruit; "bicholi," "yaga-bicholi," Zapotec) are said to have been introduced into Mexico about 1522, and their culture upon a large scale was begun at once, especially for the purpose of making wine. During at least a portion of the Spanish occupation, however, the local manufacture of wine was prohibited by the Spanish Government, for the protection of the wine industry of Spain. Clavigero states that vineyards were established in Baja California by the Jesuits, and that grapes were more successful there than any other fruit except figs.

Oviedo relates that grapes were cultivated in Santo Domingo at the beginning of the sixteenth century, and he mentions particularly the vineyard of Diego Colón, which was destroyed through neglect. He refers to the wild grapes (*Vitis tiliifolia*) of Santo Domingo which, he says are good, "that is, for wild grapes," and suggests that they might be improved by cultivation. Wine is occasionally made in Mexico from the wild grapes. The Indians of the United States sometimes dried the fruit for winter use, and in spring they tapped the larger vines to obtain the sap, which was used as a beverage.

Wild grapes are mentioned by Hernández¹ in a chapter entitled "De Ceualchiltic, seu vite sylvestri, Lambruscave indigena." He states that the name "xocomecatli" also was applied to the plant.

¹ Thesaurus 128. 1651.

Leaves glabrate beneath when mature, or pilosulous, the tomentum, if any, confined chiefly to the venis.

Plants scarcely climbing, the tendrils mostly abortive; leaves comparatively small-----1. *V. arizonica*.

Plants climbing, the tendrils well developed; leaves large.

Tomentum none on the leaves-----2. *V. bourgaeana*.

Tomentum usually present on the lower surface of the leaves along the veins -----3. *V. berlandieri*.

Leaves with persistent loose or close tomentum over the whole lower surface.

Tomentum wholly gray or whitish-----4. *V. cinerea*.

Tomentum rusty or reddish, at least along the veins-----5. *V. tiliifolia*.

1. *Vitis arizonica* Engelm. Amer. Nat. 2: 321. 1868.

Baja California and Sonora to Coahuila and Tamaulipas. Western Texas to Arizona and Utah.

Plants much branched, the stems floccose-tomentose; leaves broadly cordate, mostly 4 to 6 cm. long, acute or short-acuminate, coarsely dentate, sometimes shallowly lobate, loosely floccose beneath when young; fruit black, 2 or 3-seeded. "Vid," "parra" (Tamaulipas).

Havard¹ remarks concerning this species, "*Vitis arizonica* has been found growing in rows near Fort Whipple, Arizona, which may be accepted as conclusive evidence of its culture by the Pueblo Indians."

2. *Vitis bourgaeana* Planch. in DC. Monogr. Phan. 5: 368. 1887.

Jalisco to Morelos, Puebla, and Veracruz; type from the region of Orizaba, Veracruz.

Stems loosely floccose-tomentose; leaves broadly cordate, 7 to 15 cm. long, acuminate, irregularly dentate, often shallowly 3-lobate or deeply 5-lobate, glabrate above, beneath sparsely pilosulous or glabrate.

3. *Vitis berlandieri* Planch. Compt. Rend. Acad. Sci. (Paris) 91: 425. 1880.

Coahuila to Veracruz. Western Texas.

Stems loosely floccose-tomentose or glabrate; leaves broadly cordate, 9 to 14 cm. long, often as broad as long, short-acuminate, coarsely dentate and often shallowly 3-lobate, glabrate above, puberulent beneath; fruit 6 to 8 mm. in diameter, purple, slightly glaucous, with pleasant flavor. "Uva cimarrona" (Veracruz).

4. *Vitis cinerea* Engelm.; Bushberg, Cat. ed. 3. 17. 1883.

Vitis aestivalis cinerea Engelm.; A. Gray, Man. ed. 5. 697. 1867.

Vitis biformis Rose, Contr. U. S. Nat. Herb. 8: 315. 1905.

Sonora to Coahuila, Tamaulipas, San Luis Potosí, and Durango. Central and southern United States.

Young branches floccose-tomentose; leaves broadly cordate, 6 to 14 cm. long, crenate-dentate, often shallowly 3-lobate, floccose-tomentose above when young but soon glabrate; fruit black, 6 to 8 mm. in diameter, acid. "Uva" (San Luis Potosí); "parra silvestre" (Tamaulipas).

5. *Vitis tiliifolia* Humb. & Bonpl.; Roem. & Schult. Syst. Veg. 5: 320. 1819.

Vitis caribaea DC. Prodr. 1: 634. 1824.

Vitis blancoii Munson, Wild Grapes N. Amer. 14. 1890.

Sinaloa to San Luis Potosí, Veracruz, Tabasco, and Chiapas. Southern Florida, West Indies, Central America, and northern South America.

Young branches floccose-tomentose; leaves broadly cordate, 7 to 18 cm. long, usually abruptly acuminate, rather finely dentate, rarely lobate, usually

¹ Bull. Torrey Club 22: 104. 1895.

densely tomentose beneath; fruit 6 to 8 mm. in diameter, purple. "Parra silvestre" (Tabasco); "bejuco de agua" (Oaxaca, Nicaragua, Colombia, Porto Rico); "bejuco de cazadores," "pichol" (Oaxaca); "uva" (Michoacán, Guerrero); "uvilla cimarrona" (Jalisco, Veracruz); "parra broncadora" (Jalisco); "parra" (Nicaragua, Porto Rico, Santo Domingo, Costa Rica); "agrâ" (Costa Rica, Colombia; a corruption of *agraz*, the name for the wild grape of Spain); "parra cimarrona" (Cuba, Santo Domingo, Porto Rico); "bejuco de parra" (Guatemala); "uva cimarrona" (Nicaragua); "bejuco caro" (Santo Domingo).

The stems sometimes attain a diameter of 20 cm. From a section of the stem a considerable amount of water may be obtained, a fact of which advantage is often taken by hunters or other persons in forests where the ordinary sources of water are wanting. The sap is reputed to have diuretic properties and a decoction of the leaves has been employed as a remedy for fevers. Descourtilz states that the leaves were applied as poultices for gout.

It is probably this species to which the names *Vitis indica* and *V. labrusca* were applied by Sessé and Mociño.¹

3. CISSUS L. Sp. Pl. 117. 1753.

Vines, the stems herbaceous or woody; leaves simple or ternate, usually succulent; flowers mostly perfect, 4-parted, cymose-corymbose; ovary 2-celled; fruit 1 to 4-seeded, usually inedible.

Leaves simple, entire or dentate, never lobate.

Leaves sessile or very short-petiolate, densely soft-pilose beneath.

1. *C. arsenii*.

Leaves long-petiolate.

Pedicels densely pubescent.....2. *C. subtruncata*.

Pedicels glabrous.

Leaves broadly cuneate at base, broadest near the apex, nearly entire, glabrous3. *C. sinaloae*.

Leaves rounded or cordate at base, broadest at or below the middle, usually conspicuously dentate, glabrous or pubescent.

4. *C. sicyoides*.

Leaves trifoliate, or simple and lobate.

Flowers green; leaves very thick and fleshy.

Leaves deeply 5-lobate.....5. *C. tuberosa*.

Leaves 3-lobate or trifoliate.....6. *C. trifoliata*.

Flowers red; leaves thin.

Leaflets glabrous beneath, usually 1.5 to 4 cm. long.....7. *C. microcarpa*.

Leaflets pubescent beneath, at least along the nerves.

Flowers 3 to 4 mm. long.....8. *C. cucurbitina*.

Flowers 1.5 to 2 mm. long.

Leaflets rounded at apex.....9. *C. salutaris*.

Leaflets all or mostly abruptly acute or acuminate at apex.

10. *C. rhombifolia*.

1. *Cissus arsenii* Standl., sp. nov.

Type from Morelia, Michoacán (*Arsène* 10006; U. S. Nat. Herb. no. 1,001,397).

Stems densely puberulent; petioles stout, 2 to 7 cm. long; leaves ovate-rhombic, 4 to 6.5 cm. long, obtuse or rounded at apex, broadly cuneate or rounded at base, serrate, green above but densely pubescent; peduncles 1 to 1.5 cm. long, the cymes dense, few-flowered, 1 to 2 cm. broad; pedicels glabrous; flowers green.

¹ Pl. Nov. Hisp. 39. 1887.

2. *Cissus subtruncata* Rose, Contr. U. S. Nat. Herb. 12: 284. 1909.

Guerrero, Oaxaca, Puebla, and Morelos; type collected near the city of Oaxaca.

Stems densely pubescent; leaves cordate to subreniform, 4 to 12 cm. long and about as broad, rounded to short-acuminate at apex, truncate to cordate at base, serrate-dentate, densely pubescent; cymes pedunculate, equaling or longer than the leaves; flowers green.

3. *Cissus sinaloae* Standl., sp. nov.

Type collected between Rosario and Acaponeta, Tepic (*Rose* 1872; U. S. Nat. Herb. no. 300756).

Glabrous throughout; petioles 6 to 12 mm. long; leaf blades oblong-obovate, 8 to 12 cm. long, truncate or obtuse at apex, thin, with a few remote appressed serrations; inflorescence long-pedunculate, the cymes umbellate; fruit obovoid, 6 mm. long.

4. *Cissus sicyoides* L. Syst. Nat. ed. 10. 2: 897. 1759.

Cissus elliptica Schlecht. & Cham. Linnaea 5: 440. 1830.

Sonora to Tamaulipas, Yucatán, and Chiapas. Widely distributed in tropical America.

Slender vine, often very long; leaves oblong-ovate to subreniform, 4 to 16 cm. long, obtuse to acuminate, rounded to deeply cordate at base, coarsely or finely serrate, varying from glabrous to densely pubescent; cymes corymbiform, loose and open; fruit globose-obovoid, 1-seeded, black. "Hierba del buey" (Tamaulipas); "tripa de zopilote" (Sinaloa); "bejuco loco" (Tabasco, *Roviro*); "tabkanil" (Yucatán, Maya); "vid silvestre" (Hidalgo, Veracruz); "tripas de Judas" (Valley of Mexico, Morelos, Hidalgo, Oaxaca); "tumba-vaqueros" (Valley of Mexico, Hidalgo, Morelos); "molonqui" (Valley of Mexico, *Ramírez*); "temecatli" (Nahuatl); "tripa de vaca" (Guanajuato); "iasú," "bejuco iasú" (Costa Rica); "bejuco comemano" (Guatemala, Honduras); "bejuco castro," "bejuco chirriador" (Colombia); "uvilla" (Nicaragua); "ubí" (Cuba); "caro," "bejuco de caro" (Porto Rico, Santo Domingo).

The species is a variable one, especially in leaf form and pubescence, and many segregates and varieties have been proposed. The inflorescence is often attacked by a smut, *Mycosyrinx cissi*, and it is then greatly enlarged and modified. This diseased form was made the type of a new genus, *Spondylantha*, by Presl.

The tough stems are sometimes used as a substitute for cordage, and in Costa Rica for making baskets. When cut they yield a plentiful supply of watery sap. The leaves, when macerated in water, give a lather like that produced by soap, and they are employed for washing clothes. They have a slightly acid flavor. Sometimes they are applied to sores or inflammations, and in Mexico a decoction of the stems is used as a remedy for rheumatism. The fruit is said to yield a blue dye.

Some of the Mexican specimens have been determined incorrectly as *Ampelopsis cordata* Michx.

It is this species, apparently, which is figured by Hernández¹ as "Tlacamazatcazqui y papan." It is perhaps also the plant figured² and briefly described as "yztac çaçalle, seu Herba glutinosa, & candenti." The decoction of the root of the latter, he states, was administered for diarrhea and as a diuretic, and used in baths to relieve pain of various sorts.

¹ Thesaurus 414. 1651.

² Thesaurus 283. 1651.

5. *Cissus tuberosa* DC. Prodr. 1: 629. 1824.

Guerrero, Oaxaca, and Puebla.

Stems pubescent or glabrate; leaves 4 to 9 cm. long, the divisions narrow or broad, coarsely dentate or deeply lobate, sparsely pubescent or glabrate; pedicels glabrous; fruit subglobose, 5 to 6 mm. in diameter. "Coral de Colima," "bejuco de coral" (Oaxaca).

6. *Cissus trifoliata* L. Syst. Nat. ed. 10. 2: 897. 1759.*Sicyos trifoliata* L. Sp. Pl. 1013. 1753.*Cissus acida* L. Sp. Pl. ed. 2. 170. 1762.

Baja California to Colima, Coahuila, Yucatán, and Oaxaca. Widely distributed in tropical America.

Plants glabrous or sparsely pubescent; leaves mostly trifoliolate, the leaflets 2 to 9 cm. long, usually broadly cuneate, coarsely dentate or lobate; cymes equaling or longer than the leaves; fruit purple or nearly black, 5 to 8 mm. long. "Bolontobi" (Yucatán); "hierba del buey" (Chihuahua, Sonora, Ramírez); "uvilla" (Nicaragua).

This has been reported from Yucatán as *Vitis arborea* L. Some of the Mexican specimens have been referred to *C. incisa* (Nutt.) Des Moul., a form which is doubtfully distinct from *C. trifoliata*. In Yucatán the mucilaginous leaves are applied as poultices for sores and cutaneous diseases. The leaves have an acid flavor and Barham states that in Jamaica they were eaten as a sauce with other food. Havard states that the large tubers borne upon the roots are very poisonous, causing violent vomiting and purging, and he reports that the leaves sometimes produce an eruption upon the skin, like that caused by poison ivy (*Rhus radicans*).

7. *Cissus microcarpa* Vahl, Eclog. Amer. 1: 16. 1796.

Veracruz and Chiapas. West Indies and northern South America.

Glabrous throughout or nearly so; leaves trifoliolate, the leaflets obliquely ovate, elliptic, or rhombic, obtuse to acuminate, irregularly appressed-serrate; fruit 6 to 7 mm. in diameter.

8. *Cissus cucurbitina* Standl., sp. nov.

Type from Cuernavaca, Morelos (Rose & Rose 11047; U. S. Nat. Herb. no. 453834).

Petioles 6.5 to 9.5 cm. long; leaves simple or trifoliolate; simple leaves rounded-cordate, 14 to 16 cm. long, shallowly 3-lobate, deeply cordate at base, rounded at apex, remotely appressed-serrate, glabrous or nearly so; leaflets of trifoliolate leaves rhombic, appressed-serrate; cymes short-pedunculate, densely many-flowered, about 7 cm. broad, covered with sparse appressed whitish hairs; calyx 2 to 2.5 mm. long; corolla 3 mm. long.

The material available is incomplete, but the very large flowers indicate that the plant is specifically distinct.

9. *Cissus salutaris* H. B. K. Nov. Gen. & Sp. 5: 225. 1821.

Oaxaca and Veracruz. Colombia and Venezuela; type from Venezuela.

Stems sparsely hispidulous; leaflets 3, obovate or elliptic-obovate, 4.5 to 9 cm. long, coarsely crenate-serrate, with conspicuous reticulate venation, hairy on both surfaces or finally glabrate; flowers umbellate-cymose, the pedicels hairy.

10. *Cissus rhombifolia* Vahl, Eclog. Amer. 1: 11. 1796.

Sinaloa to San Luis Potosí, Veracruz, and Oaxaca. West Indies, Central America, and South America.

Leaflets 3, ovate, rhombic, or broadly elliptic, 4 to 10 cm. long, all petiolulate, sharply serrate, hirtellous on one or both surfaces; flowers in cymose

umbels, the pedicels hairy; petals often hirtellous; fruit black. "Palo huaco (hueco ?)" (San Luis Potosí, *Palmer*).

Palmer reports that in San Luis Potosí an infusion of the stems in "aguardiente" is used as a remedy for stomach troubles. The species has been reported from Yucatán, where it is said to bear the Maya name "xtab-canil."

DOUBTFUL SPECIES.

Cissus mexicana DC. Prodr. 1: 631. 1824. Described from Mexico; said to have 5 leaflets, and perhaps a synonym of *Parthenocissus quinquefolia*.

4. *AMPELOCISSUS* Planch. in DC. Monogr. Phan. 5: 368. 1887.1. *Ampelocissus acapulcensis* (H. B. K.) Planch. in DC. Monogr. Phan. 5: 403. 1887.

Vitis acapulcensis H. B. K. Nov. Gen. & Sp. 7: 230. 1825.

? *Ampelocissus erdwendbergii* Planch. in DC. Monogr. Phan. 5: 404. 1887.

Sinaloa to Guerrero and Morelos; type from Acapulco, Guerrero. El Salvador.

Large vine; leaves broadly cordate, 7 to 16 cm. long, acute, erose-dentate, angulate or often shallowly 3-lobate, densely ferruginous-tomentose beneath, at least when young; flowers dioecious, the staminate in very dense cymes about 8 cm. broad, the branches densely tomentose; petals red, glabrous; fruit wine-colored, with a bloom, 12 to 25 mm. in diameter. "Uva" (Guerrero).

In general appearance the plant is similar to some species of *Vitis*, but the large fruits and inflorescences are unlike those of any native Mexican *Vitis*. No information is available concerning the quality of the fruit; but its large size indicates that the plant might be a valuable one in cultivation.

5. *AMPELOPSIS* Michx. Fl. Bor. Amer. 1: 159. 1803.

Large vines with coiling tendrils; leaves simple or compound; flowers polygamo-dioecious or polygamo-monoecious; petals 5; fruit 2 to 4-seeded, not edible.

Ampelopsis arborea (L.) Rusby has been reported from Yucatán, but the report is based upon specimens of *Cissus trifoliata* L.

Leaves simple.....1. *A. cordata*.
Leaves trifoliolate.....2. *A. mexicana*.

1. *Ampelopsis cordata* Michx. Fl. Bor. Amer. 1: 159. 1803.

Veracruz. Southern and central United States.

Glabrous throughout or nearly so; leaves broadly ovate, deltoid-ovate, or cordate-ovate, 5 to 12 cm. long, acute or acuminate, coarsely serrate; cymes small and loose; fruit 2-seeded, bluish, 4 to 6 mm. in diameter.

2. *Ampelopsis mexicana* Rose, Contr. U. S. Nat. Herb. 8: 51. 1905.

Sinaloa to Guerrero; type from Acaponeta, Tepic.

Stems glabrous, glaucescent; leaflets ovate to elliptic, 3 to 6 cm. long, acuminate, coarsely serrate, pale beneath, pilosulous when young but soon glabrate; cymes long-pedunculate, loose and open; seeds 2 or 3.

This was described originally as having twice or thrice ternate leaves, an error arising from the fact that a branch was mistaken for the rachis of a leaf.

DOUBTFUL SPECIES.

AMPELOPSIS ? *DENUDATA* Planch. in DC. Monogr. Phan. 5: 619. 1887. Type from Xochicalco, Mexico.

93. ELAEOCARPACEAE. Elaeocarpus Family.

Trees; leaves alternate or subopposite, simple; flowers perfect, 4 or 5-parted; sepals valvate; petals present or absent; stamens numerous; fruit baccate or capsular.

Fruit baccate; petals present-----1. **MUNTINGIA**.
Fruit capsular; petals none-----2. **SLOANEA**.

1. MUNTINGIA L. Sp. Pl. 509. 1753.**1. Muntingia calabura L. Sp. Pl. 509. 1753.**

Guerrero to Veracruz, Yucatán, and Chiapas. West Indies, Central America, and northern South America; type from Jamaica.

Small tree, 6 to 10 meters high; leaves alternate, lance-oblong, 6 to 14 cm. long, acuminate, oblique at base, 3-nerved, dentate, glabrate above, tomentose beneath; flowers white, perfect, the long pedicels solitary or fasciculate in the leaf axils; sepals 5; petals 5, about 1 cm. long; stamens numerous, free; fruit baccate, globose, about 1 cm. in diameter, glabrous, many-celled. "Capulín" (Tabasco, Yucatán, Oaxaca, Veracruz, Guerrero, Costa Rica, Guatemala, El Salvador, Nicaragua); "capolín" (Yucatán); "jonote" (Oaxaca); "ber-silana" (Chiapas); "puan" (Veracruz, *Palmer*); "palman" (Puebla, *Ramírez*); "capulí" (Cuba, El Salvador); "capulina," "memizo," "guácima cerezo" (Cuba); "chitotó," "manguito," "acurucó," "chirriador," "maja-güito" (Colombia); "mahaujo" (Colombia, Venezuela); "datiles," "ratiles" (Philippines, the latter a Tagalog corruption); "cedrillo," "majagua" (Venezuela); "memiso" (Santo Domingo).

The tree has become naturalized in Siam and the Philippines. The bark contains a tough fiber which is used in tropical America for making rope and twine. The fruit is edible; it is yellow or red and very sweet. Descourtilz ascribes antispasmodic properties to the flowers.

2. SLOANEA L. Sp. Pl. 512. 1753.**1. Sloanea mexicana Standl., sp. nov.**

Type from La Siberia, Michoacán or Guerrero, altitude 1,000 meters (*Langlassé* 980; U. S. Nat. Herb. no. 386311).

Tree, 15 to 20 meters high, with yellow flowers; branchlets densely tomentulose; petiole 9 cm. long, tomentulose; leaf blades (only one seen) elliptic, 35 cm. long, 17.5 cm. wide, subcordate at base, subacute at apex, thin, sinuate toward the apex, glabrous except on the veins, there puberulent, the venation prominent beneath; flowers in axillary racemes, these about 7-flowered, tomentulose, the stout pedicels 0.5 to 2.5 cm. long; sepals 5 to 8, oblong, or ovate-oblong, obtuse or acutish, tomentulose, 5 to 7 mm. long; stamens very numerous, longer than the calyx, puberulent; anthers linear-lanceolate, less than half as long as the filaments; ovary 4-celled, densely pilose.

Several species of *Sloanea* have been reported from Central America, but none of them agree with the Mexican specimens.

94. TILIACEAE. Linden Family.

Trees or shrubs; leaves alternate, simple, sometimes lobate, stipulate, commonly deciduous; pubescence mostly of branched hairs; flowers usually perfect; sepals 5, rarely 3 or 4, free or coherent, commonly valvate; petals as many as the sepals, or wanting; stamens usually numerous; fruit 2 to 10-celled, or by abortion 1-celled, dry or drupaceous, dehiscent or indehiscent.

- Peduncle adnate to a bract; fruit nutlike.....1. **TILIA**.
 Peduncle not adnate to a bract; fruit not nutlike.
 Fruit unarmed.
 Fruit silique-like, long and slender; flowers small.....2. **CORCHORUS**.
 Fruit a thick broad capsule; flowers large.
 Capsule thin, compressed, bivalvate.....3. **BELOTIA**.
 Capsule hard and woody, 5-angled, 5-valvate.....4. **LUEHEA**.
 Fruit armed with spines or bristles.
 Anthers linear; fruit depressed.....5. **APEIBA**.
 Anthers short; fruit not depressed.
 Fruit compressed, bivalvate, radiately bristly along the edges.
 6. **HELIOCARPUS**.
 Fruit not compressed, usually indehiscent, covered on all sides with
 spines.....7. **TRIUMFETTA**.

1. **TILIA** L. Sp. Pl. 514. 1753.

Trees, the pubescence of simple or stellate hairs; leaves usually obliquely cordate, serrate; flowers white or yellowish, in axillary or terminal cymes, the peduncle winged with a large, foliaceous, partly adnate bract; sepals distinct; fruit globose, nutlike, indehiscent, 1 or 2-seeded.

The English names applied to species of *Tilia* are "linden" and "basswood." The trees are excellent shade trees and are often planted for this purpose. They are well adapted to street planting. The wood is light brown, soft, and light, with a specific gravity of 0.40 to 0.45. It is employed extensively for construction purposes, furniture, carriages, woodenware, and paper pulp. The tough fiber of the bark is sometimes utilized for cordage and rough mats. The sap is said to contain considerable sugar. The sweet-scented flowers yield an excellent quality of honey. The bark and leaves in water give a mucilaginous infusion. The flowers of *T. europaea* L. are official in the German Pharmacopoeia. They contain a colorless fragrant volatile oil, and are employed as a remedy for hysteria and indigestion.

Leaves glabrous beneath except sometimes in the axils of the veins.

Leaves barbate beneath in the axils of the veins.....1. **T. floridana**.

Leaves entirely glabrous beneath.....2. **T. mexicana**.

Leaves finely or coarsely stellate-tomentose beneath.

Tomentum of the lower leaf surface loose and spreading, especially along the veins, brownish.....3. **T. occidentalis**.

Tomentum fine, close, and grayish.....4. **T. houghi**.

1. **Tilia floridana** Small, Fl. Southeast. U. S. 761, 1335. 1903.

Chihuahua, Coahuila, and Nuevo León. Southeastern United States; type from Florida.

Leaves 7 to 12 cm. long, 5 to 7.5 cm. wide, short-acuminate, serrate with abruptly mucronate teeth, the lower surface at first with a few scattered stellate hairs but soon glabrous; bracts long-pedunculate; petals 6 to 7 mm. long; fruit about 8 mm. long, densely tomentulose.

The Mexican specimens have been determined by Dr. C. S. Sargent. One specimen from Nuevo León (*Pringle* 10188) was distributed as a new species.

2. **Tilia mexicana** Schlecht. *Linnaea* 11: 377. 1837.

Known only from the type locality, Cuesta Grande de Chiconquilaco, Veracruz.

Leaves very oblique at base, not cordate, 10 cm. long and 6 cm. wide or smaller, short-acuminate, with very acute gland-tipped teeth.

The writer has seen no material agreeing with the original description, in which the lack of pubescence upon the leaves is emphasized. Most Mexican specimens of *Tilia* have been referred previously to this species.

3. *Tilia occidentalis* Rose, Contr. U. S. Nat. Herb. 8: 317. 1905.

Michoacán and Guerrero; type from mountains near Pátzcuaro, Michoacán.

Leaves 7 to 15 cm. long (on young shoots as much as 23 cm.), 5.5 to 11 cm. wide, abruptly short-acuminate, obliquely truncate to cordate at base, glabrous above, loosely tomentose beneath or in age glabrate; bracts sessile or short-pedunculate; petals 6 to 7 mm. long; fruit about 6 mm. long. "Sirimo," "tirimo" (Michoacán).

4. *Tilia houghi* Rose, Contr. U. S. Nat. Herb. 8: 318. 1905.

Michoacán to Oaxaca, Hidalgo, and Veracruz; type from Cuernavaca, Morelos.

Leaves 6 to 16 cm. long, 4.5 to 12 cm. wide, abruptly short-acuminate, obliquely truncate to cordate at base, bright green and glabrate above, densely and persistently tomentulose beneath; bracts sessile or pedunculate; petals 6 to 7 mm. long; fruit about 7 mm. in diameter, densely tomentulose. "Tilo" (Valley of Mexico); "sirimo" or "cirimo" (Valley of Mexico, Oaxaca); "yaca" (Oaxaca).

A *Tilia* has been reported from Jalisco by Oliva, and is probably of this species. The plant is employed in Mexico as a substitute for the European *T. europaea*. A decoction of the leaves is used to heal wounds and as a remedy for rheumatism.

2. CORCHORUS L. Sp. Pl. 529. 1753.

Herbs or shrubs, with mostly simple hairs; leaves serrate; flowers axillary or opposite the leaves, the peduncles mostly 1-flowered; flowers small, yellow; fruit a capsule, elongate and silique-like, 2 to 5-celled, many-seeded.

The species are essentially herbs, but they sometimes persist and become suffrutescent. *C. capsularis* L. and *C. olitorius* L. of the Old World tropics furnish the jute fiber of commerce.

Capsules strongly compressed, 2-horned at apex-----1. *C. siliquosus*.
Capsule only slightly compressed, acuminate at apex, not 2-horned.

Capsules erect-ascending, straight-----2. *C. orinocensis*.
Capsules spreading, curved-----3. *C. hirtus*.

1. *Corchorus siliquosus* L. Sp. Pl. 529. 1753.

Reported from Yucatán and Tabasco. Texas, West Indies, Central America, and northern South America.

Plants herbaceous or woody, often 1 meter high, the stems pilosulous or glabrate; leaves short-petiolate, ovate, lance-ovate, or obovate, 0.5 to 2.5 cm. long, obtuse or acute, crenate-dentate, glabrous; petals 5 mm. long; capsules 4 to 5 mm. long. "Té de perla" (El Salvador); "escoba blanca" (Porto Rico); "malva té" (Cuba, Porto Rico); "té" (Panama).

The leaves are sometimes employed as a substitute for Chinese tea.

2. *Corchorus orinocensis* H. B. K. Nov. Gen. & Sp. 5: 337. 1821.

Yucatán and probably elsewhere. Arizona, West Indies, and South America.

Stems puberulent or glabrate; leaves narrowly lanceolate to ovate, 3.5 to 6 cm. long, usually long-acuminate, crenate, glabrous; petals about 8 mm. long; capsules 3.5 to 5 cm. long.

3. *Corchorus hirtus* L. Sp. Pl. ed. 2. 747. 1762.*Corchorus pilolobus* Link, Enum. Pl. 2: 72. 1822.

Sinaloa and Tepic and probably elsewhere. West Indies, Central America, and South America.

Stems pilosulous or glabrate; leaves ovate to narrowly lanceolate, 1.5 to 5.5 cm. long, acute or acuminate, crenate, glabrous; capsules 3 to 5 cm. long. "Malva té" (Porto Rico).

3. *BELOTIA* A. Rich. in Sagra, Hist. Cuba 9: 207. 1845.

Trees or shrubs; leaves 3-nerved, serrate; flowers in terminal panicles and lateral cymes; sepals distinct; capsule 2-celled, obcompressed; seeds long-ciliate.

Leaves covered beneath with a very fine and dense, grayish, closely appressed tomentum, sometimes also stellate-pilosulous-----1. *B. grewiaefolia*. Leaves loosely stellate-pilosulous beneath but without tomentum.2. *B. mexicana*.1. *Belotia grewiaefolia* A. Rich. in Sagra, Hist. Cuba 9: 207. pl. 21. 1845.*Belotia galeottii* Turcz. Bull. Soc. Nat. Moscou 19: 504. 1846.

Veracruz and Oaxaca. Guatemala and Cuba; type from Cuba.

Tree, 9 to 24 meters high; leaves ovate-oblong to oblong-elliptic, 8 to 18 cm. long, acuminate, rounded at base, serrulate, green above and finally glabrate; sepals 6 to 10 mm. long; fruit 1 to 2 cm. long and somewhat broader, stellate-pilose. "Yaco de venado," "patita" (Oaxaca); "jonote coyolillo" (Veracruz); "guacimilla," "majagüilla blanca," "majagüilla macho" (Cuba).

It is probably this species which is reported from Tabasco as "palencano." The wood is said to be soft, but it is used for rafters and other objects. The tough fiber of the bark is employed for cordage.

2. *Belotia mexicana* (DC.) K. Schum. in Engl. & Prantl, Pflanzenfam. 3^e: 28. 1890.*Grewia mexicana* DC. Prodr. 1: 510. 1824.? *Belotia insignis* Baill. Adansonia 10: 182. 1872.

Tepic to Oaxaca.

Tree, 5 to 6 meters high; leaves lance-oblong to broadly elliptic, 7 to 18 cm. long, obtuse or acute, velutinous or in age glabrate on the upper surface, serrulate; flowers purplish, the sepals 10 to 12 mm. long; fruit about 2 cm. long and 2.5 cm. wide, densely pilose. "Yaco de cal," "yaco venado" (Oaxaca).

It is perhaps this species which is reported from Chiapas by Ramírez with the vernacular name "capulincillo," but that name (which would indicate a fleshy fruit) is scarcely applicable to a plant of this genus.

4. *LUEHEA* Willd. Ges. Naturf. Freund. Berlin Neue Schrift. 3: 410. 1801.

Shrubs or trees; leaves dentate, 3 or 5-nerved; flowers large and showy, white, in axillary cymes, the calyx subtended by numerous bractlets; sepals 5; capsule large, woody, 5-celled, usually 5-angulate, many-seeded.

Bractlets linear, finely pilosulous within; fruit obtusely angulate.

1. *L. speciosa*.Bractlets lanceolate or linear-lanceolate, pilose-barbate within along the costa; fruit acutely angulate-----2. *L. candida*.

1. *Luehea speciosa* Willd. Ges. Naturf. Freund. Berlin Neue Schrift. 3: 410. 1801.

Luehea platypetala A. Rich. in Sagra, Hist. Cuba 9: 212. pl. 23. 1845.

Luehea scabrifolia Presl, Epim. Bot. 212. 1849.

Veracruz, Yucatán, Campeche, and Oaxaca. Cuba, Central America, and South America.

Shrub or tree, 2 to 15 meters high; leaves short-petiolate, elliptic to oval or elliptic-ovate, 10 to 22 cm. long, abruptly acuminate, cordate or rounded at base, green and scabrous above, pale-tomentulose beneath, serrate; petals 2.5 to 4.5 cm. long; capsule 3 to 4 cm. long, densely pubescent. "Pepe cacao" (Campeche); "kazcat," "chacah" (Yucatán, Maya); "guácimo" (Panama); "guácimo macho" (Costa Rica); "pataxtillo" (Tabasco); "tablón" (Colombia); "guácima amarilla," "guácima varía," "guácima baría" (Cuba).

2. *Luehea candida* (DC.) Mart. Nov. Gen. & Sp. 1: 102. 1824.

Alegria candida DC. Prodr. 1: 517. 1824.

Luehea mexicana Spach; Steud. Nom. Bot. ed. 2. 2: 77. 1841.

Luehea endopogon Turcz. Bull. Soc. Nat. Moscou 31¹: 225. 1858.

Sinaloa to Chiapas. Central America and Colombia.

Tree, 4 to 6 meters high; leaves broadly elliptic or ovate-elliptic, 10 to 20 cm. long, acute or abruptly acuminate, rounded or cordate at base, serrate, scabrous above, tomentulose beneath; petals 5 to 5.5 cm. long, 3 to 4 cm. wide; capsule 5 to 6 cm. long, glabrate in age. "Pataxte," "patazte" (Oaxaca); "algodoncillo" (Michoacán, Guerrero); "molenillo" (Nicaragua, Costa Rica); "guácimo molenillo" (Costa Rica).

In Central America the dry fruit, deprived of its seeds, is fastened to the end of a stick and used to beat chocolate, thus making the beverage light and frothy.

5. *APEIBA* Aubl. Pl. Guian. 1: 538. 1775.

1. *Apeiba tibourbou* Aubl. Pl. Guian. 1: 538, pl. 213. 1775.

Veracruz and Oaxaca. West Indies; Central and South America.

Tree, 6 to 7 meters high, with flat spreading crown; leaves short-petiolate, elliptic-oval or elliptic-ovate, 10 to 30 cm. long, acute or short-acuminate, cordate at base, 5-nerved, crenulate, stellate-hirtellous; flowers yellowish, in lateral cymes; sepals free; petals about 1.5 cm. long; fruit depressed-globose, 8 to 10 cm. in diameter, coriaceous, pulpy within, very densely covered with long stout hairy spines. "Peine de mico" (Veracruz, Oaxaca, Costa Rica, Panama); "burillo" (Nicaragua); "heriso," "erizo" (Colombia, Venezuela); "malagano" (Colombia); "cabeza de negro" (Guiana).

The bark fiber is said to be used in some localities for making coarse rope. The leaves and bark are mucilaginous, and antispasmodic properties are ascribed to the flowers.

6. *HELIOCARPUS* L. Sp. Pl. 448. 1753.

Trees or shrubs, the pubescence of stellate hairs; leaves often trilobate; flowers small, the small cymes arranged in a terminal panicle; sepals 4, distinct; petals 4; stamens numerous; fruit capsular, subglobose or subclavate, 2-celled, slightly compressed, the edge surrounded by a row of radiating plumose bristles.

Many of the Mexican species are imperfectly known, the fruit being lacking in some cases and the flowers in others. The differences between the species, moreover, are not sharply marked.

Besides the vernacular names listed under the species, the following additional ones are reported for plants whose specific identity is doubtful: "Coche"

(Sinaloa); "cuaulahuac" (Veracruz); "jolocfn blanco" (Tabasco); "cuau-lote," "xolotzin" (various parts of Mexico); "burillo falso" (Nicaragua); "calagüe," "calagua," "calagual" (El Salvador); "tolotzin," "catena" (Tabasco); "copal" (Veracruz); "majahua" (Jalisco); "yaga-guiehi" (Oaxaca, Zapotec, *Reko*).

The wood of these trees is soft and light, and is employed for floats and bottle stoppers. In Brazil paper has been made from it. In Mexico a kind of paper was formerly made from the bark by beating it into thin sheets. The bark of young branches is tough and is often used as a substitute for cordage, or sometimes coarse rope and twine is made from it. The pulverized bark, or a decoction of it, is sometimes applied to sores.

Fruit borne on a long bristly stipe.

Leaf blades with stipule-like appendages at base-----1. *H. appendiculatus*.

Leaf blades not appendaged.

Leaves densely tomentose or stellate-pilose beneath, with loose spreading hairs-----2. *H. tomentosus*.

Leaves glabrate beneath, sparsely pilose, or covered with a minute close tomentum.

Leaf blades as broad as long or nearly so-----3. *H. tigrinus*.¹

Leaf blades much longer than broad.

Leaves glabrous or nearly so-----4. *H. glabrescens*.¹

Leaves covered beneath with minute stellate hairs.

5. *H. donnell-smithii*.

Fruit sessile or nearly so.

Leaves covered beneath with a pale close minute tomentum.

Leaves about as broad as long-----6. *H. velutinus*.

Leaves much longer than broad-----7. *H. pallidus*.

Leaves glabrous beneath or with pubescence of coarse spreading hairs.

Calyx lobes not appendaged-----8. *H. terebinthaceus*.

Calyx lobes appendaged at apex.

Leaves glabrous or glabrate beneath, or with scattered stellate hairs.

Body of the fruit elliptic-oblong-----9. *H. glanduliferus*.

Body of the fruit suborbicular.

Leaves about as broad as long, shallowly lobed-----3. *H. tigrinus*.

Leaves much longer than broad, not lobed.

Leaves cordate at base-----10. *H. polyandrus*.

Leaves rounded or cuneate at base-----11. *H. occidentalis*.

Leaves densely stellate-tomentose beneath.

Leaves nearly or quite as broad as long, usually lobed.

12. *H. reticulatus*.

Leaves about twice as broad as long, not lobed.

Sepals 4.5 mm. long, with erect appendages-----13. *H. attenuatus*.

Sepals 2 to 3 mm. long, with spreading appendages.

14. *H. palmeri*.

1. *Heliocarpus appendiculatus* Turcz. Bull. Soc. Nat. Moscou 31¹: 226. 1858.

San Luis Potosí, Veracruz, Chiapas, and Tabasco; type from Teapa, Tabasco.

Shrub or tree, sometimes 7.5 meters high; leaves ovate to orbicular, 10 to 20 cm. long, acute or acuminate, usually not lobed, dentate, stellate-tomentose beneath; sepals 5 to 6 mm. long, not appendaged; fruit (including bristles) 10 to 14 mm. wide, very hairy. "Majagua" (Chiapas); "burío" (Costa Rica).

¹The fruit is not known in these species.

2. *Heliocarpus tomentosus* Turcz. Bull. Soc. Nat. Moscou 31¹: 225. 1858.

Puebla, Oaxaca, and Veracruz; type from Mirador, Veracruz.

Shrub or tree, 4.5 to 9 meters high; leaves large, broadly ovate, acute or acuminate, cordate at base, not lobed; flowers yellowish white, the sepals about 5 mm. long, not appendaged; fruit (and bristles) 7 to 8 mm. wide. "Jonote" (Veracruz).

This, like some other species, has been reported from Mexico as *H. americanus* L.

3. *Heliocarpus tigrinus* Hochr. Ann. Cons. Jard. Genève 18-19: 123. 1914.

Known only from the type locality, Moreno, Michoacán, altitude 450 meters.

Shrub, 4.5 meters high, with glabrous stems; leaves 5 to 15 cm. long, sharply serrate, cordate at base, green, thinly pilose beneath; flowers yellowish green, the sepals 5 mm. long; fruit not known.

4. *Heliocarpus glabrescens* Hochr. Ann. Cons. Jard. Genève 18-19: 122. 1914.

Known only from the original collection, from the cordillera of Veracruz, altitude 1,000 meters.

Branches glabrous; leaves ovate, 5 to 11 cm. long, long-acuminate, rounded at base, glabrous but penicillate beneath in the axils of the nerves, dentate; sepals 6 mm. long; fruit not known.

5. *Heliocarpus donnell-smithii* Rose, Bot. Gaz. 31: 110. pl. 1. 1901.

Heliocarpus caeciliae Loesener, Repert. Sp. Nov. Fedde 12: 227. 1913.

Veracruz and Tabasco. Guatemala and Nicaragua; type from Arenal, Guatemala.

Tree, 7 to 9 meters high; branches sparsely stellate-pilose; leaves ovate or lance-ovate, 6 to 15 cm. long, acuminate, subcordate at base, serrulate; fruit 10 to 12 mm. broad. "Jolocín" (Tabasco).

6. *Heliocarpus velutinus* Rose, Contr. U. S. Nat. Herb. 8: 317. 1905.

Known only from the type locality, limestone hills near Yautepec, Morelos, altitude 1,350 meters.

Small tree; leaves long-petiolate, about 15 cm. long, shallowly trilobate, cordate at base, crenate, green and glabrate above; fruit 5 to 6 mm. broad, the bristles shorter than the diameter of the body.

7. *Heliocarpus pallidus* Rose, Contr. U. S. Nat. Herb. 5: 128. pl. 10. 1897.

Known only from the type locality, Acapulco, Guerrero.

Shrub or tree, 3.5 to 7.5 meters high, the branches minutely stellate-tomentulose; leaves broadly ovate, 5 to 10 cm. long, sometimes shallowly lobate, long-acuminate, serrate, rounded at base; sepals 6 mm. long; fruit about 10 mm. broad.

8. *Heliocarpus terebinthaceus* (DC.) Hochr. Ann. Cons. Jard. Genève 18-19: 125. 1914.

Grewia terebinthacea DC. Cat. Hort. Monsp. 114. 1813.

Heliocarpus nelsoni Rose, Contr. U. S. Nat. Herb. 5: 128. 1897.

Heliocarpus laevis Rose, Contr. U. S. Nat. Herb. 8: 317. 1905.

Jalisco to Oaxaca.

Shrub or small tree, 2.5 to 6 meters high, the branches stellate-tomentose; leaves large, cuspidate-acuminate, dentate, stellate-tomentose on both surfaces; sepals 4 to 5 mm. long; fruit densely covered with plumose bristles. "Jonote" (Oaxaca).

9. *Heliocarpus glanduliferus* Robinson; Rose, Contr. U. S. Nat. Herb. 5: 127. 1897.

Veracruz and Chiapas. Central America; type from Santa María, Guatemala.

Tree, about 6 meters high; leaves broadly ovate to ovate-oblong, long-acuminate, stellate-pubescent and glandular beneath, crenate-serrate; sepals 5 to 6 mm. long; fruit body 6 to 7 mm. long, glandular, the margin fringed with plumose bristles. "Calagüe" (El Salvador).

10. *Heliocarpus polyandrus* S. Wats. Proc. Amer. Acad. 21: 420. 1886.

Heliocarpus glaber T. S. Brandeg. Zoe 5: 209. 1905

Chihuahua, Sonora, and Sinaloa; type from Hacienda San Miguel, southwestern Chihuahua.

Shrub, 3 meters high; leaves broadly ovate, 7 to 13 cm. long, acute or acuminate, crenate, nearly glabrous; sepals 4 to 5 mm. long; fruit 5 to 6 mm. wide, the bristles short.

11. *Heliocarpus occidentalis* Rose, Contr. U. S. Nat. Herb. 5: 127. pl. 8. 1897.

Colima and Guerrero; type from Acapulco, Guerrero.

Shrub or tree, 4.5 to 9 meters high, the trunk 7.5 to 12 cm. in diameter; leaves broadly ovate or lance-ovate, acuminate, crenate; fruit about 12 mm. broad, the bristles much longer than the body.

12. *Heliocarpus reticulatus* Rose, Contr. U. S. Nat. Herb. 5: 128. pl. 9. 1897.

Heliocarpus microcarpus Rose, Contr. U. S. Nat. Herb. 8: 316. 1905.

Zacatecas, Durango, and Jalisco to Morelos and Chiapas; type from Guadalajara, Jalisco. Guatemala.

Shrub or tree, 3 to 8 meters high, the branches stellate-tomentose; leaves large, long-petiolate, cuspidate-acuminate, cordate at base, serrate, tomentose on both surfaces; sepals 5 to 6 mm. long; fruit 6 to 12 mm. broad, very hairy. "Quauhalagua" or "cuahualagua" (Morelos, Puebla); "jolotzín" (Morelos).

13. *Heliocarpus attenuatus* S. Wats. Proc. Amer. Acad. 21: 420. 1886.

Chihuahua, Sonora, and Sinaloa; type from Hacienda San Miguel, southwestern Chihuahua.

Shrub or tree, 2.5 to 12 meters high, the trunk sometimes 25 to 30 cm. in diameter, the branchlets tomentose; leaves ovate, 5 to 12 cm. long, long-acuminate, cordate at base. "Zamo baboso" (Sinaloa).

14. *Heliocarpus palmeri* S. Wats. Proc. Amer. Acad. 21: 420. 1886.

Known only from the type locality, Hacienda San Miguel, southwestern Chihuahua.

Shrub, 2.5 to 3 meters high, the branches closely tomentose; leaves ovate, 7 to 15 cm. long, long-acuminate, rounded or subcordate at base, crenate-serrate.

7. TRIUMFETTA L. Sp. Pl. 444. 1753.

Shrubs or sometimes herbs, with stellate pubescence; leaves often 3 or 5-lobate; flowers small or large, yellow, axillary or opposite the leaves, fasciculate-cymulose; sepals 5, appendaged at apex; petals 5, rarely absent; stamens 10 to many; fruit subglobose, 2 to 5-celled, indehiscent or separating into 2 to 5 cocci, covered with short or long spines, each of these uncinatate at apex.

The fruits adhere readily to clothing and other objects by their hooked spines. The inner bark of all species yields a strong fiber, resembling jute, which is suitable for the manufacture of cordage.

The plants are said to have received the name "paroquet-bur" in Jamaica, because parokets feed on the ripe fruit. The names "jonote," "cajete" (Chiapas), and "güizapol de borrego" (Jalisco) are reported for Mexican plants of the genus, whose specific identity is uncertain.

Spines of the fruit retrorsely barbate.

Petals none; gynophore very short, without glands-----1. *T. lappula*.

Petals present; gynophore somewhat elongate, with 5 glands at base.

Upper surface of leaves densely stellate-pubescent-----2. *T. semitriloba*.

Upper surface of leaves pilose with long, mostly simple hairs.

3. *T. dumetorum*.

Spines of the fruit glabrous, puberulent, or pilose with long spreading hairs.

Calyx 20 to 35 mm. long, or sometimes larger.

Petals less than half as long as the sepals and concealed by them.

4. *T. speciosa*.

Petals nearly as long as the sepals, conspicuous.

Leaves ovate or broadly rhombic, long-petiolate, broadest at or near the base.

Petiole with large glands at apex; leaves broadly rhombic; petals 5 to 6 mm. wide-----5. *T. coriacea*.

Petiole without glands; leaves ovate or lance-ovate; petals 2 mm. wide.

Petals densely long-pilose at base-----6. *T. columnaris*.

Petals very sparsely and minutely stellate-pubescent at base.

7. *T. chihuahuensis*.

Leaves oblong to rounded-obovate, short-petiolate or sessile, broadest at or above the middle.

Sepals with very short thick appendages; leaves minutely stellate-pubescent on the upper surface-----8. *T. cucullata*.

Sepals with long slender appendages; leaves coarsely stellate-pubescent on the upper surface.

Sepals 2.8 to 3.5 cm. long-----9. *T. polyandra*.

Sepals 2 cm. long-----10. *T. obovata*.

Calyx 6 to 18 mm. long.

Petals none-----11. *T. apetala*.

Petals present.

Fruit dehiscent-----12. *T. dehiscens*.

Fruit (so far as known) indehiscent.

Appendages of the sepals 3.5 to 5 mm. long-----13. *T. falcifera*.

Appendages less than 3 mm. long.

Leaves glabrous, or the pubescence of the upper surface chiefly or wholly of simple hairs.

Leaves glabrous except for tufts of hairs beneath in the axils of the veins-----14. *T. mexicana*.

Leaves pubescent on one or both surfaces.

Spines nearly or quite as long as the body of the fruit, slender; leaves broadly ovate, slender-cuspidate--15. *T. grandiflora*.

Spines very short, stout; leaves ovate-lanceolate, acuminate.

16. *T. goldmanii*.

Leaves copiously stellate-pubescent or tomentose on both surfaces.

Petioles short and stout, usually less than 1 cm. long, the upper leaves mostly sessile.

Upper leaves sessile; stamens usually 15-----17. *T. palmeri*.

Upper leaves petiolate; stamens 25 to 30-----18. *T. brevipes*.

Petioles long and slender.

Sepals glabrous or glabrate-----19. *T. acracantha*.

Sepals stellate-pilose.

Spines of the fruit few, much thickened below.

20. *T. socorrensis*.

Spines numerous, very slender.

Petals half as long as the sepals or shorter.

21. *T. galeottiana*.

Petals nearly as long as the sepals-----22. *T. discolor*.

1. *Triumfetta lappula* L. Sp. Pl. 444. 1753.

Morelos, Oaxaca, and probably elsewhere. West Indies, Central America, and western Africa.

Slender shrub, 1.5 to 3 meters high; leaves long-petiolate, ovate or rhombic, often trilobate, dentate, acute or acuminate, finely stellate-pubescent; sepals 3 to 4 mm. long, densely tomentose; fruit (including spines) 6 to 8 mm. in diameter, stellate-pubescent, the spines slender. "Mozote de caballo" (Costa Rica, Nicaragua); "pega-pega" (Panama); "cadillo" (Porto Rico); "mata de negro" (Santo Domingo).

The bark furnishes a fine and strong fiber. The leaves and bark contain a sweet, slightly astringent mucilage, and an infusion is used in Costa Rica as a remedy for colds. The plant is used also to purify or clarify syrup, in making native sugar.

2. *Triumfetta semitriloba* Jacq. Enum. Pl. Carib. 22. 1760.

? *Triumfetta althaeoides* Lam. Encycl. 3: 420. 1789.

Sinaloa to Tamaulipas, Yucatán, and Chiapas. West Indies, Central America, and South America.

Slender shrub, 1 to 3 meters high; leaves ovate to rhombic, long-petiolate, acute or acuminate, rounded or cordate at base, often shallowly lobed; sepals 5 to 7 mm. long; petals yellow, about equaling the sepals; fruit 6 to 8 mm. in diameter, the body glabrate in age, the spines slender. "Majalmilla," "majahuilla" (Sinaloa); "cadillo" (Tabasco, Veracruz, Porto Rico, Colombia); "ochmul" (Yucatán); "abrojo" (Colima); "huizapotillo" (Jalisco, Urbina); "cadillo malva" (Tamaulipas); "guizazo," "guizazo de cochino" (Cuba); "escobilla amarilla" (Guatemala).

Like the other species, this plant has tough fiber, which has been used for making rope, coarse cloth, and, in Brazil, paper. The roots are mucilaginous and astringent, and they are said to have diuretic properties. Locally they are administered for venereal diseases and for liver and kidney affections.

3. *Triumfetta dumetorum* Schlecht. Linnaea 11: 377. 1837.

Triumfetta lindeniana Turcz. Bull. Soc. Nat. Moscou 31¹: 229. 1858.

Triumfetta botteriana Turcz. Bull. Soc. Nat. Moscou 32¹: 260. 1859.

Veracruz and Oaxaca; type from Jalapa, Veracruz. Guatemala.

Shrub, 1 to 2 meters high; leaves long-petiolate, broadly ovate to oblong-lanceolate, acuminate, rounded or obtuse at base, sometimes lobate, duplicate-serrate, green beneath and thinly stellate-hirsute; calyx 6 to 8 mm. long, often glabrate; petals equaling the sepals, yellow; fruit 8 to 10 mm. in diameter, with very slender spines.

It is not improbable that some earlier name, based upon a West Indian or South American plant, may be found for this species.

4. *Triumfetta speciosa* Seem. Bot. Voy. Herald 86. 1853.

Triumfetta macrocalyx Turcz. Bull. Soc. Nat. Moscou 31¹: 230. 1858.

Triumfetta micropetala Hochr. Ann. Cons. Jard. Genève 18-19: 98. 1914.

Veracruz, Oaxaca, and Chiapas. Central America; type from Boquete, Panama.

Shrub, 1 to 2 meters high; leaves long-petiolate, usually 3-lobate, acute or acuminate, rounded or subcordate at base, serrulate, densely tomentose beneath; sepals red, 3 to 4 cm. long, hirsute, with slender appendages; fruit 1 to 2 cm. in diameter, the spines slender, usually very hairy.

5. *Triumfetta coriacea* Hochr. Ann. Cons. Jard. Genève 18-19: 108. 1914.

Known only from the type locality, in the Sierra Madre of Michoacán or Guerrero, altitude 800 meters.

Shrub, 1.5 meters high; petiole with several large glands at the apex; leaves short-acuminate, rounded or cuneate at base, dentate, minutely tomentose beneath; sepals about 22 mm. long, with very short appendages; petals 2 cm. long, yellow.

6. *Triumfetta columnaris* Hochr. Ann. Cons. Jard. Genève 18-19: 101. 1914.

Triumfetta pseudocolumnaris Hochr. Ann. Cons. Jard. Genève 18-19: 103. 1914.

Oaxaca and Chiapas, and perhaps elsewhere; type from Totontepec.

Shrub; leaves 4 to 9 cm. long, long-acuminate, rounded or subcordate at base, serrate, villous-tomentose beneath; sepals about 2 cm. long, thinly stellate-pilose; petals linear, about as long as the sepals, densely pilose at base.

7. *Triumfetta chihuahuensis* Standl., sp. nov.

Chihuahua; type from Guayanopa Canyon in the Sierra Madre, altitude 1,500 meters (*M. E. Jones*, September 23, 1903; U. S. Nat. Herb. no. 855849).

Slender shrub; leaves long-petiolate, lanceolate to rounded-ovate, long-acuminate, rounded or subcordate at base, serrate, finely stellate-pubescent, green beneath, 5 or 7-nerved at base; sepals 20 to 22 mm. long, sparsely stellate-pubescent; petals linear-oblong, shorter than the sepals, acute, glabrous except at base; fruit (including spines) 8 mm. in diameter, minutely puberulent, covered with slender spines.

8. *Triumfetta cucullata* Fernald, Bot. Gaz. 20: 532. 1895.

Known only from the type locality, Zopilote, Tepic.

Petioles bearing several large glands; leaves mostly oblong-elliptic, 3-nerved, acute, obtuse or cuneate at base, glandular-serrulate, very rough; sepals 2.5 to 3 cm. long, stellate-tomentose; petals spatulate, nearly equaling the sepals.

9. *Triumfetta polyandra* DC. Prodr. 1: 508. 1825.

Triumfetta insignis S. Wats. Proc. Amer. Acad. 22: 400. 1887.

Sinaloa to Chiapas.

Leaves 3 or 5-nerved, oblong to oval or sometimes rounded, 7 to 15 cm. long, obtuse or acute, obtuse or subcordate at base, glandular-serrulate, tomentose beneath; sepals stellate-tomentose; petals oblong, obtuse, yellow, about as long as the sepals; fruit 2.5 to 4 cm. in diameter, covered with very numerous slender plumose spines. "Pastora," "cadillo" "guachapure de la sierra (Sinaloa).

10. *Triumfetta obovata* Schlecht. & Cham. Linnaea 5: 228. 1830.

Veracruz; type from Hacienda de la Laguna.

Branches and leaves densely tomentose; leaves obovate or rounded-obovate, acute or obtuse, shallowly cordate at base, serrulate, 3 or 5-nerved; calyx tomentose; fruit about 2 cm. in diameter, covered with long slender plumose spines.

It is doubtful whether this is distinct from *T. polyandra*. The writer has seen only a single specimen, but it appears to have decidedly smaller flowers than that species.

11. *Triumfetta apetala* Hochr. Ann. Cons. Jard. Genève 18-19: 97. 1914.

Known only from the type locality, mountains of Oaxaca, altitude 1,300 to 1,600 meters.

Shrub; leaves ovate or ovate-lanceolate, 8 to 10 cm. long, long-petiolate, long-acuminate, dentate, stellate-pilose; sepals 4 mm. long; fruit 4 mm. in diameter, glabrous.

12. *Triumfetta dehiscens* Rose, Contr. U. S. Nat. Herb. 12: 185. 1909.

Sonora and Sinaloa; type from Colomas, Sinaloa.

Shrub; leaves broadly ovate, acuminate, duplicate-serrate, gray-tomentose beneath, with glands at base of blade; flowers not known; fruit glabrate, 1 cm. in diameter, 5-celled, covered with very slender spines.

13. *Triumfetta falcifera* Rose, Contr. U. S. Nat. Herb. 12: 285. 1909.

Michoacán and Guerrero; type from Acapulco, Guerrero.

Shrub, 2 meters high; leaves long-petiolate, lance-ovate to rhombic-ovate, cuspidate-acuminate, rounded or subcordate at base, serrate; sepals 7 to 8 mm. long, hirsute, the appendages entire or lobate; petals much shorter than the sepals, yellow; fruit about 1 cm. in diameter, covered with stout spines.

14. *Triumfetta mexicana* Turcz. Bull. Soc. Nat. Moscou 31¹: 230. 1858.

Adenodiscus mexicanus Turcz. Bull. Soc. Nat. Moscou 19²: 504. 1846.

Veracruz and Oaxaca; type from mountains of Oaxaca.

Slender shrub; leaves slender-petiolate, broadly ovate, acuminate, serrate, 7-nerved at the rounded or subcordate base; sepals puberulent, 3 to 4 mm. long.

15. *Triumfetta grandiflora* Vahl, Eclog. Amer. 2: 39. 1798.

Triumfetta longicuspis Turcz. Bull. Soc. Nat. Moscou 31¹: 229. 1858.

Oaxaca. Guatemala and West Indies.

Leaves long-petiolate, broadly ovate, cuspidate-acuminate, rounded or subcordate at base, glandular-serrate, in age glabrate; sepals glabrate, 15 to 18 mm. long; petals linear-oblong, nearly as long as the sepals; fruit 1.5 cm. in diameter, glabrous, covered with very numerous slender spines.

16. *Triumfetta goldmanii* Rose, Contr. U. S. Nat. Herb. 12: 285. 1909.

Sinaloa; type from Sierra de Choix.

Slender shrub, 1.5 meters high; leaves slender-petiolate, long-acuminate, sometimes shallowly trilobate, rounded at base, serrate; calyx 1.5 cm. long, sparsely and very minutely stellate-pubescent; petals linear, about as long as the sepals; fruit 5 to 6 mm. in diameter, the spines 1 to 2 mm. long. "Cadillo."

17. *Triumfetta palmeri* S. Wats. Proc. Amer. Acad. 22: 400. 1887.

Durango and Jalisco; type from Río Blanco, Jalisco.

Shrub; leaves oblong, lance-oblong, or rhombic-lanceolate, acute, obtuse or rounded at base, serrate, coarsely stellate-pilose; sepals 12 mm. long, densely stellate-tomentose, with very short appendages; petals linear, shorter than the sepals; fruit 8 mm. in diameter, puberulent, covered with short stout spines.

18. *Triumfetta brevipes* S. Wats. Proc. Amer. Acad. 22: 400. 1887.

Jalisco and Michoacán; type from Río Blanco, Jalisco.

Shrub; leaves lance-oblong, acuminate, rounded at base, 5-nerved, coarsely serrate, tomentose beneath; sepals about 13 mm. long, stellate-tomentose; petals oblanceolate, obtuse, shorter than the sepals; fruit 8 to 10 mm. in diameter, glabrate in age, covered with short stout spines.

Doubtfully distinct from *T. palmeri*.

19. *Triumfetta acracantha* Hochr. Ann. Cons. Jard. Genève 18-19: 111. 1914.

Sinaloa to Guerrero; type from Baqueta.

Shrub, 1.5 meters high; leaves ovate or ovate-rhombic, long-acuminate, rounded or subcordate at base, duplicate-serrate, green and thinly stellate-pubescent beneath; sepals about 6 mm. long; petals 2.5 mm. long.

20. *Triumfetta socorrensis* T. S. Brandeg. Erythea 7: 1. 1899.

Known only from Socorro Island, Baja California.

Shrub; leaves rounded-ovate, obtuse or acutish, subcordate at base, serrate, very densely tomentose; fruit 1.5 to 2 cm. in diameter, densely pilose.

21. *Triumfetta galeottiana* Turcz. Bull. Soc. Nat. Moscou 32¹: 260. 1859.

? *Triumfetta brachypetala* Turcz. Bull. Soc. Nat. Moscou 31¹: 227. 1858.

Jalisco to Veracruz and Chiapas; Turczaninow gives the type locality as "Oaxaca, alt. 3,000 ped.," but a specimen of the original collection (*Galeotti* 4153) in the National Herbarium is labeled as from "Bois de Zacuapan," Veracruz, at the same altitude.

Shrub, 1 to 2.5 meters high; leaves ovate to rounded-ovate, long-acuminate, rounded or subcordate at base, serrate, usually densely tomentose beneath; sepals 3 to 5 cm. long; fruit 6 to 8 mm. in diameter, usually glabrous, covered with slender spines.

22. *Triumfetta discolor* Rose, Contr. U. S. Nat. Herb. 12: 285. 1909.

Durango; type collected between Pedro Paulo and San Blascito.

Shrub; leaves rounded, 2 to 7 cm. long, obtuse or rounded at apex, subcordate at base, serrate, gray-tomentose beneath, sometimes shallowly trilobate; sepals about 18 mm. long; petals linear-oblongate.

DOUBTFUL SPECIES.

TRIUMFETTA OLIGACANTHA Hochr. Ann. Cons. Jard. Genève 18-19: 106. 1914. Based upon a specimen from either Peru or Mexico; related to *T. semitriloba*.

TRIUMFETTA ORIZABAE Turcz. Bull. Soc. Nat. Moscou 32¹: 261. 1859. Type from Orizaba.

TRIUMFETTA OXYPHYLLA DC. Prodr. 1: 508. 1824. Described from Mexico.

TRIUMFETTA PANICULATA Hook. & Arn. Bot. Beechey Voy. 279. 1836-39. Type from Jalisco.

95. MALVACEAE. Mallow Family.

Shrubs or trees, or more often herbs, the pubescence usually of stellate hairs; leaves alternate, commonly palmate-nerved, simple or compound, stipulate; flowers axillary, racemose, or paniculate, usually perfect, the calyx often subtended by bractlets; sepals 5, more or less united; petals 5; stamens numerous, united to form a column; fruit usually dry, composed of several carpels, these verticillate about an axis, dehiscent or indehiscent, or the fruit sometimes capsular.

The plants of this family have mucilaginous juice. Many of them are employed in domestic medicine because of their emollient properties.

Fruit a loculicidal capsule; calyx subtended by bractlets.

Bractlets at the base of the calyx 5 or more.

Cells of the fruit 1-ovulate.....16. **KOSTELETZKYA.**

Cells of the fruit containing 2 or more ovules.....17. **HIBISCUS.**

Bractlets 3.

Capsule usually 5-celled.....18. **GOSSYPIUM.**

Capsule 3-celled.

Petals white, turning purplish; leaves usually lobed; bractlets longer than the calyx.....19. **THURBERIA.**

Petals purple; leaves entire; bractlets shorter than the calyx.

20. **ERIOXYLUM.**

Fruit not capsular, the carpels separating from each other and from the axis at maturity; or the fruit rarely capsular, but bractlets then absent.

Style branches (10) twice as many as the carpels.

Carpels rough, often spine-armed, usually dry.....14. **MALACHE.**

Carpels smooth, unarmed, fleshy.....15. **MALVAVISCUS.**

Style branches of the same number as the carpels.

Bractlets present at the base of the calyx.

Seeds 2 or more in each cell of the fruit.....11. **SPHAERALCEA.**

Seed 1 in each cell.

Bractlets connate12. **LAVATERA**.

Bractlets distinct.....13. **MALVASTRUM**.

Bractlets none at the base of the calyx.

Seeds 2 or more in each cell.

Carpels of the fruit winged.

Carpels each with a dorsal wing above, and with crests along the margins.....1. **BAKERIDESIA**.

Carpels each with 2 lateral wings.....2. **HORSFORDIA**.

Carpels not winged.

Carpels 1-celled.

Carpels each with 2 retrorse spines below....3. **NEOBRITTONIA**.

Carpels without spines below.....4. **ABUTILON**.

Carpels imperfectly 2-celled.

Carpels usually 5, imperfectly 2-celled by the lateral constriction of their walls.....5. **WISSADULA**.

Carpels 5 to 11, a free partition projecting from the dorsal wall.

6. **PSEUDABUTILON**.

Seed 1 in each cell.

Fruit a loculicidal 5-celled capsule.....7. **BASTARDIA**.

Fruit of 5 or more carpels, these separating at maturity.

Dorsal wall of the carpels separating at maturity from the lateral walls.....8. **GAYA**.

Dorsal wall not separating from the lateral walls.

Carpels membranaceous, inflated at maturity.

9. **ROBINSONELLA**.

Carpels thick, not inflated.....10. **SIDA**.

1. **BAKERIDESIA** Hochr. Ann. Cons. Jard. Bot. Genève 15-16: 298. 1913.

The following is the only known species of the genus.

1. *Bakeridesia galeottii* (Baker f.) Hochr. Ann. Cons. Jard. Genève 15-16: 298. 1913.

Abutilon galeottii Baker f. Journ. Bot. Brit. & For. 31: 73. 1893.

Described from Veracruz.

Stems woody; leaves petiolate, broadly ovate-cordate, 3 to 8 cm. long, acuminate, entire, puberulent; flowers axillary, solitary or geminate, long-pedunculate; calyx stellate-puberulent; corolla yellow, 2.2 cm. long; fruit of about 13 carpels, these each with a broad dorsal wing above, the margins sinuate-cristate.

2. **HORSFORDIA** A. Gray, Proc. Amer. Acad. 22: 296. 1887.

Shrubs or large herbs, with stellate pubescence; peduncles axillary, 1-flowered, or sometimes paniculate; bractlets none; fruit of 8 to 12 coalescent carpels, these 1 to 3-seeded, the upper portion accrescent and developing 2 wings.

Leaves rounded-cordate, 1.5 to 2.5 cm. long, usually as broad as long.

1. *H. rotundifolia*.

Leaves cordate-ovate to lanceolate, mostly 3 to 7 cm. long, much longer than broad.

Leaves chiefly lanceolate; carpels 2 or 3-seeded.....2. *H. newberryi*.

Leaves ovate or broadly ovate; carpels 1-seeded.....3. *H. alata*.

1. *Horsfordia rotundifolia* S. Wats. Proc. Amer. Acad. 24: 40. 1889.

Horsfordia purissimae T. S. Brandeg. Proc. Calif. Acad. II. 2: 135. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Low shrub; leaves rounded or obtuse at apex, crenate, finely stellate-tomentose; flowers in naked panicles; petals yellow, 7 to 8 mm. long; carpels 6 to 8, 1-seeded.

2. *Horsfordia newberryi* (S. Wats.) A Gray, Proc Amer. Acad. 22: 297. 1887.
Abutilon newberryi S. Wats. Proc. Amer. Acad. 11: 125. 1876.

Sonora and Baja California. Southern Arizona and California; type collected on the lower Colorado River.

Shrub, 1 to 2.5 meters high, covered throughout with a very fine dense yellowish stellate tomentum; leaves attenuate, rounded or cordate at base, very thick, subentire; petals yellow, 8 mm. long; carpels 8 or 9.

3. *Horsfordia alata* (S. Wats.) A. Gray, Proc. Amer. Acad. 22: 297. 1887.

Sida alata S. Wats. Proc. Amer. Acad. 20: 356 1885.

Horsfordia palmeri S. Wats. Proc. Amer. Acad. 24: 40. 1889.

Sonora and Baja California; type from northwestern Sonora.

Shrub, 1 to 3.5 meters high; leaves obtuse or acute, dentate or subentire, densely stellate-tomentose with somewhat viscid pubescence; petals pink, 1 to 1.5 cm. long; carpels 10 to 12. "Malva blanca" (Baja California).

3. NEOBRITTONIA Hochr. Ann. Cons. Jard. Bot. Genève 9: 184. 1905.

The following is the only species known.

1. *Neobrittonia acerifolia* (Lag.) Hochr. Ann. Cons. Jard. Bot. Genève 9: 184. 1905.

Sida acerifolia Lag. Gen. & Sp. Nov. 21. 1816.

Abutilon acerifolium Don, Hist. Dichl. Pl. 1: 504. 1831.

Sida discissa Bertol. Mem. Soc. Ital. Moden. 23: 305. 1844.

Abutilon discissum Schlecht. Linnaea 25: 218. 1852.

Morelos. Guatemala; described from cultivated plants.

Plants 2 to 3 meters high, the stems pilose with very long soft spreading hairs; leaves 6 to 20 cm. long, deeply cordate at base, deeply 3 or 5-lobed, green, thinly pilose; flowers axillary; petals orbicular, 2 cm. long, lilac-violet; carpels numerous, 2 cm. long, rounded at apex, stellate-hirsute, each with 2 retrorse spines below.

4. ABUTILON Adans. Fam. Pl. 2: 398. 1763.

Herbs, shrubs, or small trees; leaves usually cordate; flowers small or large, variously colored; calyx without bractlets; carpels of the fruit 4 to many, 2 to several-seeded, bivalvate.

Ovules 4 or more in each cell; flowers mostly large, usually 3 to 5 cm. long.

Leaves deeply lobed-----1. *A. striatum*.

Leaves not lobed.

Petals 1.5 cm. long or less; upper leaves sessile-----2. *A. amplexifolium*.

Petals 2 to 5 cm. long; upper leaves petiolate.

Leaves crenate-dentate-----3. *A. purpusii*.

Leaves entire.

Calyx 1.7 cm. long or shorter.

Calyx 8 to 10 mm. long, the lobes triangular-----4. *A. bakerianum*.

Calyx 13 to 17 mm. long, the lobes narrowly triangular or triangular-lanceolate-----5. *A. peyritschii*.

Calyx 2 cm. long or more, usually fully 2.5 cm. long.

Carpels broadly winged on the back-----6. *A. notolophium*.

Carpels not winged-----7. *A. yucatanum*.

Ovules usually 3 in each cell; flowers commonly smaller, nearly always less than 2.5 cm. long.

Flowers axillary.

Carpels rounded at apex.

Stems long-hirsute ----- 8. *A. hirtum*.

Stems stellate-tomentose or pilosulous, never hirsute.

Leaves covered beneath with a very dense, minute, pale tomentum.

22. *A. incanum*.

Leaves green beneath, loosely stellate-pubescent.

Petals about 1 cm. long; leaves long-acuminate --- 9. *A. percaudatum*.

Petals 4 to 6 mm. long; leaves obtuse or acute ---- 10. *A. parvulum*.

Carpels narrowed at apex to a long or short beak.

Stems hirsute ----- 11. *A. wrightii*.

Stems stellate-tomentose, never hirsute.

Peduncles viscid-pubescent.

Leaves with a closed basal sinus, the lobes overlapping.

12. *A. simulans*.

Leaves with an open sinus ----- 13. *A. dugesii*.

Peduncles without viscid pubescence.

Carpels of the fruit stellate-hirsute, at least above.

Carpels abruptly narrowed into a very short beak.

14. *A. glabriflorum*.

Carpels gradually narrowed to a long beak.

Carpels about 1.5 cm. long; leaves green above, whitish beneath.

15. *A. hypoleucum*.

Carpels about 1 cm. long; leaves nearly concolorous.

35. *A. aurantiacum*.

Carpels finely stellate-tomentose.

Carpels abruptly short-pointed ----- 16. *A. sphaerostaminum*.

Carpels gradually long-pointed.

Sepals equaling or longer than the carpels ---- 17. *A. lignosum*.

Sepals shorter than the carpels ----- 18. *A. californicum*.

Flowers chiefly in umbels, panicles, or racemes.

Carpels rounded or obtuse at apex, very shortly or not at all beaked.

Carpels 4 or 5.

Calyx 10 to 12 mm. long ----- 19. *A. bastardioides*.

Calyx 4 to 7 mm. long.

Calyx nearly as long as the carpels, erect ----- 20. *A. malacum*.

Calyx less than half as long as the carpels, spreading or reflexed.

Carpels short-beaked; stems trigonous ----- 21. *A. trisulcatum*.

Carpels usually not beaked; stems usually terete.

22. *A. incanum*.

Carpels more than 5, usually 8 or more.

Stems pilose with very long spreading hairs ----- 23. *A. sonorae*.

Stems stellate-tomentose or short-pilose.

Flowers umbellate ----- 24. *A. discolor*.

Flowers in large panicles.

Stems glabrate; calyx lobes broadly ovate, obtuse.

25. *A. reventum*.

Stems densely tomentose or tomentulose; calyx lobes ovate, acute.

Stems minutely tomentose; calyx less than half as long as the carpels ----- 26. *A. andrieuxii*.

Stems loosely tomentose; calyx nearly as long as the carpels.

27. *A. xanti*.

Carpels acute, narrowed to a conspicuous beak.

Carpels 5.

Stems hirsute or hispid-----28. *A. thurberi*.

Stems finely stellate-pubescent.

Leaves broadly cordate-ovate, mostly 5 to 8 cm. wide.

29. *A. membranaceum*.

Leaves ovate or elliptic-ovate, 2 to 4 cm. wide----30. *A. ellipticum*.

Carpels 6 or more.

Stems pilose with long spreading hairs-----31. *A. giganteum*.

Stems stellate-tomentose or short-pilose.

Carpels (excluding the beaks) 6 to 7 mm. long; leaves green beneath.

Leaves deeply cordate at base-----32. *A. umbellatum*.

Leaves rounded or subcordate at base----33. *A. hemsleyanum*.

Carpels 1 cm. long or usually much longer.

Calyx and carpels pilose or hirsute.

Petals 1 cm. long or less-----27. *A. xanti*.

Petals about 2 cm. long.

Carpels long-hirsute, the beaks suberect-----34. *A. palmeri*.

Carpels short-hirsute, the beaks spreading.

35. *A. aurantiacum*.

Calyx and carpels finely stellate-tomentose.

Pedicels viscid-pubescent-----36. *A. holwayi*.

Pedicels not viscid-pubescent-----37. *A. dentatum*.

1. *Abutilon striatum* Dicks. in Lindl. Bot. Reg. 39. 1839.

? *Abutilon venosum* Lem. Fl. Serr. Jard. 2³: pl. 5. 1846.

Specimens from Puebla have been seen by the writer, but perhaps all were taken from cultivated plants. Native of Guatemala.

Slender shrub, the branches glabrous; leaves 5 or 7-lobate, nearly glabrous, the lobes long-acuminate, serrate; flowers axillary; petals about 4 cm. long, orange veined with crimson or purple; carpels about 1.5 cm. long. "Monacillo amarillo" (Oaxaca, Durango, cultivated); "campanilla" (Guatemala).

Abutilon venosum, based upon cultivated plants of Mexican origin, is said to have petals as much as 7 cm. long.

2. *Abutilon amplexifolium* (DC.) Don, Hist. Dichl. Pl. 1: 502. 1831.

Sida amplexifolia DC. Prodr. 1: 469. 1824.

Jalisco to Veracruz.

Stems loosely pilose; leaves ovate-cordate, usually with overlapping basal lobes, long-acuminate, crenate-dentate, stellate-pilose beneath; flowers mostly paniculate, the petals 1.5 cm. long; carpels about 12, inflated, 1 cm. long, hirtellous.

3. *Abutilon purpusii* Standl., sp. nov.

Veracruz and Chiapas; type from Barranca de Tenampa, Zacuapan, Veracruz (*Purpus* 4332; U. S. Nat. Herb. no. 841806).

Stems finely stellate-tomentose; leaves broadly cordate, 10 to 20 cm. long, long-acuminate, deeply cordate at base, crenate-dentate, finely stellate-pubescent, sparsely so above; flowers mostly axillary, the peduncles 5 to 11 cm. long; calyx about 2 cm. long, densely brown or yellowish-tomentose, the lobes oval-ovate, mucronate; petals 3 cm. long or more; carpels 2.5 to 3 cm. long, rounded at apex, thinly stellate-tomentose.

4. *Abutilon bakerianum* Rose, Contr. U. S. Nat. Herb. 5: 133. pl. 11. 1897.

Oaxaca and Chiapas; type from Tomellin Canyon, Oaxaca.

Tree, 4.5 to 6 meters high; leaves rounded-cordate, 3.5 to 15 cm. long, abruptly short-acuminate, green above, minutely stellate-tomentose beneath;

calyx lobes broadly ovate, finely tomentose; petals 3 cm. long; carpels 1.5 cm. long, rounded at apex, stellate-hirsute.

5. *Abutilon peyritschii* Standl.

Abutilon macranthum Peyr. *Linnaea* 30: 59. 1859. Not *A. macranthum* St. Hil. 1825.

Veracruz; type from Zacuapan. Guatemala.

Small tree; leaves rounded-cordate, 5 to 20 cm. long, abruptly acuminate, deeply cordate at base, green and glabrate above, finely stellate-pubescent beneath; calyx brown-tomentose, the lobes oblong-ovate; petals 3 cm. long, yellow, purplish at base.

6. *Abutilon notolophium* A. Gray, *Proc. Amer. Acad.* 5: 175. 1861.

Abutilon goldmani Baker & Rose, *Contr. U. S. Nat. Herb.* 5: 170. 1899.
San Luis Potosí and Veracruz.

Leaves rounded-cordate, 7 to 21 cm. long, abruptly acuminate, deeply cordate at base, green and glabrate above, finely stellate-tomentose beneath; flowers axillary or umbellate; sepals densely tomentose; petals 3.5 cm. long, yellow; carpels 1.5 to 2 cm. long, stellate-hirsute.

7. *Abutilon yucatanum* Standl., sp. nov.

Type from La Vega, Yucatán (*Goldman* 634; U. S. Nat. Herb. No. 397004).

Stems, peduncles, and calyx densely covered with an orange-brown tomentum; leaves broadly cordate, 8 to 17 cm. long, acuminate, deeply cordate at base, entire, green above, beneath finely stellate-pubescent; peduncles axillary, 8 to 12 cm. long; calyx 2.2 cm. long, densely stellate-tomentose, the lobes acute; petals narrow, 4 to 4.5 cm. long; carpels 12 or more, 1.2 cm. long, stellate-tomentose.

8. *Abutilon hirtum* (Lam.) Sweet, *Hort Brit.* 1: 53. 1826.

Sida hirta Lam. *Encycl.* 1: 7. 1783.

Tamaulipas and Tabasco, and probably elsewhere; reported from Veracruz. Southern Florida, West Indies, and tropical Asia and Africa.

Stems minutely tomentulose and long-hirsute; leaves orbicular-cordate, acute, dentate, stellate-velutinous, calyx lobes broadly ovate, cuspidate, tomentose; petals 1.5 cm. long; carpels numerous, 1 cm. long, stellate-hirsute. "Botón de oro" (Veracruz, *Seler*); "buenas tardes" (Porto Rico).

9. *Abutilon percaudatum* Hochr., sp. nov.

Type from Río Verde, San Luis Potosí (*Palmer* 19; U. S. Nat. Herb. No. 470873).

Stems pilosulous with simple hairs; leaves ovate to rounded-cordate, 7 to 10 cm. long, deeply cordate at base, shallowly crenate, thinly stellate-pubescent; calyx lobes lance-ovate, coarsely pubescent; petals 1 cm. long; carpels 1 cm. long.

10. *Abutilon parvulum* A. Gray, *Pl. Wright.* 1: 21. 1852.

Chihuahua and Sonora. Western Texas to Arizona and Colorado; type from Texas.

Plants usually herbaceous, the stems stellate-pubescent, 30 to 60 cm. high; leaves ovate-cordate, 2 to 5 cm. long, obtuse or acute, coarsely dentate, green, stellate-pubescent; petals orange-yellow; carpels 8 mm. long, minutely stellate-tomentose.

11. *Abutilon wrightii* A. Gray, *Bost. Journ. Nat. Hist.* 6: 162. 1850.

Sonora and Coahuila. Western Texas; type collected along the Rio Grande.

Stems chiefly herbaceous, 20 to 60 cm. high, densely hirsute; leaves broadly cordate, 2 to 4 cm. long, obtuse or rounded at apex, deeply cordate at base,

crenate, densely white-tomentose beneath; petals yellow, carpels nearly 1.5 cm. long, long-beaked, stellate-pilose.

12. *Abutilon simulans* Rose, Contr. U. S. Nat. Herb. 8: 318. 1905.

Jalisco to Morelos and Oaxaca; type from Cuernavaca, Morelos.

Plants 1.5 to 2.5 meters high, the stems viscid-pubescent; leaves ovate or broadly cordate, 6 to 17 cm. long, long-acuminate, crenate or coarsely dentate, beneath covered with a fine close whitish stellate tomentum; calyx lobes broadly ovate and overlapping, finely tomentose; petals yellow, about 1.5 cm. long; carpel bodies 10 to 13 mm. long, long-beaked.

Doubtfully distinct from the next species.

13. *Abutilon dugesii* S. Wats. Proc. Amer. Acad. 21: 447. 1886.

Querétaro and Guanajuato; type from Guanajuato.

Stems viscid-pubescent; leaves ovate or broadly cordate, 4 to 10 cm. long, acuminate, crenate or dentate, densely stellate-tomentose beneath; calyx lobes ovate, acuminate; petals orange, 6 to 10 mm. long; carpels about 10, 10 to 12 mm. long, long-beaked, finely stellate-pubescent.

14. *Abutilon glabriflorum* Hochr., sp. nov.

Tamaulipas; type from Victoria (*Palmer* 373; U. S. Nat. Herb. no. 572603).

Shrub, the stems truly fruticose, glabrate in age; leaves broadly cordate, 3.5 to 7 cm. long, acute or acuminate, shallowly crenate or denticulate, densely stellate-pubescent, whitish beneath; sepals broadly ovate, acute; petals 1.5 to 2 cm. long; carpels 10 to 12 mm. long.

15. *Abutilon hypoleucum* A. Gray, Pl. Wright. 1: 20. 1852.

Abutilon selerianum Ulbrich, Repert. Nov. Sp. Fedde 12: 227. 1913.

Coahuila to San Luis Potosí and Puebla; type from Monterrey, Nuevo León. Western Texas.

Stems suffrutescent, tomentose, in age reddish brown and glabrate; leaves lance-ovate to broadly cordate, 4 to 11 cm. long, long-acuminate, deeply cordate at base, crenate or dentate, green above, densely white-tomentose beneath; calyx lobes ovate, overlapping at base; petals 2 to 2.5 cm. long.

16. *Abutilon sphaerostaminum* Hochr., sp. nov.

Veracruz; type from Zacuapan (*Purpus* 2234; U. S. Nat. Herb. no. 840351).

Small shrub with tomentose or glabrate stems; leaves broadly cordate, 5 to 12 cm. long, long-acuminate, shallowly crenate or dentate, densely or finely white-tomentose beneath; sepals broadly ovate, acuminate, finely tomentose; carpels 10 to 12 mm. long.

17. *Abutilon lignosum* (Cav.) Don, Hist. Dichl. Pl. 1: 501. 1831.

Sida lignosa Cav. Monad. Diss. 34. pl. 9. f. 2. 1790.

Abutilon jacquini Don, Hist. Dichl. Pl. 1: 503. 1831.

Abutilon berlandieri A. Gray; S. Wats. Proc. Amer. Acad. 20: 358. 1885.

Abutilon scabrum S. Wats. Proc. Amer. Acad. 24: 41. 1889.

Sonora and Chihuahua to Yucatán and Jalisco. Southern Florida and Texas; West Indies; type from Santo Domingo.

Plants suffrutescent, 1 to 2 meters high; leaves ovate to broadly cordate, 5 to 15 cm. long, usually long-acuminate, crenate or dentate, densely stellate-tomentose beneath; sepals cordate-ovate, acuminate; petals 1 to 1.5 cm. long; carpels 10 to 12 mm. long. "Colotahue," "pelotazo bronco" (Sinaloa).

The fiber of the stems is employed in western Mexico for making twine and rope.

18. *Abutilon californicum* Benth. Bot. Voy. Sulph. 8. 1844.

Abutilon lemmoni S. Wats. Proc. Amer. Acad. 20: 357. 1885.

Baja California and Sonora to Oaxaca; type from Magdalena Bay, Baja California.

Shrub, 1 to 2.5 meters high, the stems brownish or yellowish-tomentose; leaves broadly cordate, 1.5 to 5 cm. long, rounded to short-acuminate at apex, crenate, thick, stellate-tomentose; sepals broadly ovate, acuminate; petals 1 to 1.5 cm. long; carpels 10 to 12 mm. long.

19. *Abutilon bastardioides* Baker f. Contr. U. S. Nat. Herb. 1: 306. 1895.

Known only from the type locality, Colima.

Stems suffrutescent; leaves rounded-cordate, 4 to 7 cm. long, short-acuminate, repand-dentate, pale beneath and finely stellate-pubescent; sepals lance-ovate; petals 12 mm. long; carpels finely tomentose.

20. *Abutilon malacum* S. Wats. Proc. Amer. Acad. 21: 446. 1886.

Chihuahua, Coahuila, and Durango. Western Texas and southern New Mexico; type from Texas.

Stems very minutely tomentose; leaves rounded-cordate, 4 to 9 cm. long, obtuse to short-acuminate, coarsely dentate, minutely tomentose; calyx lobes lance-ovate, acute or acuminate; petals orange, 7 to 9 mm. long; carpels 7 to 9 mm. long, stellate-tomentose.

21. *Abutilon trisulcatum* (Jacq.) Urban, Repert. Sp. Nov. Fedde 16: 32. 1919.

Sida trisulcata Jacq. Enum. Pl. Carib. 26. 1760.

Sida triquetra L. Sp. Pl. ed. 2. 963. 1763.

Abutilon triquetrum Sweet, Hort. Brit. 53. 1827.

? *Abutilon floribundum* Schlecht. Linnaea 11: 366. 1837.

Sonora to Tamaulipas, Yucatán, and Guerrero. Cuba; Nicaragua.

Stems herbaceous or suffrutescent, 1 to 2.5 meters high, obtusely trigonous, minutely tomentulose; leaves narrowly or broadly cordate, 4 to 15 cm. long, long-acuminate, crenate or subentire, grayish and minutely stellate-velutinous on both surfaces; calyx lobes ovate, acuminate; petals yellow, 5 mm. long; carpels 6 to 8 mm. long. "Amantillo" (Jalisco, *Oliva*); "sacxin" (Yucatán, *Dondé*); "tronador" (Colima).

Palmer reports that in Colima the fiber extracted from the stems is utilized in making rope, hammocks, and nets. The stems are buried in mud for three or four days, then washed, and the bark (which contains the fiber) stripped from the stems by hand.

22. *Abutilon incanum* (Link) Sweet, Hort. Brit. 53. 1827.

Sida incana Link, Enum. Pl. 2: 204. 1822.

Abutilon ramosissimum Presl, Rel. Haenk. 2: 116. 1836.

Abutilon texense Torr. & Gray, Fl. N. Amer. 1: 231. 1838.

Baja California and Sonora to Nuevo León, San Luis Potosí, and Sinaloa. Hawaii.

Shrub, 2.5 meters high or less, the stems minutely tomentose; leaves broadly cordate, 1.5 to 6 cm. long, obtuse to acuminate, crenate or dentate, finely grayish-tomentose; sepals broadly ovate, mucronate; petals yellow or orange, often purple at base, 6 to 9 mm. long; carpels 6 to 7 mm. long, minutely tomentose. "Pelotazo chico" (Sinaloa).

This, like *A. trisulcatum*, is a source of fiber. *A. racemosum* Schlecht.¹ is probably a synonym of this species.

¹ Linnaea 11: 367. 1837.

23. *Abutilon sonorae* A. Gray, Pl. Wright. 2: 23. 1853.

Chihuahua and Sonora to Guerrero; type collected on the Sonoita, Sonora.

Stems 1 meter high or less, chiefly herbaceous, puberulent and long-pilose; leaves rounded-cordate, 7 to 18 cm. long, acuminate, usually subtrilobate, irregularly dentate, whitish-tomentose beneath; sepals broadly ovate, acute; petals yellow, about 6 mm. long; carpels 7 to 11, 8 to 10 mm. long, stellate-pubescent.

24. *Abutilon discolor* Baker f. Journ. Bot. Brit. & For. 31: 73. 1893.

San Luis Potosí and Tamaulipas (?); type from Tula, Tamaulipas (?).

Stems reddish or yellowish-pubescent; leaves acuminate, 4 to 10 cm. long, entire or nearly so, stellate-pubescent beneath; sepals lance-ovate to broadly ovate, acuminate; carpels reniform, stellate-hirsute.

25. *Abutilon reventum* S. Wats. Proc. Amer. Acad. 21: 418. 1886.

Chihuahua and Sonora to Oaxaca, Querétaro, and Zacatecas; type from Hacienda San José, Chihuahua. Southern Arizona.

Leaves broadly cordate or reniform-cordate, 6 to 25 cm. long, abruptly acuminate, sometimes shallowly trilobate, irregularly crenate or subentire, white beneath with a velutinous tomentum; petals deep orange, 10 to 12 mm. long; carpels about 8, 7 to 10 mm. long, stellate-pilosulous.

26. *Abutilon andrieuxii* Hemsl. Diag. Pl. Mex. 24. 1879.

Abutilon reticulatum Rose, Contr. U. S. Nat. Herb. 5: 171. 1899.

Tepic to Oaxaca and Puebla; type from Tlacolula, Oaxaca.

Shrub, 1 to 4.5 meters high; leaves rounded-cordate, 4 to 22 cm. long, acute or abruptly short-acuminate, sometimes shallowly trilobate, obscurely crenate or subentire, covered beneath with a fine whitish stellate tomentum; petals yellow, 12 to 15 mm. long; carpels 8 or 9, stellate-pilose, 1 cm. long.

27. *Abutilon xanti* A. Gray, Proc. Amer. Acad. 22: 301. 1887.

Southern Baja California; type from Cape San Lucas.

Shrub, 1 to 3.5 meters high; leaves rounded-cordate, 8 to 20 cm. long, short-acuminate, often shallowly trilobate, irregularly dentate or subentire, whitish beneath with a velutinous tomentum; petals 8 mm. long, pale yellow; carpels 1 cm. long, stellate-pilose.

28. *Abutilon thurberi* A. Gray, Mem. Amer. Acad. n. ser. 5: 307. 1854.

Type from Magdalena, Sonora.

Stems 30 to 60 cm. high; leaves ovate-cordate, 5 cm. long or less, green, thinly stellate-pubescent, serrate; calyx hirsute; petals orange-yellow; carpels sparsely hirsute.

29. *Abutilon membranaceum* Baker f. Contr. U. S. Nat. Herb. 3: 312. 1895.

Known only from the type locality, Tepic.

Stems slender, suffrutescent, sparsely pubescent; leaves broadly ovate, 5 to 12 cm. long, cuspidate-acuminate, rounded or subcordate at base, very thin, coarsely crenate-dentate, green and very sparsely stellate-pubescent; sepals ovate, acuminate; carpels stellate-hirtellous, 8 mm. long.

30. *Abutilon ellipticum* Schlecht. Linnaea 11: 368. 1837.

Abutilon attenuatum Robins. & Seat. Proc. Amer. Acad. 28: 104. 1893.

Jalisco, Michoacán, and Hidalgo; type from Tlalpujahua, Michoacán.

Slender shrub; leaves 4 to 7 cm. long, obtuse to long-acuminate, sometimes shallowly trilobate, crenate or serrate, green above, paler beneath and stellate-tomentose; sepals broadly ovate, cuspidate-acuminate; petals 8 to 10 mm. long; carpels 1 cm. long, stellate-hirsute, very long-beaked.

Abutilon erosum Schlecht.¹ is perhaps the same species.

¹Linnaea 11: 367. 1837.

31. *Abutilon giganteum* (Jacq.) Presl, Rel. Haenk. 2: 116. 1836.

Sida gigantea Jacq. Pl. Hort. Schönbr. 2: 8. pl. 141. 1797.

Sida elata Macfad. Fl. Jam. 87. 1837.

? *Abutilon mexicanum* Presl, Rel. Haenk. 2: 115. 1836.

Abutilon divaricatum Turcz. Bull. Soc. Nat. Moscou 31¹: 204. 1859.

Abutilon elatum Griseb. Fl. Brit. W. Ind. 79. 1859.

Veracruz and Guerrero. West Indies, Central America, and South America.

Shrub, 1 to 2 meters high; leaves broadly cordate, 6 to 18 cm. long, acute to long-acuminate, crenate or dentate, densely stellate-velutinous beneath; petals yellow, 1 to 1.5 cm. long; carpels 12 mm. long, stellate-pilose.

32. *Abutilon umbellatum* (L.) Sweet, Hort. Brit. 53. 1826.

Sida umbellata L. Syst. Nat. ed. 10. 2: 1145. 1759.

Jalisco to Oaxaca, and doubtless elsewhere; Yucatán (?). West Indies and South America.

Leaves broadly cordate, 4 to 9 cm. long, obtuse or acute, crenate or dentate, green, thinly stellate-pubescent beneath; petals yellow, about 1 cm. long; carpels stellate-hirsute, long-beaked.

33. *Abutilon hemsleyanum* Rose, Contr. U. S. Nat. Herb. 10: 123. 1906.

Abutilon sidoides Hemsl. Diag. Pl. Mex. 24. 1879. Not *A. sidoides* Dalz. & Gibbs. 1861.

Jalisco to San Luis Potosí, Mexico, and Oaxaca; type from the region of San Luis Potosí.

Stems 1 to 1.5 meters high, stellate-pubescent; leaves lance-ovate to broadly ovate, 5 to 14 cm. long, acute to long-acuminate, crenate or dentate, green beneath but rather densely stellate-pubescent; sepals broadly ovate, acuminate; petals 8 to 10 mm. long; carpels hispid-stellate, with very long beaks.

Probably not sufficiently distinct from *A. umbellatum*.

34. *Abutilon palmeri* A. Gray, Proc. Amer. Acad. 8: 289. 1870.

Abutilon macdougalii Rose & Standl. Contr. U. S. Nat. Herb. 16: 13. pl. 4. 1912.

Baja California and Sonora; type from Sonora.

Stems hirsute and villosulous and somewhat viscid; leaves broadly cordate, 4 to 10 cm. long, acute or acuminate, coarsely dentate, often shallowly trilobate, densely stellate-velutinous; sepals ovate, cuspidate-acuminate, long-pilose; carpels densely soft-pilose.

35. *Abutilon aurantiacum* S. Wats. Proc. Amer. Acad. 20: 357. 1885.

Baja California; type from Bahía de Todos Santos.

Leaves rounded-cordate, 3 to 13 cm. long, obtuse or acute, dentate and often shallowly trilobate, densely stellate-velutinous; calyx lobes broadly ovate, acute, pilose; petals orange; carpels about 10, 8 mm. long, pilose.

36. *Abutilon holwayi* Rose, Contr. U. S. Nat. Herb. 8: 318. 1905.

Abutilon durangense Rose & York, Contr. U. S. Nat. Herb. 10: 123. pl. 40. 1906.

Durango to Querétaro and Oaxaca; type from Oaxaca.

Stems viscid-pubescent; leaves ovate-cordate, 4 to 12 cm. long, acute or acuminate, crenate or subentire, densely stellate-tomentose beneath; sepals broadly ovate, acuminate; petals 1.5 cm. long or less.

37. *Abutilon dentatum* Rose, Contr. U. S. Nat. Herb. 8: 318. 1905.

Known only from the type locality, near the city of Chihuahua.

Leaves ovate-cordate, 6 to 10 cm. long, acuminate, dentate, densely stellate-tomentose beneath; sepals broadly ovate, cuspidate-acuminate.

DOUBTFUL SPECIES.

ABUTILON BLANDUM Fenzl, Del. Sem. Hort. Vindob. 1830. Type from Los Baños.

ABUTILON HAENKEANUM Presl, Rel. Haenk. 2: 115. 1836. Type from western Mexico.

5. **WISSADULA** Medic. Malvenfam. 24. 1787.

REFERENCE: R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 1-95. 1908.

Shrubs or herbs, with stellate pubescence; leaves petiolate, entire or dentate; flowers axillary or in terminal panicles; carpels usually 5, laterally constricted, commonly 3-seeded.

Leaves entire.

Leaves glabrous above or strigose with simple hairs-----1. *W. excelsior*.

Leaves minutely stellate-pubescent on the upper surface.

2. *W. amplissima*.

Leaves crenate-dentate.

Stamen tube short, hirsute; leaves not lobate; carpels 3.

Calyx tomentose, without long spreading hairs-----3. *W. tricarpellata*.

Calyx tomentose and long-pilose.

Branches finely tomentulose, not pilose-----4. *W. cincta*.

Branches tomentulose and long-pilose.

Seeds 4 in each carpel-----5. *W. gracilis*.

Seeds 3 in each carpel.

Leaves orbicular-cordate, abruptly acuminate; petals 10 mm. long.

6. *W. wissaduloides*.

Leaves ovate, long-attenuate; petals 7 mm. long--7. *W. hirsutiflora*.

Stamen tube elongate, glabrous; leaves often lobate or angulate; carpels 5.

Branches tomentose with stellate glandular hairs, and with long simple hairs above-----8. *W. trilobata*.

Branches stellate-tomentose, sometimes with short glandular hairs above.

Calyx lobes 4 to 7 mm. long, acuminate; carpels beaked.

9. *W. holosericea*.

Calyx lobes 1.5 mm. long, obtuse; carpels not beaked--10. *W. microcalyx*.

1. *Wissadula excelsior* (Cav.) Presl, Rel. Haenk. 2: 118. 1836.

Sida excelsior Cav. Monad. Diss. 27. pl. 5. f. 3. 1785.

Veracruz and Chiapas. Cuba, Central America, and South America.

Shrub; leaves ovate or oblong-ovate, the upper ones often subsessile, long-acuminate, stellate-pubescent beneath, the pubescence ferruginous along the nerves; flowers in lax panicles; petals yellowish, 4 mm. long; carpels 5, 8 mm. long, apiculate.

2. *Wissadula amplissima* (L.) R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 48. 1908.

Sida amplissima L. Sp. Pl. 685. 1753.

Wissadula mucronulata A. Gray in Torr. U. S. & Mex. Bound. Bot. 39. 1859.

Abutilon mucronulatum A. Gray, Proc. Amer. Acad. 5: 175. 1862.

Sinaloa to Tamaulipas, Morelos, and Oaxaca. Western Texas, Central America, South America, and Africa.

Shrub, 1.5 to 2.5 meters high; leaves broadly cordate, 5 to 15 cm. long, acuminate, densely stellate-tomentulose beneath; flowers axillary or paniculate; petals yellow, 4 to 6 mm. long; carpels 4 or 5, 6 to 10 mm. long, apiculate.

3. *Wissadula tricarpellata* Robins. & Greenm.; Rose, Contr. U. S. Nat. Herb. 5: 179. 1899.

Wissadula hirsutiflora tricarpellata R. E. Fries, Svensk. Vet. Akad. Handl. 43^a: 82. 1908.

Jalisco and Colima; type from Tequila, Jalisco.

Leaves ovate or broadly cordate, 3 to 8 cm. long, acuminate or long-acuminate, thinly stellate-pubescent beneath; petals 6 to 7 mm. long, purplish when dry; carpels not beaked.

4. *Wissadula cincta* (T. S. Brandeg.) Rose, Contr. U. S. Nat. Herb. 5: 178. 1899.

Abutilon cinctum T. S. Brandeg. Zoe 3: 348. 1893.

Wissadula incana T. S. Brandeg. Zoe 5: 210. 1905.

Sonora; type from Los Duraznillos.

Slender shrub; leaves broadly cordate, 1 to 2.5 cm. long, obtuse or acute, densely grayish-tomentose; flowers chiefly axillary; petals 7 mm. long, purplish, at least when dry; carpels 6 mm. long, not beaked.

5. *Wissadula gracilis* Hochr. Ann. Cons. Jard. Genève 6: 30. 1902.

Known only from the type locality, Tututepeque, Oaxaca.

Leaves ovate-cordate, 1 to 2 cm. long, acuminate, hirsute; flowers axillary; petals 1 cm. long.; carpels 8 mm. long.

6. *Wissadula wissaduloides* (Baker f.) Rose, Contr. U. S. Nat. Herb. 5: 179. 1899.

Abutilon wissaduloides Baker f. Contr. U. S. Nat. Herb. 3: 312. 1895.

Known only from the type locality, Imala, Sinaloa.

Leaves 5 to 8 cm. long, finely stellate-pubescent beneath; flowers axillary and paniculate; carpels 6 mm. long, not beaked.

7. *Wissadula hirsutiflora* (Presl) Rose, Contr. U. S. Nat. Herb. 1: 306. 1895.

Bastardia hirsutiflora Presl, Rel. Haenk. 2: 112. 1836.

Tepic and Guerrero; type from Acapulco, Guerrero.

Leaves 3 to 6 cm. long, densely stellate-tomentose; flowers chiefly axillary; carpels 5 to 6 mm. long, apiculate.

8. *Wissadula trilobata* (Hemsl.) Rose, Contr. U. S. Nat. Herb. 5: 178. 1899.

Abutilon trilobatum Hemsl. Diag. Pl. Mex. 24. 1879.

Wissadula acuminata Rose, Contr. U. S. Nat. Herb. 5: 144. 1897.

San Luis Potosí, Veracruz, Querétaro, Guanajuato, and Hidalgo; type from the region of San Luis Potosí.

Shrub or herb, 1 to 2 meters high; leaves broadly cordate, 5 to 17 cm. long, acuminate, coarsely dentate, often trilobate, stellate-tomentose beneath; flowers axillary and paniculate; petals 10 to 12 mm. long; carpels 9 mm. long, beaked.

9. *Wissadula holosericea* (Scheele) Garcke, Zeitschr. Naturw. 63: 124. 1890.

Abutilon holosericeum Scheele, Linnaea 21: 471. 1848.

Coahuila, Nuevo León, and Durango. Texas.

Leaves ovate to suborbicular, 6 to 20 cm. long, acute or acuminate, often trilobate, densely stellate-tomentose; flowers axillary or paniculate; petals yellow, 12 mm. long; carpels 8 mm. long, beaked.

10. *Wissadula microcalyx* Rose; R. E. Fries, Svensk. Vet. Akad. Handl. 43^a: 87. 1908.

Known only from the type locality, Tehuacán, Puebla.

Leaves ovate or orbicular-cordate, 7 to 18 cm. long, acute or acuminate, often shallowly trilobate, densely stellate-tomentose; flowers paniculate; petals about 1.5 cm. long, yellow.

DOUBTFUL SPECIES.

WISSADULA GLANDULOSA Rose, Contr. U. S. Nat. Herb. 10: 123. 1906. Type collected between Higuerillas and San Pablo, Querétaro. Probably a species of *Pseudabutilon*. Type not seen.

6. PSEUDABUTILON R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 96. 1908.

REFERENCE: R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 96-108. 1908.

Shrubs or herbs, with stellate pubescence; flowers axillary or in terminal spikes or panicles, ebracteolate; ovules 3; carpels 5 to 11, usually apiculate or rostrate, falsely 2-celled; seeds 3.

Carpels 10 or 11.

Carpels conspicuously short-beaked.....1. *P. paniculatum*.

Carpels not beaked.....2. *P. scabrum*.

Carpels 5.

Flowers in terminal spikelike panicles; fruit 8 mm. or less in diameter.

3. *P. spicatum*.

Flowers axillary or in loose panicles; fruit more than 10 mm. in diameter.

Branches long-pilose and tomentose.....4. *P. pringlei*.

Branches stellate-tomentose but not pilose.

Calyx in anthesis 10 mm. long.....5. *P. lozani*.

Calyx 6 mm. long or less.....6. *P. rosei*.

1. Pseudabutilon paniculatum (Rose) R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 104. 1908.

Wissadula paniculata Rose, Contr. U. S. Nat. Herb. 5: 178. 1899.

Sinaloa; type from Imala.

Slender shrub, 1.5 to 2.5 meters high; leaves broadly ovate-cordate, 9 cm. long or less, cuspidate-acuminate, crenate-dentate, green, sparsely stellate-pubescent; flowers paniculate; petals yellow, 1 to 1.8 cm. long; carpels 4 to 5 mm. long.

2. Pseudabutilon scabrum (Presl) R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 103. 1908.

Wissadula scabra Presl, Rel. Haenk. 2: 117. 1836.

Jalisco and probably elsewhere; type from some unknown locality.

Shrub, 2 to 2.5 meters high; leaves broadly cordate-ovate, 13 cm. long or less, cuspidate-acuminate, dentate, green, thinly stellate-pubescent; flowers paniculate; petals yellow, about 12 mm. long; carpels 6 to 7 mm. long.

3. Pseudabutilon spicatum (H. B. K.) R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 98. 1908.

Abutilon spicatum H. B. K. Nov. Gen. & Sp. 5: 271. 1821.

Wissadula spicata Presl, Rel. Haenk. 2: 117. 1836.

Wissadula elongata T. S. Brandeg. Zoe 5: 210. 1905.

Sinaloa to Guerrero. Cuba, Central America, and South America; type from the Río Negro.

Shrub or herb, 0.5 to 2 meters high; leaves reniform-cordate, 6 to 18 cm. long and wide, abruptly acuminate, obscurely dentate, often shallowly trilobate, green above, rather densely stellate-pubescent beneath; petals yellow, 6 to 7 mm. long; carpels 4 to 5 mm. long.

4. Pseudabutilon pringlei (Rose) R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 99. 1908.

Wissadula pringlei Rose, Contr. U. S. Nat. Herb. 3: 312. 1895.

Puebla and Oaxaca; type from the State of Oaxaca.

Shrub or herb, about a meter high; leaves broadly cordate, 5 to 7.5 cm. long, cuspidate-acuminate, crenulate, densely stellate-tomentose; petals 10 to 12 mm. long; carpels 8 to 10 mm. long, beaked.

The same or a closely related plant, of which only imperfect material is available, occurs in Tepic.

5. *Pseudabutilon lozani* (Rose) R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 100. 1908.

Wissadula lozani Rose, Contr. U. S. Nat. Herb. 10: 124. pl. 41. 1906.

Type from El Carrizo, Nuevo León. Also in western Texas.

Leaves broadly cordate, 5 to 11 cm. long, acute or obtuse, crenulate, densely stellate-tomentose; petals yellow, 10 to 12 mm. long; carpels 8 mm. long, short-beaked.

6. *Pseudabutilon rosei* R. E. Fries, Svensk. Vet. Akad. Handl. 43⁴: 102. 1908.

Wissadula conferta T. S. Brandeg. Zoe 5: 250. 1908.

Querétaro and Puebla; type from Tehuacán, Puebla.

Leaves broadly cordate, 6 to 12 cm. long, acute or obtuse, crenate, sometimes shallowly trilobate, densely stellate-tomentose; petals 8 mm. long; carpels 6 mm. long, not beaked.

7. **BASTARDIA** H. B. K. Nov. Gen. & Sp. 5: 254. 1821.

Shrubs or herbs; leaves cordate, petiolate; flowers yellow, axillary, the peduncles 1-flowered; bractlets none; carpels 5, 1-seeded.

Carpels slender-beaked.....1. *B. bivalvis*.
Carpels not beaked.....2. *B. viscosa*.

1. *Bastardia bivalvis* (Cav.) H. B. K. Nov. Gen. & Sp. 5: 255. 1821.

Sida bivalvis Cav. Monad. Diss. 13. pl. 11, f. 3. 1785.

Bastardia berlandieri A. Gray, Proc. Amer. Acad. 22: 295. 1887.

Michoacán to Oaxaca and Veracruz. Greater Antilles and South America.

Slender shrub, 1.5 to 2.5 meters high, the branches tomentose and viscid-pilose; leaves ovate-cordate, 1.5 to 6 cm. long, obtuse to acuminate, crenulate, densely stellate-tomentose beneath; petals about 8 mm. long; fruit 5-lobate, 8 mm. broad.

2. *Bastardia viscosa* (L.) H. B. K. Nov. Gen. & Sp. 5: 256. 1821.

Sida viscosa L. Syst. Nat. ed. 10. 2: 1145. 1759.

Tamaulipas and Veracruz; reported from Guerrero. West Indies and South America.

Shrub or herb, 0.5 to 1 meter high, the branches viscid-pubescent; leaves ovate-cordate, 2 to 6 cm. long, acuminate, sinuate-dentate, paler beneath and stellate-tomentulose; petals 6 mm. long; fruit about 6 mm. wide.

8. **GAYA** H. B. K. Nov. Gen. & Sp. 5: 266. 1821.

Shrubs or herbs; leaves toothed; flowers yellowish or purplish, chiefly solitary in the axils, sometimes racemose; carpels 8 or more, membranaceous, bivalvate, 1-seeded.

Carpels 25 to 30, 10 to 12 mm. long.....1. *G. occidentalis*.

Carpels 8 to 14, 6 mm. long or less.

Stems long-pilose.....2. *G. violacea*.

Stems puberulent or short-pilose.

Petals 5 to 6 mm. long.....3. *G. minutiflora*.

Petals 10 to 12 mm. long.....4. *G. calyptrata*.

1. *Gaya occidentalis* (L.) H. B. K. Nov. Gen. & Sp. 5: 208. 1821.

Sida occidentalis L. Amoen. Acad. 4: 325. 1759.

Tamaulipas and Veracruz. Cuba and Hispaniola.

Plants suffrutescent, about a meter high; leaves oblong to ovate, 1.5 to 6 cm. long, obtuse or acute, serrulate, densely stellate-tomentose; petals yellow, 1.5 to 2 cm. long.

2. *Gaya violacea* Rose, Contr. U. S. Nat. Herb. 12: 286. 1909.

Known only from the type locality, Sierra Madre near Monterrey, Nuevo León.

Shrub, 2 meters high or less; leaves ovate or lance-ovate, 6 to 9 cm. long, long-acuminate, coarsely crenate, green above, pale beneath and minutely stellate-pubescent; petals 8 mm. long; carpels 8 or 9.

3. *Gaya minutiflora* Rose, Contr. U. S. Nat. Herb. 1: 305. 1895.

Colima to Oaxaca and Morelos; type from Colima.

Slender shrub or herb; leaves ovate or ovate-oblong, 2 to 6.5 cm. long, acuminate, finely or coarsely crenate-dentate, thinly stellate-pubescent; carpels 9 or 10.

4. *Gaya calyptrata* (Cav.) H. B. K. Nov. Gen. & Sp. 5: 208. 1821.

Sida calyptrata Cav. Monad. Diss. 57. 1780.

Sida disticha Cav. Icon. Pl. 5: 12. pl. 57. 1799.

Gaya hermannioides H. B. K. Nov. Gen. & Sp. 5: 209. pl. 475. 1821.

Sida gaya DC. Prodr. 1: 466. 1824.

Gaya disticha Presl, Rel Haenk 2: 113, 1836.

Veracruz, Puebla, and Chiapas. Central America and South America.

Slender shrub or herb; leaves ovate to lance-oblong, 2 to 4 cm. long, obtuse to acuminate, finely or coarsely serrate, sparsely or densely stellate-pubescent; carpels 10 to 14.

9. **ROBINSONELLA** Rose & Baker, Gard. & For. 10: 244. 1897.

Shrubs or trees; leaves petiolate, entire, dentate, or lobate; flowers chiefly axillary, usually fasciculate, large and showy, ebracteolate; carpels membranaceous, inflated at maturity.

Leaves deeply 3 or 5-lobate-----1. **R. lindeniana**.

Leaves obscurely or not at all lobate.

Leaves covered beneath with a minute appressed pale silvery tomentum.

2. **R. discolor**.

Leaves loosely stellate-pubescent beneath, pilose along the nerves.

3. **R. cordata**.

1. *Robinsonella lindeniana* (Turcz.) Rose & Baker, Gard. & For. 10: 245. 1897.

Sida lindeniana Turcz. Bull. Soc. Nat. Moscou 31¹: 200. 1838.

Sida ghisbreghtiana Turcz. Bull. Soc. Nat. Moscou 31¹: 200. 1838.

Abutilon ambiguum Turcz. Bull. Soc. Nat. Moscou 31¹: 205. 1838.

Veracruz; type from Mirador.

Shrub, 2.5 to 3 meters high or larger; leaves 7 to 25 cm. wide, the lobes acute or acuminate, entire or dentate, green above, coarsely stellate-tomentose beneath; petals white, 7 to 8 mm. long; carpels 7 to 8 mm. long, not beaked, stellate-pubescent.

2. *Robinsonella discolor* Rose & Baker, Contr. U. S. Nat. Herb. 5: 181. 1899.

Known only from the type locality, Las Palmas, San Luis Potosí, altitude 90 to 120 meters.

Slender tree, 6 to 9 meters high; leaves broadly cordate to orbicular-cordate, 4 to 10 cm. long, acute or acuminate, green above; petals white, 8 mm. long; carpels about 12, 8 to 10 mm. long.

3. *Robinsonella cordata* Rose & Baker, Gard. & For. 10: 244. *f.* 31. 1897.

Durango to Puebla and Oaxaca; type from Tamazulapan, Oaxaca.

Tree, 4.5 to 9 meters high; leaves ovate-cordate, 4 to 13 cm. long, long-acuminate, crenate-dentate, glabrate above; petals white or purplish, 1.5 to 2.5 cm. long. "Guácima" (Durango).

10. *SIDA* L. Sp. Pl. 683. 1753.

Herbs or shrubs, with stellate-pubescent; leaves entire or toothed; flowers sessile or pedicellate, axillary, racemose, or paniculate, the pedicels often jointed; bractlets none; carpels 5 or more, 1-seeded, bivalvate or indehiscent.

Few of the species listed below are true shrubs, but it has appeared more satisfactory to list all of them here as a matter of record and convenience.

Flowers adnate to the petioles of leaflike bracts; petioles hirsute; flowers congested at the ends of the branches; carpels muricate.

Plants decumbent; leaves oblong to oval; petals 7 to 10 mm. long.

1. *S. ciliaris*.

Plants erect; leaves linear or oblong-linear; petals 12 to 15 mm. long.

2. *S. anomala*.

Flowers never adnate to the petioles of leaflike bracts; petioles usually not hirsute; flowers variously arranged; carpels not muricate.

Calyx terete.

Leaves entire, linear-----3. *S. linifolia*.

Leaves serrate or dentate.

Leaves cuneate at base, narrowly lanceolate.

Leaves glabrous on the upper surface; inflorescence naked or nearly so-----4. *S. lodiensis*.

Leaves densely stellate-pubescent on both surfaces; inflorescence densely leafy-----5. *S. stricta*.

Leaves all or mostly cordate at base, oblong to rounded-cordate.

Pedicels less than twice as long as the calyx in anthesis.

6. *S. pyramidata*.

Pedicels mostly more than three times as long as the calyx in anthesis.

Flowers in open panicles.

Leaves densely stellate-pilosulous, crenate-----7. *S. paniculata*.

Leaves green, sparsely and very minutely stellate-pubescent, lacinate-serrate-----8. *S. tehuacana*.

Flowers solitary in the leaf axils.

Leaves pilose on the upper surface with mostly simple hairs; upper leaves nearly sessile-----9. *S. filipes*.

Leaves minutely stellate-tomentose on the upper surface; upper leaves slender-petiolate-----10. *S. palmeri*.

Calyx conspicuously angulate.

Carpels 7 to 12.

Leaves, all or most of them, deeply cordate at base, ovate-cordate, densely stellate-velutinous.

Stems and calyx pilose with long, slender hairs-----11. *S. setifera*.

Stems and calyx finely stellate-tomentose-----12. *S. cordifolia*.

Leaves cuneate to rounded at base, rarely shallowly cordate, never velutinous.

Carpels each with 2 long retrorsely barbed awns---13. *S. salviaefolia*.

Carpels not awned, or the awns short and not barbed.

Leaves linear or linear-oblong.

Carpels rounded at apex; leaves pubescent on the upper surface.

14. *S. neomexicana*.

Carpels acute or short-awned; leaves usually glabrous on the upper surface-----15. *S. lindheimeri*.

Leaves broader than linear-oblong, often ovate.

Pedicels jointed below the middle; leaves distichous--16. *S. acuta*.

Pedicels jointed above the middle, or sometimes not jointed; leaves not distichous.

Flowers chiefly racemose, the subtending leaves bractlike.

17. *S. xanti*.

Flowers axillary.

Pedicels much longer than the subtending leaves.

18. *S. potosina*.

Pedicels all or mostly shorter than the leaves.

Stems and calyx sparsely hirsute; leaves shallowly cordate at base-----19. *S. tragiaefolia*.

Stems and calyx not hirsute; leaves cuneate or rounded at base.

Calyx lobes acute and mucronate; stipules not ciliate.

20. *S. rhombifolia*.

Calyx lobes cuspidate-acuminate; stipules long-ciliate.

21. *S. corymbosa*.

Carpels 5 or sometimes 6.

Flowers densely glomerate in the leaf axils or on the branches of a panicle.

Leaves hirsute beneath-----22. *S. urens*.

Leaves stellate-velutinous beneath-----23. *S. aggregata*.

Flowers solitary in the axils or loosely paniculate, never in dense glomerules.

Leaves rounded or obtuse at base, rarely subcordate, oblong or linear-oblong -----24. *S. angustifolia*.

Leaves cordate at base, usually deeply so, broader than oblong.

Leaves mostly rounded or obtuse at apex, rarely acute, usually 2 cm. long or less-----25. *S. procumbens*.

Leaves acuminate or long-acuminate, usually much more than 2 cm. long.

Leaves very asymmetric at base-----26. *S. decumbens*.

Leaves symmetric at base.

Stems viscid-pilose above-----27. *S. glutinosa*.

Stems usually without viscid pubescence-----28. *S. glabra*.

1. *Sida ciliaris* L. Syst. Nat. ed. 10. 1145. 1759.

Sida muricata Cav. Icon. Pl. 6: 78. pl. 597, f. 1. 1801.

Sinaloa and Jalisco to Oaxaca and Yucatán. Texas, West Indies, Central America, and South America.

Plants chiefly herbaceous and spreading, the branches stellate-strigose; leaves mostly 1 to 2 cm. long, obtuse, rounded at base, serrate, glabrous above, stellate-pubescent beneath; bracts subulate, long-ciliate; petals copper-colored; carpels about 7.

2. *Sida anomala* St. Hil. Fl. Bras. Merid. 1: 177. pl. 33. 1825.

Tepic and probably elsewhere. Central America and South America.

Stems chiefly or wholly herbaceous, strigose; leaves 1 to 3 cm. long, obscurely serrate, obtuse or acute, glabrous above; petals purplish.

3. *Sida linifolia* Juss.; Cav. Monad. Diss. 14. pl. 2, f. 1. 1785.

Sida longifolia T. S. Brandeg. Zoe 5: 212. 1905.

Sinaloa and Jalisco to Guerrero and Veracruz. West Indies, Central America, South America, and tropical Africa.

Plants chiefly herbaceous, erect, the stems sparsely pilose; leaves short-petiolate, 3 to 9 cm. long, acute, sparsely hirsute or glabrate; flowers pedicellate, in small corymbs or short racemes at the ends of the branches; petals white or yellowish, 7 to 10 mm. long; carpels about 7, not beaked.

4. *Sida lodiegensis* Baker f. Contr. U. S. Nat. Herb. 3: 311. 1895.

Sinaloa; type from Lodiago.

Plants tall and much branched, the stems minutely stellate-pubescent; leaves short-petiolate, 3 to 11 cm. long, alternate, obscurely serrate, sparsely and minutely stellate-pubescent beneath; flowers subracemose; petals about 4 mm. long; carpels 5.

5. *Sida stricta* Standl., sp. nov.

Sinaloa and Tepic; type from Mazatlán, Sinaloa (*Rose, Standley & Russell* 14110; U. S. Nat. Herb. no. 636966).

Stems fruticose below, about 1 meter high, densely stellate-pubescent with fulvous hairs; leaves short-petiolate, 2 to 6 cm. long, acute, thick, serrate, 3-nerved, very densely stellate-tomentose; flowers axillary, the pedicels 1 cm. long or less; calyx lobes acute, densely stellate-pubescent; petals 4 mm. long, bright yellow; carpels 5, not beaked.

6. *Sida pyramidata* Desport.; Cav. Monad. Diss. 11. pl. 1, f. 10. 1785.

Sida dumosa Swartz, Prodr. Veg. Ind. Occ. 101. 1788.

Sida hilariana Presl, Rel. Haenk. 2: 107. 1836.

Sida cinerea Baker f. Contr. U. S. Nat. Herb. 3: 311. 1895.

Tepic to Guerrero, Puebla, and Veracruz. West Indies, Central America, and Colombia; type from Santo Domingo.

Slender shrub, 1 to 3 meters high, the branches very minutely stellate-pubescent; leaves long-petiolate, rounded-cordate, 4 to 15 cm. long, abruptly acute or acuminate, crenate or dentate, minutely stellate-pubescent or glabrate; calyx loosely stellate-pubescent and usually pilose; petals yellow, 7 to 8 mm. long; carpels about 7, not beaked.

7. *Sida paniculata* L. Syst. Nat. ed. 10. 1145. 1759.

Veracruz and Oaxaca. West Indies, Central America, and South America.

Slender erect shrub or herb, the branches densely stellate-pubescent with coarse fulvous hairs; leaves short-petiolate, ovate or lance-ovate, 4.5 to 11 cm. long, acuminate, densely pubescent; flowers in loose glabrate panicles, the pedicels filiform; petals red, 3 to 4 mm. long; carpels 5, not beaked.

8. *Sida tehuacana* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 274. 1912.

Known only from the type locality, Tehuacán, Puebla.

Stems purplish, glabrate; leaves slender-petiolate, ovate or deltoid-lanceolate, 3 to 4 cm. long, acuminate, glabrate; inflorescence loosely paniculate, glabrate, the pedicels filiform; petals purple, 8 mm. long; carpels 7, not beaked.

9. *Sida filipes* A. Gray, Bost. Journ. Nat. Hist. 6: 164. 1850.

Coahuila, Nuevo León, and Tamaulipas. Texas; type collected near Austin.

Low slender shrub, the branches finely stellate-pubescent; leaves short-petiolate, linear-oblong to lance-oblong, 2 to 7 cm. long, obtuse, cordate at base, crenate; pedicels filiform, about as long as the leaves; petals purple, 4 to 5 mm. long; carpels about 8, not beaked.

10. *Sida palmeri* Baker f. Journ. Bot. Brit. & For. 30: 295. 1892.

Sphaeralcea fruticosa T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 275. 1912.

San Luis Potosí; type collected between San Luis Potosí and Tampico.

Slender shrub, the branches minutely stellate-pubescent; leaves oblong or lance-oblong, 1 to 3.5 cm. long, obtuse or rounded at apex, finely crenate; pedicels very long and slender; petals purple, 10 to 12 mm. long; carpels about 10, not beaked.

11. *Sida setifera* Presl, Rel. Haenk. 2: 105. 1836.

Sonora to Tepic; type from western Mexico.

Slender shrub, the stems minutely stellate-tomentulose and long-pilose; leaves long-petiolate, broadly ovate-cordate, 1.5 to 7.5 cm. long, acute or obtuse, crenate or dentate, densely stellate-velutinous; flowers short-pedicellate, glomerate; calyx long-pilose; petals yellow, 7 to 8 mm. long; carpels not beaked.

12. *Sida cordifolia* L. Sp. Pl. 684. 1753.

Sonora to Guerrero, Veracruz, and Tamaulipas. West Indies, Central America, South America, and tropical Asia and Africa.

Shrub or herb, the branches stellate-tomentose; leaves long-petiolate, broadly cordate or rounded-cordate, 1.5 to 10 cm. long, acute or obtuse, crenate, often angulate, densely stellate-tomentose, at least beneath; flowers mostly glomerate; petals salmon-pink, 6 to 8 mm. long; carpels not beaked.

In India the roots are reputed to have astringent and tonic properties, and are employed for fevers and nervous and urinary affections. In some parts of Africa they are used as a remedy for rheumatism, because of their supposed diuretic properties. The leaves are employed in India for ophthalmia and the juice of the root for ulcers, and aphrodisiac properties are ascribed to the plant.

13. *Sida salviaefolia* Presl, Rel. Haenk. 2: 110. 1836.

Sida erecta Macfad. Fl. Jam. 1: 80. 1837.

Sida holwayi Baker & Rose, Contr. U. S. Nat. Herb. 5: 176. 1899.

Sinaloa to Guerrero and Morelos. Jamaica, Porto Rico, and Colombia.

Plants chiefly herbaceous, erect, the branches minutely stellate-pubescent; leaves oblong or lance-oblong, 1 to 3 cm. long, obtuse, finely stellate-pubescent beneath, crenate-serrate; flowers subracemose; calyx 5 to 6 mm. long.

14. *Sida neomexicana* A. Gray, Proc. Amer. Acad. 22: 296. 1887.

Chihuahua to Durango, Jalisco, and San Luis Potosí. Western Texas to southern Arizona; type from Santa Rita, New Mexico.

Stem unusually herbaceous and 30 cm. high or less, minutely stellate-pubescent; leaves 1.5 to 4 cm. long, obtuse or acute, serrate, finely stellate-pubescent but green; flowers pedicellate, borne chiefly at the ends of the branches; petals orange, turning purplish, about 1 cm. long.

15. *Sida lindheimeri* Engelm. & Gray, Bost. Journ. Nat. Hist. 5: 213. 1845.

Coahuila to Veracruz and Chiapas. Louisiana and Texas; type from Texas.

Stems chiefly herbaceous, minutely stellate-pubescent or glabrate; leaves short-petiolate, 1.5 to 4 cm. long, obtuse or acute, serrate, minutely stellate-

pubescent beneath; flowers long-pedicellate, borne chiefly in the upper axils; petals yellow, 12 to 14 mm. long.

It is this species, probably, which has been reported from Mexico as *S. elliotii* Torr. & Gray.

16. *Sida acuta* Burm. Fl. Ind. 147. 1768.

Sida carpinifolia L. f. Suppl. Pl. 307. 1781.

Sonora to Tamaulipas, Yucatán, and Oaxaca. Widely distributed in tropical and subtropical regions.

Herb or shrub, sometimes 3 meters high, the stem minutely stellate-pubescent or glabrate; leaves short-petiolate, lanceolate to elliptic, 2 to 10 cm. long, acute, serrate, green and usually glabrate; stipules linear, green, persistent; flowers axillary, short-pedicellate; petals yellow or nearly white, 8 to 12 mm. long; carpels short-awned or merely acute. "Malva colorada" (Sinaloa); "malva del platanillo" (Veracruz); "chichibé" (Yucatán, Maya); "escoba blanca" (Porto Rico); "escoba," "escobo," "escoba babosa," "escobilla" (Colombia); "malva de caballo" (Cuba); "escobita dulce" (Santa Domingo).

The branches of this and other species of *Sida* are often used in Mexico for making rough brooms. In Yucatán the bark fiber is used for the manufacture of twine and hammocks. The plant is said to furnish good forage for horses and sheep. The leaves and young shoots rubbed in water give a lather which may be used for shaving, especially in the case of a tender and irritable skin. In India the roots are esteemed for their stomachic properties, and they are employed as a remedy for ague, dysentery, intermittent fevers, and snake bites.

17. *Sida xanti* A. Gray, Proc. Amer. Acad. 22: 296. 1887.

Baja California and Sinaloa; type from Cape San Lucas, Baja California.

Plants erect, herbaceous or suffrutescent, the branches stellate-pubescent and viscid or glabrate; leaves slender-petiolate, lanceolate or lance-ovate, 3 to 10 cm. long, obtuse to acuminate, dentate, green, sparsely stellate-pubescent beneath; petals 1.5 to 2 cm. long.

18. *Sida potosina* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 184. 1911.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Stems suffrutescent, 30 to 40 cm. long, stellate-pubescent; leaves short-petiolate, ovate-elliptic, 2 to 3 cm. long, obtuse or rounded at apex, crenate-dentate, stellate-pubescent; pedicels 5 to 9 cm. long; petals yellow, 7 mm. long; carpels not awned.

19. *Sida tragiaefolia* A. Gray, Bost. Journ. Nat. Hist. 6: 164. 1850.

Coahuila to Tamaulipas. Western Texas.

Plants chiefly herbaceous; leaves slender-petiolate, oblong or lance-oblong, 1.5 to 5 cm. long, obtuse, coarsely dentate, stellate-pilose beneath; flowers long-pedicellate; petals orange-yellow, 10 to 12 mm. long; carpels mucronate.

20. *Sida rhombifolia* L. Sp. Pl. 684. 1753.

Nearly throughout Mexico, at least at low altitude. Widely distributed in tropical or subtropical regions.

Plants herbaceous or shrubby, often 2 meters high, the stems minutely stellate-pubescent, leaves short-petiolate, oblong or lanceolate to rhombic-ovate or obovate, 2 to 8 cm. long, obtuse or acute, serrate, usually minutely and densely stellate-tomentulose beneath; petals pale yellow, about 6 mm. long; carpels very shortly awned or merely acute. "Huinari," "huinar," "huinare" (Michoacán, Jalisco); "axocatzin" (Ramírez); "escoba amarilla" (Nicaragua); "escobilla" (Costa Rica); "malva de cochino" (Cuba); "tebincha" (Argentina); "limpión" (Peru); "malva" (Santo Domingo).

The leaves are used in some parts of Mexico as a substitute for Chinese tea. The strong fiber of the bark is utilized for various purposes. The plants are much eaten by cattle, and they are very common weeds about houses and in fields. Maiden reports that in Australia fowls are sometimes killed by eating the ripe carpels, the sharp points irritating the digestive canal and causing inflammation. In Costa Rica a decoction of the roots is used as a remedy for infantile diarrhea.

- 21. *Sida corymbosa*** R. E. Fries, Bull. Herb. Boiss II. 7: 998. 1907.

Tepic to Veracruz; type from the region of Orizaba, Veracruz.

Plants suffrutescent, the stems stellate-hirsutulous; leaves short-petiolate, oblong or lance-oblong, 3 to 7 cm. long, acute or obtuse, serrate, pilose above, coarsely stellate-pubescent beneath; flowers long-pedicellate; calyx 1 cm. long; petals about 8 mm. long.

This species was reported from Mexico by Hemsley as *S. glomerata* Cav.

- 22. *Sida urens*** L. Syst. Nat. ed. 10. 1145. 1759.

Veracruz. West Indies, Central America, South America, and tropical Africa.

Stems herbaceous or suffrutescent, hispid; leaves long-petiolate, ovate-cordate or lance-ovate, 2 to 12 cm. long, acuminate, dentate or serrate, green; calyx hispid; petals purplish, little exceeding the calyx; carpels not beaked.

- 23. *Sida aggregata*** Presl, Rel. Haenk. 2: 106. 1830.

Guerrero. Panama; reported from Jamaica and Venezuela.

Slender shrub, the branches minutely tomentulose; leaves broadly cordate, 4 to 10 cm. long, acute, crenate; calyx densely long-pilose; petals 4 mm. long; carpels not beaked.

- 24. *Sida angustifolia*** Lam. Encycl. 1: 4, 1783.

Sida linearis Cav. Icon. Pl. 4: 6. pl. 314, f. 1. 1797.

Sida hyssopifolia Presl, Rel. Haenk. 2: 109. 1836.

Tepic to Tamaulipas, Veracruz, and Oaxaca. Texas and Arizona, Central America, South America, and the tropics of the Old World.

Plants herbaceous or frutescent, the stems and leaves minutely stellate-tomentulose; leaves on long or short petioles, acute or obtuse, crenate or serrate; flowers short-pedicellate; petals pale yellow, 4 to 6 mm. long; carpels 2-awned.

This has often been reported from Mexico as *S. spinosa* L.

- 25. *Sida procumbens*** Swartz, Prodr. Veg. Ind. Occ. 101. 1788.

Sida pilosa Cav. Monad. Diss. 1: 9. pl. 1, f. 8. 1785. Not *S. pilosa* Mill. 1768.

Sida supina L'Hér. Stirp. Nov. 5: 109 bis. pl. 52 bis. 1789.

Sida diffusa H. B. K. Nov. Gen. & Sp. 5: 257. 1821.

Sida filiformis Moric. Pl. Amer. Rar. 10. pl. 8. 1830.

Sonora and Chihuahua to Tamaulipas, Yucatán, and Oaxaca. Texas to Arizona, and in the West Indies, Central America, and northern South America.

Stems chiefly herbaceous and decumbent, stellate-pubescent and usually pilose; leaves ovate-oblong to rounded-ovate, obtuse or rounded at apex, crenate; flowers on filiform pedicels; petals yellow, 6 to 8 mm. long; carpels apiculate or short-beaked.

- 26. *Sida decumbens*** St. Hil. & Naud. Ann. Sci. Nat. II. 18: 51. 1842

Guerrero. Guatemala and South America; type from Brazil.

Stems chiefly herbaceous and decumbent, long-pilose; leaves long-petiolate, obliquely ovate-cordate, 2 to 7.5 cm. long, acute or acuminate, crenate, thin, green, sparsely hirsute; petals 6 mm. long; carpels not beaked.

27. *Sida glutinosa* Commers.; Cav. *Monad. Diss.* 16. *pl.* 2, *f.* 8. 1785.

Sida endlicheriana Presl, *Rel. Haenk.* 2: 111. 1836.

Sonora and Durango to Oaxaca. West Indies, Central America, South America, and tropical Asia and Africa.

Stems herbaceous or suffrutescent, viscid-pilose; leaves ovate-cordate, 2 to 7 cm. long, acute or acuminate, crenate or serrate, thin, green; flowers long-pedicellate; petals yellow or white, 3 to 5 mm. long; carpels not beaked.

28. *Sida glabra* Mill. *Gard. Dict.* ed. 8. *Sida* no. 14. 1768.

Sida ulmifolia Cav. *Monad. Diss.* 1: 15. *pl.* 2, *f.* 4. 1785.

Sida arguta Swartz, *Prodr. Veg. Ind. Occ.* 101. 1788.

Sida alamosana S. Wats. *Proc. Amer. Acad.* 26: 133. 1891.

Sonora to Veracruz and Oaxaca. West Indies, Central America, and Venezuela.

Stems chiefly herbaceous, sometimes 2 meters high, usually long-pilose; leaves lanceolate, lance-ovate, or ovate-cordate, 3 to 8 cm. long, acuminate, crenate or serrate, thin, green; flowers long-pedicellate; petals little exceeding the calyx; carpels not beaked. "Escobita dulce" (Porto Rico).

DOUBTFUL SPECIES.

SIDA BRACHYSTEMON DC. *Prodr.* 1: 459. 1824. Type from Mexico.

SIDA CARNEA DC. *Prodr.* 1: 473. 1824. Type from Mexico.

SIDA COLLINA Schlecht. *Linnaea* 11: 364. 1837. Type from Hacienda de la Laguna, Veracruz.

SIDA COSTATA Schlecht. *Linnaea* 11: 365. 1837. Type from Hacienda de la Laguna, Veracruz.

SIDA VENUSTA Schlecht. *Linnaea* 11: 365. 1837. Type from Tlalpujahua.

11. *SPHAERALCEA* St. Hil. *Fl. Bras. Merid.* 1: 209. 1825.

Shrubs or small trees, with stellate pubescence; leaves long-petiolate, shallowly or deeply lobate; flowers large, purplish red, axillary, on long-peduncles; bractlets 3; fruit of numerous carpels, these 2 or 3-seeded, not awned.

Several herbaceous species of the genus occur in Mexico, and some of the species not listed here may become suffrutescent at times, but they are essentially herbaceous.

Bractlets united below the middle, ovate; flowers 5.5 to 6.5 cm. long.

1. *S. rosea*.

Bractlets spatulate, distinct; flowers 4 cm. long or shorter.

Bractlets equaling the calyx, gradually narrowed below-----2. *S. crenulata*.

Bractlets shorter than the calyx, abruptly narrowed below into a narrow claw-----3. *S. umbellata*.

1. *Sphaeralcea rosea* (DC.) Standl.

Malva rosea DC. *Prodr.* 1: 435. 1824.

Meliphlea vitifolia Zucc. *Abh. Akad. Wiss. München* 2: 359. *pl.* 9. 1832-36.

Malvastrum roseum Hemsl. *Biol. Centr. Amer. Bot.* 1: 100. 1879.

Sphaeralcea vitifolia Hemsl. *Biol. Centr. Amer. Bot.* 1: 114. 1879.

Michoacán to Chiapas. Guatemala.

Leaves 5 to 18 cm. long, shallowly or deeply lobate, deeply cordate at base, coarsely stellate-tomentose, the lobes acute or acuminate, irregularly crenate-dentate; calyx densely stellate-tomentose, 3 to 4 cm. long; carpels numerous, thin, 2 cm. long.

2. *Sphaeralcea crenulata* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 384. 1909.

Known only from the type locality, Cerro de Paxtle, near San Luis Tultitlanapa, Puebla.

Leaves 4 to 6 cm. long, angulate or shallowly lobate, finely stellate-pubescent, the lobes obtuse, irregularly crenate and dentate; calyx 1 to 1.5 cm. long; petals 3 cm. long or less.

3. *Sphaeralcea umbellata* (Cav.) Don, Hist. Dichl. Pl. 1: 465. 1831.

Malva umbellata Cav. Icon. Pl. 1: 64. pl. 95. 1791.

Sphaeralcea galeottii Turcz. Bull. Soc. Nat. Moscou 31¹: 186. 1858.

San Luis Potosí to Puebla.

Shrub or tree, 1.5 to 6 meters high; leaves 6 to 22 cm. long, cordate at base, coarsely stellate-pubescent beneath, shallowly lobate, the lobes acute or acutish, sinuate-dentate; calyx about 2 cm. long; carpels 1.5 cm. long, stellate-hirsute.

12. LAVATERA L. Sp. Pl. 690. 1753.

Shrubs with stellate pubescence; leaves angulate or lobate; peduncles 1-flowered, axillary, solitary or fasciculate; bractlets coalescent, forming a 3 to 6-lobate involucre; carpels numerous, 1-seeded, verticillate about a prominent axis.

An interesting general account of the American species has been published by E. L. Greene.¹ The roots of *L. plebeia* Sims, which somewhat resemble parsnips, are used as food by the natives of Australia. The fiber of the same species was utilized by the aborigines for the manufacture of baskets and fishing lines, and the stems have been tested successfully for paper making.

Leaves glabrous or essentially so.....1. *L. venosa*.

Leaves finely stellate-pubescent.

Axis of the fruit not equaling the carpels.....2. *L. assurgentiflora*.

Axis of the fruit conic, much exceeding the carpels.

Bractlets more than half as long as the calyx, conspicuously united at base.....3. *L. occidentalis*.

Bractlets less than half as long as the calyx, nearly distinct.

4. *L. insularis*.

1. *Lavatera venosa* S. Wats. Proc. Amer. Acad. 12: 249. 1877.

Known only from San Benito Island, Baja California.

Shrub, glabrous throughout or nearly so; leaves 7 to 15 cm. long, green, usually 7-lobed, the lobes obtuse, coarsely crenate; petals 4 cm. long, white below, violet above; carpels 4 mm. long.

2. *Lavatera assurgentiflora* Kellogg, Proc. Calif. Acad. 1: 14. 1854.

Northern Baja California. California; type from Anacapa Island.

Shrub, 3 meters high or less; leaves long-petiolate, 5 to 13 cm. long, finely stellate-pubescent, deeply cordate at base, usually 5-lobate, the lobes irregularly dentate or lobate; peduncles long and slender; bractlets less than half as long as the calyx; petals 3 to 4 cm. long, deep pink, veined with red.

A handsome plant, often cultivated in Mexico (specimens have been seen from the City of Mexico, Puebla, and Veracruz).

3. *Lavatera occidentalis* S. Wats. Proc. Amer. Acad. 11: 124. 1876.

Known only from Guadalupe Island, Baja California.

Shrub, about a meter high; leaves 7 to 12 cm. long, 7-lobate, the lobes acute or obtuse, coarsely crenate; petals 5 cm. long, whitish, striped with violet; carpels 6 to 10.

¹ Gard. & For. 3: 378-379. 1890.

4. *Lavatera insularis* S. Wats. Proc. Amer. Acad. 12: 249. 1877.

Known only from Coronado Island, Baja California.

Leaves 7 to 15 cm. wide, 7-lobate, the lobes obtuse, coarsely crenate; petals 3 to 4 cm. long, yellowish, striped with purple; carpels about 10.

13. *MALVASTRUM* A. Gray, Mem. Amer. Acad. n. ser. 4: 21. 1849.

Herbs or shrubs, with stellate pubescence; leaves often lobate; flowers white, yellow, or red, axillary or terminal, each subtended by 1 to 3 bractlets; carpels 5 or more, 1-seeded, indehiscent or bivalvate.

There are several Mexican species which are wholly herbaceous. Those listed here are hardly true shrubs.

Petals 1.5 to 2 cm. long, red or pink.

Calyx stellate-hispid-----1. *M. densiflorum*.

Calyx finely stellate-pubescent-----2. *M. fasciculatum*.

Petals 1 cm. long or less, variously colored.

Stems strigose, the hairs 4-rayed, the rays in approximate pairs directed forward and backward-----3. *M. coromandelianum*.

Stems with pubescence of branched hairs, the rays usually more than 4, radiately divaricate.

Carpels bicuspidate-----4. *M. bicuspidatum*.

Carpels rounded on the back, not bicuspidate.

Carpels strigose or hispid above; leaves not lobate; flowers chiefly in terminal spikes-----5. *M. spicatum*.

Carpels glabrous, rarely finely stellate-pubescent when young; leaves usually shallowly or deeply lobate; flowers chiefly in axillary clusters.

Stems soon glabrous or nearly so-----6. *M. lacteum*.

Stems densely stellate-pubescent-----7. *M. ribifolium*.

1. *Malvastrum densiflorum* S. Wats. Proc. Amer. Acad. 17: 368. 1882.

Northern Baja California. Southern California; type from San Jacinto Mountains.

Stems 1 meter high or less, suffrutescent; leaves round-cordate, 1.5 to 4 cm. long, obtuse or rounded at apex, crenate-dentate, often shallowly trilobate, stellate-pubescent; carpels glabrous.

2. *Malvastrum fasciculatum* (Nutt.) Greene, Fl. Franc. 108. 1891.

Malva fasciculata Nutt.; Torr. & Gray, Fl. N. Amer. 1: 226. 1838.

Malvastrum thurberi A. Gray, Mem. Amer. Acad. n. ser. 5: 307. 1855.

Malacothamnus fasciculatus Greene, Leaflets 1: 208. 1906.

Northern Baja California and Sonora; type from Sonora. Southern Arizona and California.

Herbaceous or shrubby, sometimes 4.5 meters high; leaves rounded-subcordate, 2 to 5 cm. long, obtuse or rounded at apex, often obscurely lobate, finely stellate-pubescent; inflorescence nearly naked; carpels stellate-pubescent.

3. *Malvastrum coromandelianum* (L.) Garcke, Bonplandia 5: 295. 1857.

Malva coromandeliana L. Sp. Pl. 687. 1753.

Malva tricuspidata Ait. Hort. Kew. ed. 2. 4: 210. 1812.

Malvastrum tricuspidatum A. Gray, Pl. Wright. 1: 16. 1852.

Sonora and Chihuahua to Tamaulipas, Yucatán, and Oaxaca. Widely distributed in tropical and subtropical regions.

Plants essentially annual but often becoming fruticose; leaves chiefly rhombic-ovate, often broadly so, 2 to 5 cm. long, obtuse or rounded at apex, usually rounded at base, crenate-dentate, green, thinly strigose; flowers mostly axillary

and solitary, short-pedunculate; petals yellow; carpels hispid. "Escoba blanca," "escobita dulce" (Porto Rico).

4. *Malvastrum bicuspidatum* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 12: 286. 1909.

Malvastrum tricuspidatum bicuspidatum S. Wats. Proc. Amer. Acad. 21: 417. 1886.

Chihuahua to Morelos, Oaxaca, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Plants usually fruticose, about 1 meter high, the stems reddish brown; leaves ovate or broadly ovate, 2 to 7 cm. long, acute, crenate-dentate, green, thinly or densely stellate-pubescent; petals yellow; carpels hispid. "Malva" (Sinaloa).

5. *Malvastrum spicatum* (L.) A. Gray, Mem. Amer. Acad. n. ser. 4: 22. 1849.

Malva spicata L. Syst. Nat. ed. 10. 1146. 1759.

Jalisco to Nuevo León, Veracruz, and Oaxaca. Widely distributed in tropical regions.

Plants sometimes 2 meters high; leaves rounded-ovate, 2 to 7 cm. long, obtuse, subcordate to obtuse at base, crenate-dentate, stellate-pubescent; calyx hirsute; petals yellow. "Malvavisco" (Port Rico).

6. *Malvastrum lacteum* (Ait.) Standl.

Malva lactea Ait. Hort. Kew. 2: 448. 1789.

Malva vitifolia Cav. Icon. Pl. 1: pl. 30. 1791.

Malvastrum vitifolium Hemsl. Biol. Centr. Amer. Bot. 1: 100. 1879.

Michoacán to Veracruz and Oaxaca. Guatemala.

Shrub, 1.5 to 2.5 meters high, the stems sometimes 5 cm. thick; leaves 5 to 12 cm. long, cordate at base, 3 or 5-lobate, the lobes acute or acutish, crenate-dentate, green, sparsely stellate-pubescent; flowers slender-pedicellate, in loose cymes; petals white.

7. *Malvastrum ribifolium* (Schlecht.) Hemsl. Biol. Centr. Amer. 1: 100. 1879.

Malva ribifolia Schlecht. Linnaea 11: 351. 1837.

Malva mexicana Schauer, Linnaea 20: 724. 1847.

Malvastrum mexicanum Hemsl. Biol. Centr. Amer. Bot. 1: 99. 1879.

Malvastrum schaffneri S. Wats. Proc. Amer. Acad. 25: 143. 1890.

Malvastrum greenmanianum Rose, Contr. U. S. Nat. Herb. 5: 180. 1899.

Coahuila to Mexico and Oaxaca; type from Mineral del Monte, Hidalgo. Central America.

Stems herbaceous or fruticose, sometimes 2.5 meters high; leaves 4 to 13 cm. long, usually shallowly 3 or 5-lobate, crenate-dentate, stellate-pubescent, the terminal lobe acute; flowers white, sessile or nearly so in dense axillary clusters.

14. MALACHE Vogel in Trew, Pl. Select. 50. 1772.

Shrubs or herbs; leaves often shallowly lobate; flowers axillary, paniculate, or subcapitate at the ends of long peduncles; bractlets 5 or more, usually distinct; petals spreading or erect; carpels 5, 1-seeded, often armed with spines, bivalvate or indehiscent.

Carpels with 1 or 3 long, retrorsely barbed awns at apex; leaves not cordate at base.

Carpels smooth on the back-----1. *M. rosea*.

Carpels transverse-rugose on the back.

Bractlets more than twice as long as the calyx-----2. *M. arachnoidea*.

Bractlets about equaling the calyx-----3. *M. spinifex*.

Carpels not awned; leaves cordate at base.

Petals erect; carpels of the fruit with fleshy pericarp—4. *M. malacophylla*.

Petals spreading; carpels dry.

Bractlets lanceolate or ovate.

Bractlets lanceolate, about twice as long as the calyx—5. *M. chiapensis*.

Bractlets ovate, equaling or shorter than the calyx—6. *M. nepetaefolia*.

Bractlets linear.

Fruit deeply lobed, the carpels scarcely coherent—7. *M. lasiopetala*.

Fruit not lobed, the carpels adnate to each other.

Calyx finely stellate-pubescent; bractlets not ciliate; stamen column with several large appendages at base—8. *M. melanommata*.

Calyx hirsute; bractlets long-ciliate; stamen column not appendaged.

Carpels glabrous or scaberulous—9. *M. paniculata*.

Carpels densely pubescent—10. *M. purpusii*.

1. *Malache rosea* (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 71. 1891.

Pavonia rosea Schlecht. Linnaea 11: 355. 1837.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas; type from Hacienda de la Laguna, Veracruz. West Indies, Central America, and South America.

Shrub, about a meter high, the branches stellate-pubescent; leaves short-petiolate, rhombic-obovate or obovate-oblong, 4 to 18 cm. long, acute or acuminate, dentate, minutely stellate-pubescent; flowers mostly clustered at the ends of long peduncles; bractlets linear; petals pink, about 12 mm. long. "Mozote" (Guatemala).

2. *Malache arachnoidea* (Presl) Kuntze, Rev. Gen. Pl. 1: 70. 1891.

Pavonia arachnoidea Presl, Rel. Haenk. 2: 129. 1836.

Guerrero; type from western Mexico, probably from Acapulco.

Stems slender, stellate-hirsute; leaves long-petiolate, ovate-lanceolate, 3 to 6.5 cm. long, long-acuminate, serrate-dentate, coarsely stellate-pubescent; flowers mostly axillary, long-pedicellate; bractlets subulate, hirsute; petals about 12 mm. long.

3. *Malache spinifex* (L.) Kuntze, Rev. Gen. Pl. 1: 70. 1891.

Hibiscus spinifex L. Syst. Nat. ed. 10. 1149. 1759.

Pavonia spinifex Cav. Monad. Diss. 133. 1787.

Pavonia lanceolata Schlecht. Linnaea 11: 356. 1837.

Veracruz and Oaxaca. Florida, West Indies, Central America, and South America.

Shrub or herb, 0.5 to 4 meters high, the branches pilosulous; leaves short-petiolate, oblong or lanceolate, 2 to 7 cm. long, acute, serrate, thinly pubescent; flowers mostly axillary, long-pedicellate; bractlets linear-lanceolate; petals yellow, 14 to 16 mm. long. "Cadillo espinoso" (Porto Rico); "pajarito amarillo" (Colombia); "cadillo amarillo" (Santo Domingo).

4. *Malache malacophylla* (Nees & Mart.) Standl.

Lopimia malacophylla Nees & Mart. in Curtis's Bot. Mag. pl. 4365. 1848.

Pavonia malacophylla Wright; Hemsl. Biol. Centr. Amer. Bot. 1: 117. 1879, as synonym.

Oaxaca. Cuba and South America.

Shrub, the branches densely stellate-tomentose; leaves rounded-cordate, 10 to 18 cm. long, acute or obtuse, often angulate, denticulate, velvety-tomentose; flowers chiefly axillary; bractlets about 18, linear, hirsute; petals purple-red, 3 to 3.5 cm. long.

In general appearance the plant is much like some species of *Malvaviscus*. It was reported by Hemsley as *Pavonia velutina* St. Hil.

5. *Malache chiapensis* Standl., sp. nov.

Type from Jiquipilas, Chiapas (*Goldman* 1037; U. S. Nat. Herb. no. 470832).

Shrub, the branches densely tomentose and somewhat viscid; leaves on long or short petioles, ovate-cordate, 2 to 4.5 cm. long, acute, crenate-dentate, densely-stellate-tomentose, the basal lobes usually overlapping; flowers axillary, long-pedicellate; bractlets usually 6, stellate-tomentose; petals yellow, 2 cm. long; carpels scabrous, somewhat rugose on the back.

6. *Malache nepetaefolia* Standl., sp. nov.

Coahuila and San Luis Potosí; type from General Cepeda, Coahuila (*Pringle* 13698; U. S. Nat. Herb. no. 462390).

Shrub, the branches finely stellate-pubescent; leaves slender-petiolate, deltoid-cordate or deltoid-oblong, 1.5 to 3.5 cm. long, obtuse, deeply cordate at base, coarsely crenate or near the base crenate-lobate, rather thinly stellate-pilosulous; flowers axillary, slender-pedicellate; bractlets usually 6, acute, stellate-pubescent; petals 12 to 14 mm. long; fruit deeply lobed, the carpels lightly coherent, indehiscent, finely pubescent.

7. *Malache lasiopetala* (Scheele) Kuntze, Rev. Gen. Pl. 1: 70. 1891.

Pavonia lasiopetala Scheele, Linnaea 21: 470. 1848.

Pavonia wrightii A. Gray, Gen. Fl. Amer. 2: 76. pl. 130. 1849.

Coahuila and Nuevo León; reported from Hidalgo. Western Texas; type from Texas.

Shrub, the branchlets pilosulous; leaves broadly cordate, 3 to 6 cm. long, acute, often angulate, coarsely serrate or dentate, stellate-pilose beneath; flowers axillary, long-pedicellate; petals rose-purple, about 2 cm. long; carpels glabrous.

8. *Malache melanommata* (Robins. & Seat.) Standl.

Pavonia melanommata Robins. & Seat. Proc. Amer. Acad. 28: 104. 1893.

Michoacán, Guerrero, and Morelos; type from Monte León, Michoacán.

Slender shrub, 1 to 2.5 meters high, the branches finely viscid-pubescent, leaves long-petiolate, ovate or lance-ovate, 5 to 12 cm. long, long-acuminate, cordate at base, crenate, often shallowly trilobate, minutely stellate-pubescent; flowers chiefly axillary, long-pedicellate; petals 2 to 2.5 cm. long, pink, with dark center.

9. *Malache paniculata* (Cav.) Kuntze, Rev. Gen. Pl. 1: 70. 1891.

Pavonia paniculata Cav. Monad. Diss. 3: 135. pl. 46, f. 2. 1787.

Pavonia mexicana H. B. K. Nov. Gen. & Sp. 5: 284. 1821.

? *Pavonia scabra* Presl, Rel. Haenk. 2: 129. 1836.

Veracruz. West Indies, Central America, and South America.

Shrub, 1 to 3 meters high, the branches viscid-pubescent and often hirsute; leaves ovate-cordate, 5 to 12 cm. long, acute or acuminate, often trilobate, crenate or serrate; flowers mostly paniculate; petals yellow, about 1.5 cm. long, pilose within at base.

10. *Malache purpusii* (T. S. Brandeg.) Standl.

Pavonia purpusii T. S. Brandeg. Zoe 5: 250. 1908.

Pavonia liebmanni Ulbrich, Repert. Sp. Nov. Fedde 13: 516. 1915.

Veracruz and Oaxaca; type from Zacupan, Veracruz. Guatemala.

Slender shrub, the branches viscid-tomentose and hirsute; leaves ovate-cordate, 3 to 12 cm. long, acute or acuminate, dentate; flowers axillary, long-pedicellate; petals purplish, 1.5 to 2 cm. long.

DOUBTFUL SPECIES.

It would be possible to key out some of the species listed below by the characters given in the original descriptions, but the writer has seen no

material which certainly belongs to them, and it may be that some of the names are referable to other genera.

PAVONIA GLANDULOSA Presl, Rel. Haenk. 2: 129. 1836. Type from western Mexico.

PAVONIA HETEROPHYLLA Turcz. Bull. Soc. Nat. Moscou 31¹: 189. 1858.

PAVONIA HIRTIFLORA Benth. Pl. Hartw. 7. 1839. Type from Aguascalientes.

PAVONIA RACEMIFLORA Hook. & Arn. Bot. Beechey Voy. 277. 1836-39. Type from Tepic.

PAVONIA URTICAEFOLIA Presl, Rel. Haenk. 2: 128. 1836. Type from western Mexico.

15. *MALVAVISCUS* Cav. Monad. Diss. 131. 1780.

Shrubs or trees; leaves toothed, often lobed or angled; flowers usually red, pedunculate, axillary or racemose; bractlets numerous; petals erect-connivent, or spreading only above; fruit 5-celled, the carpels baccate, indehiscent, 1-seeded.

The differences between most of the species are poorly marked, and most of the characters are so variable that there is much doubt as to which ones are of systematic value. The following treatment is not wholly satisfactory, but the writer is uncertain whether the number of recognized species should be increased or decreased.

Various species of *Malvaviscus* are cultivated in Mexico and elsewhere for their showy flowers. Among gardeners they are frequently known by the generic name *Achania*. The bark contains a tough fiber. A decoction of the flowers is employed in Mexico for inflammation of the digestive tract, and in popular practice as an emmenagogue. The plants have the emollient properties characteristic of the family.

One of the species is figured by Hernández,¹ without name or description. Another one, apparently, is illustrated and described² in a chapter headed "De Atlat Zopillin, seu aquosa herba appensa."

Corolla 7 to 8 cm. long-----1. *M. candidus*.
Corolla less than 6 cm. long.

Leaves glabrous beneath, or the pubescence of separated, simple or stellate hairs.

Corolla 4 to 5 cm. long.

Bractlets linear, glabrous-----2. *M. penduliflorus*.

Bractlets broadened above, ciliate and usually stellate-pubescent.

3. *M. conzattii*.

Corolla 2 to 3.5 cm. long.

Pubescence of the upper surface of the leaf almost wholly of simple hairs-----4. *M. rivularis*.

Pubescence of the leaves wholly or chiefly of stellate hairs.

Leaves minutely stellate-pubescent beneath along the nerves. Leaves usually as broad as long, deeply cordate at base.

5. *M. drummondii*.

Leaves coarsely stellate-pubescent along the nerves or hirtellous.

Leaves mostly 3 to 5-lobate, usually 5 to 14 cm. wide.

6. *M. populifolius*.

Leaves usually not lobate, mostly 1 to 5 cm. wide.

7. *M. grandiflorus*.

¹ Thesaurus 352. 1651.

² Thesaurus 117. 1651.

Leaves densely stellate-tomentose beneath with crowded interlaced hairs.

Corolla 1.5 cm. long-----8. *M. palmeri*.

Corolla 2.5 cm. long or larger.

Petals spreading above-----9. *M. acerifolius*.

Petals erect.

Pubescence of the lower surface of the leaves and of the bractlets wholly of minute hairs-----10. *M. oaxacanus*.

Pubescence of the leaves and bractlets partly of coarse spreading hairs.

Leaves minutely stellate-pubescent beneath upon the veins.

5. *M. drummondii*.

Leaves coarsely stellate-pilose beneath along the veins.

11. *M. arboreus*.

1. *Malvaviscus candidus* DC. Prodr. 1: 445. 1824.

Malvaviscus pringlei Baker f. Amer. Journ. Sci. 50: 175. 1895.

Coahuila, Querétaro, Jalisco, and Michoacán.

Shrub or small tree, 2 to 6 meters high; leaves 3 or 5-lobate, 8 to 20 cm. long, cordate at base, the lobes irregularly dentate or crenate, stellate-pubescent; bractlets linear, equaling or shorter than the calyx; petals white. "Lirio" (Coahuila).

The Coahuila specimens were taken from a cultivated plant, and the shrub is cultivated elsewhere in Mexico. Palmer reports that a decoction of the flowers and peach leaves is a local remedy for deafness, and that the flowers are steeped in mescal to prepare a drink for coughs and colds.

2. *Malvaviscus penduliflorus* DC. Prodr. 1: 445. 1824.

Malvaviscus lanceolatus Rose, Contr. U. S. Nat. Herb. 5: 175. 1899.

Michoacán to Chiapas.

Shrub, 1.5 to 4 meters high, nearly or quite glabrous throughout; leaves slender-petiolate or the upper nearly sessile, lanceolate to ovate-oblong, 3-nerved, rounded or cordate at base, acuminate, sinuate-serrate; petals red. "Monacillo colorado" (Oaxaca, Reko).

3. *Malvaviscus konzattii* Greenm. Field Mus. Bot. 2: 333. 1912.

Sinaloa to Chiapas and Veracruz; type from Oaxaca. Guatemala.

Shrub; leaves lanceolate to broadly ovate, 5 to 15 cm. long, acute or acuminate, obtuse to subcordate at base, sinuate-serrate, usually not lobate; petals red.

4. *Malvaviscus rivularis* T. S. Brandeg. Zoe 5: 211. 1905.

Known only from the type locality, Cofradía, Sinaloa.

Leaves lanceolate or oblong-lanceolate, 5 to 9 cm. long, acuminate, serrate-dentate, often shallowly trilobate, the pubescence beneath chiefly of simple hairs; bractlets linear; corolla red, about 3 cm. long. "Media noche."

5. *Malvaviscus drummondii* Torr. & Gray, Fl. N. Amer. 1: 230. 1838.

Tamaulipas, Veracruz, San Luis Potosí, and Yucatán. Texas.

Shrub, 1.5 to 3 meters high; leaves rounded-cordate, 4 to 9 cm. long, obtuse or acute, usually angulate or shallowly lobate, crenate-dentate; bractlets spatulate-linear; corolla red, 2 to 3.5 cm. long. "Manzanilla" (Veracruz).

The fruit is edible, and is eaten either raw or cooked.

6. *Malvaviscus populifolius* Presl, Rel. Haenk. 2: 135. 1836.

Colima to Chiapas and Morelos. Guatemala.

Leaves 5 to 20 cm. long, acute or acuminate, rounded or cordate at base, angulate or shallowly lobate, crenate or dentate; corolla red, 3 to 3.5 cm. long.

7. *Malvaviscus grandiflorus* H. B. K. Nov. Gen. & Sp. 5: 288. 1821.*Malvaviscus sepium* Schlecht. Linnaea 11: 361. 1837.

Michoacán to Chiapas, Yucatán, and Veracruz; type from Guanajuato. Central America.

Shrub or small tree, 1.5 to 5 meters high; leaves ovate to rounded-ovate, 2.5 to 9 cm. long, acute or acuminate, coarsely crenate or dentate; corolla red, 2.5 to 3.5 cm. long. "Chilmecate" (Guerrero, *Langlassé*); "mazapán," "mosilado" (Veracruz); "aguatero" (Guerrero).This form is the one to which the name *M. arboreus* Cav. has been applied most frequently. Palmer reports that a decoction of the flowers is used as a gargle for sore throat.**8. *Malvaviscus palmeri* Baker f. Contr. U. S. Nat. Herb. 3: 313. 1895.***Malvaviscus cinereus* Baker f. Journ. Bot. Brit. & For. 37: 347. 1899.

Tepic and Jalisco; type from Tepic.

Leaves reniform-cordate, 6 to 16 cm. long, acute or acuminate, 3 or 5-lobate, serrate, grayish, finely stellate-pubescent; flowers in long dense racemes; bracts linear.

The two names cited above were based upon the same collection.

9. *Malvaviscus acerifolius* Presl, Rel. Haenk. 2: 135. 1836.

Jalisco and perhaps elsewhere; type from western Mexico.

Leaves rounded-cordate, 7 to 15 cm. long, acute, angulate or lobate, crenate, densely stellate-pubescent on both surfaces; flowers subcorymbose; bractlets linear, densely stellate-pubescent.

10. *Malvaviscus oaxacanus* Standl., sp. nov.Oaxaca; type collected north of Tuxtepec (*Nelson* 348; U. S. Nat. Herb. no. 1,073,354).

Leaves ovate-cordate or rounded-cordate, 4 to 8 cm. long, acute, deeply cordate at base, crenulate or dentate, often angulate or shallowly trilobate, very minutely stellate-pubescent, becoming glabrate above; flowers axillary; bractlets linear, slightly shorter than the calyx, minutely stellate-pubescent; corolla red, 2.5 to 3 cm. long.

11. *Malvaviscus arboreus* Cav. Monad. Diss. 131. pl. 48, f. 1. 1780.*Malvaviscus acapulcensis* H. B. K. Nov. Gen. & Sp. 5: 288. 1821.*Malvaviscus mollis* DC. Prodr. 1: 445. 1824.

Sinaloa to Chiapas, Campeche, and Veracruz; type from Mexico. Central America and Colombia.

Shrub; leaves ovate to reniform-cordate, 5 to 16 cm. long, obtuse to acuminate, rounded to deeply cordate at base, crenate or dentate, often angulate or shallowly lobate, densely stellate-pubescent; bractlets linear; corolla red. "Monacillo" (Veracruz, Colima, Jalisco, Durango, Mexico, Oaxaca); "manzanita" or "manzanito" (fruit; Colima, Guatemala); "mazapán" (Mexico); "civil" (Veracruz, Tabasco); "amapola" (Costa Rica); "clavel encarnado," "estrella de Panamá" (Guatemala); "quesillo" (Nicaragua); "manzanita quesillo" (El Salvador).

The vernacular names are chiefly derived from literature, and doubtless are applied indiscriminately to all the red-flowered species.

DOUBTFUL SPECIES.

MALVAVISCUS FLAVIDUS DC. Prodr. 1: 446. 1824. Type from Mexico.*MALVAVISCUS PENTACARPUS* DC. Prodr. 1: 445. 1824. Type from Mexico.*MALVAVISCUS PLEURANTHERUS* DC. Prodr. 1: 446. 1824. Type from Mexico.*MALVAVISCUS PLEUBOGONUS* DC. Prodr. 1: 446. 1824. Type from Mexico.

16. **KOSTELETZKYA** Presl, Rel. Haenk. 2: 130. 1836.

Plants herbaceous or suffrutescent, the pubescence chiefly of stellate hairs; leaves often angulate or lobate; flowers axillary or paniculate; petals erect or spreading; bractlets 7 to 10; capsule 5-angulate, the cells 1-seeded.

Probably none of the species deserve to be classed as shrubs.

Petals erect, convolute, 2 to 3.5 cm. long.

Stems hispid-----1. **K. paniculata**.

Stems minutely stellate-pubescent.

Capsule hispid; leaves not lobed-----2. **K. malvaviscana**.

Capsule glabrate except on the angles; leaves motly 3-lobed--3. **K. thurberi**.

Petals spreading, usually less than 2 cm. long.

Pubescence of the stems chiefly of long simple hairs, very few, if any, small stellate hairs present.

Leaves, at least the upper ones, 3 to 5-lobed nearly or quite to the base.

4. **K. coulteri**.

Leaves, at least the upper ones, not lobed, the lower ones angulate or shallowly lobed-----5. **K. hastata**.

Pubescence of the stems of stellate hairs, these mostly very small.

Upper leaves mostly or 3 or 5-parted-----6. **K. digitata**.

Upper leaves not lobed or merely hastate-lobed-----7. **K. sagittata**.

1. **Kosteletzkya paniculata** Benth. Pl. Hartw. 285. 1848.

Sonora, Sinaloa, and Jalisco; type from Bolaños, Jalisco.

Shrub or herb, 1 to 2 meters high, the stems and leaves coarsely hispid; leaves long-petiolate, broadly cordate, 10 to 20 cm. long, most of them shallowly or deeply 3 to 7-lobed; flowers in large panicles; petals white (?); seeds glabrous.

2. **Kosteletzkya malvaviscana** Rose, Contr. U. S. Nat. Herb. 8: 319. pl. 67. 1905.

Known only from the type locality, Las Cuevas, Sonora.

Plants 1 to 2 meters high; leaves broadly ovate, 5 to 7 cm. long, acute, crenate-dentate, minutely stellate-pubescent, rounded at base; petals purple-pink.

Probably a form of *K. thurberi*.

3. **Kosteletzkya thurberi** A. Gray, Proc. Amer. Acad. 22: 314. 1887.

Known only from the type locality, Cocospera, Sonora.

Plants 1.5 to 3 meters high; leaves rounded-cordate, angulate, stellate-pubescent, serrulate; flowers in naked panicles; petals rose-colored.

4. **Kosteletzkya coulteri** A. Gray, Pl. Wright. 1: 23. 1852.

Sonora and Sinaloa; type from Sonora.

Plants chiefly or wholly herbaceous, a meter high; leaves long-petiolate, 3 to 8 cm. long, the lobes narrow, coarsely serrate; petals white or yellow, 13 mm. long; seeds glabrous.

5. **Kosteletzkya hastata** Presl, Rel. Haenk. 2: 130. 1836.

Kosteletzkya hispida Presl, Rel. Haenk. 2: 132. 1836.

Kosteletzkya cordata Presl, Rel. Haenk. 2: 132. 1836.

Hibiscus tampicensis Moric. Mém. Soc. Phys. Hist. Nat. Genève 7: 260. pl. 14. 1833.

Kosteletzkya tampicensis Rose, Contr. U. S. Nat. Herb. 8: 319. 1905.

Kosteletzkya violacea Rose, Contr. U. S. Nat. Herb. 5: 319. pl. 68. 1905.

Sonora to Tamaulipas and Morelos. Nicaragua.

Stems chiefly herbaceous; leaves on long or short petioles, lance-oblong to broadly cordate, 3 to 7 cm. long, dentate, often shallowly lobate or hastate-lobate; petals 10 to 13 mm. long, yellow or purplish; seeds minutely pubescent.

The specimens placed here show great variation in leaf form, but the variation upon a single plant is nearly as great as in the whole series of specimens.

6. *Kosteletzkya digitata* A. Gray, Proc. Amer. Acad. 8: 289. 1870.

Known only from the type locality, Yaqui River, Sonora.

Leaves with linear denticulate lobes, or some of the leaves simple; flowers long-pedicellate, purplish, 8 to 10 mm. long; seeds glabrous.

7. *Kosteletzkya sagittata* Presl, Rel. Haenk. 2: 131. pl. 70. 1836.

Kosteletzkya stellata Fernald, Bot. Gaz. 20: 532. 1895.

Sinaloa to San Luis Potosí, Veracruz, and Guerrero. Reported from the West Indies and northern South America.

Leaves very variable, from linear-oblong to deltoid, often hastate-lobate or even 3 or 5-lobate, serrate or dentate, green; petals white or pink; seeds minutely pubescent.

DOUBTFUL SPECIES.

KOSTELETZKYA MADRENSIS Jones, Contr. West. Bot. 12: 4. 1908.

17. HIBISCUS L. Sp. Pl. 693. 1753.

REFERENCE: Hochreutiner, Revision du genre *Hibiscus*, Ann. Cons. Jard. Genève 4: 23-191. 1900.

Shrubs or small trees, sometimes herbs, the pubescence chiefly of stellate hairs; leaves often lobed or parted; flowers chiefly axillary, of various colors; bractlets usually numerous; fruit a 5-valvate capsule; seeds glabrous or hairy.

Hibiscus manihot L., a species with large yellow flowers and with leaves divided into narrow lobes, is sometimes cultivated in Mexico under the names "pajiza" and "viudas." The okra ("chimbombo," "quimgombo"), *Hibiscus esculentus* L., also is cultivated.

Bractlets bifurcate at the apex.

Stems and petioles aculeolate.....1. *H. bifurcatus*.

Stems and petioles not aculeolate.

Leaves stellate-hispid beneath.....2. *H. costatus*.

Leaves minutely stellate-pubescent beneath.....3. *H. furcellatus*.

Bractlets not bifurcate.

Petals red, erect, convolute. Corolla 2 to 3.5 cm. long.

Bractlets spatulate, obtuse.....4. *H. nelsoni*.

Bractlets linear, acute.

Leaves rounded or broadly cuneate at base, not lobate....5. *H. spiralis*.

Leaves truncate or subcordate at base, usually shallowly hastate-lobate.

6. *H. tubiflorus*.

Petals not red, spreading.

Bractlets 2.3 to 8 mm. wide, ovate, lanceolate, spatulate, or broadly linear.

Leaves glabrous beneath or essentially so, all or most of them deeply lobate.....7. *H. sabdariffa*.

Leaves densely pubescent beneath, very shallowly or usually not at all lobate.

Bractlets united to the middle or higher.....8. *H. tiliaceus*.

Bractlets free or nearly so.

Flowers 5.5 to 6 cm. long; bractlets broadly linear; leaves mostly 7 to 25 cm. wide.....9. *H. clypeatus*.

Flowers 2.5 to 3.5 cm. long; bractlets spatulate, or lanceolate and contracted at base; leaves mostly 2 to 7 cm. wide.

Bractlets spatulate, obtuse; calyx about 12 mm. long.

10. *H. lavateroides*.

Bractlets lanceolate, acuminate; calyx about 20 mm. long.

11. *H. cardiophyllus*.

Bractlets narrowly linear or setaceous, less than 2 mm. wide.

Petals 6 to 8 cm. long; leaves glabrous or nearly so. 12. *H. rosa-sinensis*.

Petals 5 cm. long or less; leaves usually copiously pubescent.

Bractlets less than half as long as the calyx. 13. *H. denudatus*.

Bractlets nearly or quite as long as the calyx, often much longer.

Stems hispid with long, mostly simple hairs, and with 2 lines of fine pubescence. 14. *H. bisepatus*.

Stems glabrous or with short pubescence of stellate hairs, these evenly distributed.

Petals purple or purplish. 15. *H. brasiliensis*.

Petals white, yellow, or yellowish.

Petals about 1 cm. long; leaves not lobate. 16. *H. purpusii*.

Petals 3 to 5 cm. long; leaves usually lobate.

Capsule strigose. 17. *H. ribifolius*.

Capsule glabrous.

Leaves all or partly 3-parted. 18. *H. coulteri*.

Leaves merely dentate, or shallowly lobate.

Leaves 1 to 3 cm. long, obtuse or rounded at apex, the pubescence of the lower surface chiefly of 4 or 5-rayed loose hairs. 19. *H. elegans*.

Leaves mostly 3 to 5 cm. long, acute or acuminate, the pubescence of the lower surface of 3-rayed appressed hairs. 20. *H. acicularis*.

1. *Hibiscus bifurcatus* Cav. Monad. Diss. 146. pl. 51, f. 1. 1787.

Hibiscus uncinellus DC. Prodr. 1: 449. 1824.

Tepic to Chiapas and Veracruz. West Indies, Central America, and South America; type from Brazil.

Shrub or herb, 1 to 4.5 meters high, the stems hispid and aculeolate; leaves 6 to 18 cm. long, hirsute and stellate-pubescent, aculeolate beneath along the veins, usually deeply trilobate, the lobes acuminate, serrate; calyx 1.5 to 2 cm. long; petals 7 to 9 cm. long, purplish; capsule strigose. "Flor de paisto" (Michoacán, Guerrero, *Langlassé*).

The leaves are slightly acid, and in Brazil they are cooked and eaten.

2. *Hibiscus costatus* A. Rich. Ess. Fl. Cuba 138. 1845.

Hibiscus australis Rose; Donn. Smith, Enum. Pl. Guat. 6: 4. 1903, nomen nudum.

Veracruz and Oaxaca. Cuba and Guatemala; type from Cuba.

Shrub or herb, 1 to 1.5 meters high, the branches stellate-hispidulous or glabrate; leaves ovate-cordate to reniform-cordate, 3.5 to 10 cm. long, acuminate, dentate, often angulate or shallowly lobate; calyx 1.8 to 2 cm. long; petals 6.5 to 7.5 cm. long, lavender or deep pink; capsule strigose.

3. *Hibiscus furcellatus* Desr.; Lam. Encycl. 3: 358. 1789.

Veracruz. Florida, West Indies, Central America, and South America.

Shrub, 1 to 2 meters high, the stems stellate-tomentose; leaves ovate-cordate or orbicular-cordate, 5 to 12 cm. long, acute or obtuse, dentate, often angulate or shallowly lobate; calyx 1.5 to 2 cm. long; petals 6 to 8 cm. long, purple-pink; capsule strigose.

4. *Hibiscus nelsoni* Rose & Standl., sp. nov.

Type collected between Nopala and Mixistepec, Oaxaca (*Nelson* 2430; U. S. Nat. Herb. No. 1,073,355).

Leaves deltoid-lanceolate, 2.5 to 5.5 cm. long, long-acuminate, rounded or truncate at base, serrate-dentate, stellate-hispidulous with fulvous hairs;

flowers axillary; bractlets about 3 mm. wide; calyx 1 cm. long, strigose, the lobes rounded at the apex; petals 2 cm. long, stellate-hispidulous; stamen column exserted; capsule strigose or glabrate.

5. *Hibiscus spiralis* Cav. Icon. Pl. 2: 47. pl. 162. 1793.

State of Mexico and probably elsewhere; described from plants cultivated at Madrid.

Shrub, the branches soon glabrate; leaves lanceolate or ovate, 1.5 to 3 cm. long, acute, coarsely crenate-serrate, thinly and minutely stellate-pubescent; calyx about 12 mm. long; petals 2 to 2.5 cm. long; stamen column exserted; capsule strigose.

6. *Hibiscus tubiflorus* DC. Prodr. 1: 447. 1824.

Abelmoschus achanoides Turcz. Bull. Soc. Nat. Moscou 31¹: 196. 1858.

Hibiscus achanoides Hemsl. Biol. Centr. Amer. Bot. 1: 121. 1879.

Tamaulipas to Yucatán, Tabasco, and Chiapas. Southern Florida, West Indies, and Guatemala.

Slender shrub; leaves deltoid-lanceolate or deltoid-ovate, 2 to 5 cm. long, acute or obtuse, coarsely crenate-dentate, thinly stellate-hispid; calyx 6 to 15 mm. long; petals 2.5 to 3.5 cm. long; stamens slightly or not at all exserted; capsule stellate-hispidulous. "Hol," "xtupkinil" (Yucatán, Maya); "monacillo del río" (Mexico, Urbina).

7. *Hibiscus sabdariffa* L. Sp. Pl. 695. 1753.

Cultivated in Mexico and doubtless also growing without cultivation. Native of the East Indies; often cultivated and naturalized in tropical America.

Slender shrub or herb, 1 to 2 meters high, with red glabrous stems; leaves deeply 3 or 5-lobate, the lobes serrulate, the costa bearing a large gland beneath near the base; calyx 2 cm. long; petals 4 to 5 cm. long, pink or purplish; capsule strigose. "Jamaica," "flor de Jamaica" (Mexico); "viña," "agrio de Guinea" (Porto Rico).

The English names are "roselle" and "Jamaica sorrel." The plant is often cultivated for the fleshy red calyces, which are mucilaginous, with acid flavor, and are used in the preparation of jellies and sauces. The leaves also are sometimes used for flavoring food. In India the plant is of importance because of the fiber of the stems, which is separated by retting and employed for cordage. The seeds are said to have demulcent, diuretic, and tonic properties, and the calyces are employed in the preparation of cooling beverages for fever patients.¹

8. *Hibiscus tiliaceus* L. Sp. Pl. 694. 1753.

Hibiscus elatus Swartz, Prodr. Veg. Ind. Occ. 103. 1788.

Hibiscus azanzae DC. Prodr. 1: 454. 1824.

Hibiscus bracteosus DC. Prodr. 1: 455. 1824.

Paritium tiliaceum Juss.; St. Hil. Fl. Bras. Merid. 1: 198. 1825.

On seacoasts, Tepic to Oaxaca; reported from Veracruz. Widely distributed in tropical regions.

Shrub or small tree, usually 2 to 5 meters high, with large stipules; leaves ovate-cordate to reniform-cordate, 6 to 18 cm. long, abruptly short-acuminate, entire or nearly so, green above, pale beneath and stellate-tomentulose; calyx 2 to 2.5 cm. long; petals yellow, turning greenish when dry, 6 to 7 cm. long; capsule densely pubescent. "Holó," "xtoló" (Yucatán, Maya); "majahua," "majagua," "masahua," "mazahua" (Oaxaca, Veracruz, Guerrero, Venezuela,

¹ See P. J. Wester, Contributions to the history and bibliography of the roselle, Bull. Torrey Club 38: 91-98. 1911.

Nicaragua, Cuba, Costa Rica, Porto Rico, Santo Domingo, Peru, Panama); "emajagua" (Porto Rico, Peru); "huamaga" (Ecuador); "damajagua" (Peru); "alodoncillo" (Venezuela); "demajagua," "majagua azul," "majagua macho" (Cuba); "majagüito de playa" (Colombia); "majagua de playa" (Panama); "nau" (Hawaii); "fau" (Samoa); "pago" (Guam).

The word "majagua" has been corrupted in English into "mahoe," the name used in Jamaica and elsewhere. The wood is white, soft, and porous, and is said to weigh 35 to 38 pounds per cubic foot. It is sometimes utilized as a substitute for cork. The plant was an important source of fiber in the Western Hemisphere before the arrival of the Europeans, and is still used extensively for cordage. It was employed in many parts of the Tropics for the manufacture of mats and coarse cloth. In quality the fiber is similar to jute, and it has the property of becoming stronger after being soaked in water. To the flowers, roots, and bark are ascribed aperitive, emollient, sudorific, and laxative properties. In the Pacific islands the bark was sometimes eaten when other food was lacking. The aborigines of Queensland value the roots as food, likewise the leaves, which have a slightly acid flavor. In Samoa the bark is used for straining the narcotic drink *ava*. In Guam ropes of it, after having been oiled, are employed as cables. For an illustration of the plant see Contr. U. S. Nat. Herb. 8: pl. 50.

9. *Hibiscus clypeatus* L. Syst. Nat. ed. 10. 1149. 1759.

Hibiscus berlandierianus Moric. Pl. Amer. Rar. 8. pl. 6. 1830.

Veracruz, Campeche, and Yucatán. Greater Antilles.

Shrub or small tree, 3 to 6 meters high, branches stellate-tomentose; leaves rounded-cordate, 8 to 24 cm. long, acute, obscurely dentate or nearly entire, usually angulate, densely stellate-pubescent; calyx about 4 cm. long, nearly equaling the petals; capsule densely hispid, about 4 cm. long. "Huevo de gato" (Porto Rico).

10. *Hibiscus lavateroides* Moric. Pl. Amer. Rar. 9. pl. 7. 1830.

Tamaulipas and Veracruz; type from Tampico, Tamaulipas.

Leaves broadly ovate or ovate-cordate, 2 to 7 cm. long, obtuse or acute, dentate, stellate-hispidulous; petals pink or purplish, 2.5 to 3.5 cm. long; capsule stellate-pubescent, 12 to 15 mm. long.

11. *Hibiscus cardiophyllus* A. Gray, Pl. Wright. 1: 22. 1852.

Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, and Puebla. Western Texas; type from Turkey Creek.

Shrub or herb, 30 to 60 cm. high, the stems stellate-hispidulous; leaves rounded-cordate, 3 to 7 cm. long, obtuse, sinuate-dentate, sometimes angulate, pale beneath and densely stellate-tomentose; petals crimson, about 3 cm. long; capsule glabrous or nearly so.

12. *Hibiscus rosa-sinensis* L. Sp. Pl. 694. 1753.

Common in cultivation and often growing without cultivation. Probably native of China, but now widely dispersed in tropical countries.

Shrub or small tree, nearly or quite glabrous throughout; leaves ovate or broadly ovate, 5 to 15 cm. long, acute or acuminate, coarsely crenate-dentate; stamen tube exserted. "Tulipán" (Yucatán); "tulipán rojo" (Oaxaca); "rosa china," "gallardete" (Oaxaca); "obelisco" (Mexico, Jalisco, Durango); "súchil" (*Ramírez*); "clavel" (Guatemala); "resucitado," "escandalosa roja" (Colombia); "Mar Pacífico" (Cuba, Honduras); "pavona," "amapola," "mapola," "candelada" (Porto Rico); "clavelón" (El Salvador); "bonche" (Colombia).

The Chinese hibiscus is one of the most common ornamental shrubs in tropical America, and is cultivated also in hothouses in temperate regions. The flowers are often double, and they occur in many shades of red and yellow, some forms having variegated petals. In India the shrub is known as "China-rose," "shoeblack-plant," or "shoe-flower plant." The latter names are derived from the fact that the petals, which turn black when crushed, are used for blacking shoes. They are employed by the women of China to dye the hair and eyebrows. The flowers are sometimes pickled and eaten in China, and they are used to color spirituous liquors. The petals impart to paper a bluish purple tint which reacts like litmus. The bark is employed in China as an emmenagogue.

A related species (known in Porto Rico as "lira" and in Colombia and the Philippines as "araña") is *H. schizopetalus* (Mast.) Hook., which likewise is cultivated in Mexico. It is distinguished by having recurved petals which are cut into narrow lobes. Still another species cultivated in Mexico is the Rose-of-Sharon or althea, *Hibiscus syriacus* L. ("altea," "flor de una hora"), an Asiatic plant. It is similar to *H. rosa-sinensis*, but has mostly smaller flowers, single or double, pink, purple, or white, with a very short stamen column.

13. *Hibiscus denudatus* Benth. Bot. Voy. Sulph. 7. pl. 3. 1844.

Hibiscus denudatus involucellatus A. Gray, Pl. Wright. 1: 22. 1852.

Baja California to Durango, Coahuila, and Chihuahua; type from Magdalena Bay, Baja California. Western Texas to Arizona.

Plants herbaceous or suffrutescent, 30 to 60 cm. high; leaves rounded-ovate or oblong-ovate, 1 to 3.5 cm. long, rounded or obtuse at apex, rounded or subcordate at base, sinuate-dentate, finely stellate-pubescent; calyx 8 to 14 mm. long; petals 2 to 2.5 cm. long, lavender-purple; capsule glabrous or nearly so.

14. *Hibiscus biseptus* S. Wats. Proc. Amer. Acad. 21: 418. 1886.

Baja California to Chihuahua, Jalisco, and Sinaloa; type from Hacienda San Miguel, Chihuahua.

Stems herbaceous or suffrutescent, 1 meter high or less, in age sometimes glabrous; leaves 1.5 to 7 cm. long, the upper ones deeply lobed, the lower ones often merely crenate-dentate, thinly stellate-hispidulous or nearly glabrous; calyx 1.5 to 2.5 cm. long; petals 3 to 4.5 cm. long, white or pale yellow, with purple spot at base; capsule glabrous.

15. *Hibiscus brasiliensis* L. Sp. Pl. ed. 2. 977. 1763.

Hibiscus phoeniceus Jacq. Hort. Bot. Vind. 3: 11. pl. 14. 1776.

Hibiscus oxyphyllus DC. Prodr. 1: 455. 1824.

Hibiscus violaceus T. S. Brandeg. Zoe 5: 211. 1905.

Hibiscus iochromus T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 385. 1909.

Chihuahua to Sinaloa, Oaxaca, and Veracruz. West Indies, Central America, and South America.

Slender shrub, 1 to 2 meters high, the branches soon glabrate; leaves deltoid-lanceolate or deltoid-ovate, 3 to 8 cm. long, long-acuminate, coarsely crenate-dentate, often deeply lobate, thinly stellate-hispidulous or glabrate; bractlets shorter or often much longer than the calyx; petals 1 to 2 cm. long; capsule strigose. "Mírame-linda" (Nicaragua); "peregrina" (Cuba); "cadillo" (Santo Domingo).

16. *Hibiscus purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 368. 1917.

Known only from the type locality, Zacuapan, Veracruz.

Tree; leaves oblong-lanceolate, 5 to 10 cm. long, cuspidate-acuminate, obtuse or rounded at base, serrate, nearly glabrous; flowers nearly sessile; petals greenish yellow; capsule stellate-hirsute.

17. *Hibiscus ribifolius* A. Gray, Proc. Amer. Acad. 5: 154. 1861.

Baja California; type from Cape San Lucas.

Shrub, 1 to 2.5 meters high, the branches stellate-pubescent; leaves deltoid-ovate, 2 to 5.5 cm. long, acute or acuminate, coarsely serrate-dentate, often subhastate, soon glabrate; petals sulphur-yellow, 2.5 to 3.5 cm. long.

18. *Hibiscus coulteri* Harv.; A. Gray, Pl. Wright. 1: 23. 1852.

Sonora and Chihuahua to Hidalgo; type from Zimapán, Hidalgo.

Shrub, 1 meter high or less, or often herbaceous; leaves dimorphous, the lower ones rounded-ovate or ovate-oval and dentate, the upper ones mostly parted into 3 narrow dentate lobes; petals white or pale yellow, 2 to 4 cm. long.

It is probable that the proper name for this species is *H. acetosaefolius* DC.¹ The plate of Sessé and Mociño² upon which that name was based agrees very well with specimens of *H. coulteri*, except for the small size of the flowers, as illustrated.

19. *Hibiscus elegans* Standl., sp. nov.

Hidalgo, Puebla, and Oaxaca; type from Tehuacán, Puebla (*Pringle* 7505; U. S. Nat. Herb. No. 305765.)

Shrub, the branches stellate-strigose; leaves elliptic to oval or ovate-rhombic, 1 to 3 cm. long, rounded or obtuse at apex, rounded or broadly cuneate at base, crenate-dentate, green, stellate-hispidulous; calyx 1.5 to 2 cm. long, the lobes linear-lanceolate; bractlets shorter than the calyx; petals 3 to 4 cm. long, yellow, with red spot at base.

20. *Hibiscus acicularis* Standl., sp. nov.

Tamaulipas and Nuevo León; type from Monterrey, Nuevo León (*Pringle* 13880; U. S. Nat. Herb. No. 462430).

Stems herbaceous or suffrutescent, 60 cm. high, stellate-strigose; leaves hastate-deltoid, obtuse to long-acuminate, crenate or serrate, green, thin, sparsely pubescent with mostly 3-rayed and appressed hairs; flowers long-pedunculate; bractlets equaling or longer than the calyx; calyx 1.5 to 2.5 cm. long, the lobes linear-lanceolate; petals 3 to 4 cm. long, white or pale yellow; seeds covered with long silky hairs. "Amor de un día" (Tamaulipas).

DOUBTFUL SPECIES.

HIBISCUS CYANOGENUS DC. Prodr. 1: 455. 1824. Described from Mexico. Probably not of this genus.

18. *GOSSYPIUM* L. Sp. Pl.

REFERENCE: George Watt, The wild and cultivated cotton plants of the world, 1907.

Shrubs or large herbs, sometimes small trees; leaves usually 3 to 9-lobed; flowers large, yellow or purplish, the calyx subtended by 3 large cordate bracts; calyx truncate or shallowly 5-lobate; fruit a loculicidal capsule, the seeds commonly covered with long cotton.

The cultivated species of the genus are greatly confused and poorly understood. This is due chiefly to the fact that many of the cultivated forms are the result of hybridization.

Cotton is, of course, one of the most important plants of Mexico, where it has been in cultivation from ancient times. The early European visitors men-

¹ Prodr. 1: 455. 1824.

² DC. Calq. Dess. Fl. Mex. pl. 79.

tion frequently the cotton garments worn by the natives, who showed great skill in their manufacture. Cotton is now one of the most valuable of cultivated crops in Mexico.

The general Spanish word for cotton is "algodón." This is frequently modified by various varietal names. The name for the plant is "algodonero." The following additional names are reported: "Taman" (Yucatán, Maya); "xurata" (Michoacán); "xchup" (Yucatán, Maya); "cuinim" (Huastec); "icheatl" (Nahuatl); "tûdy," "dehti" (Otomí, *Buelna*); "pishm" (cotton), "pishten-kiup" (the plant), "pishten-pulh" (the flower), "pishten" (cotton) (Mixe, *Belmar*).

The root bark of cultivated cotton is official in the U. S. Pharmacopoeia. It has emmenagogue properties and is sometimes employed to facilitate parturition, but at present it is little used. By the slaves of the South in former days it was employed as a means of producing abortion. The plant is said to be used in Mexico for the same purposes, an infusion of the leaves and flowers is employed as a gargle for sore throat, and an infusion of the roasted seeds for dysentery and similar affections.

Besides the fiber obtained from the cotton plant, a valuable product is found in the seeds. These yield an oil which is applied to a wide variety of uses, and the residue left after the extraction of oil is an important source of fertilizer and of food for stock.

Bractlets entire, united below-----1. *G. gossypioides*.
Bractlets toothed or lobed or, if entire (in one species), free.

Seeds covered with very short and close hairs or nearly glabrous, never with long wool. Bractlets free.

Bractlets incised; leaves entire, stellate-velutinous-----2. *G. davidsonii*.
Bractlets entire; leaves mostly lobed, glabrous or nearly so.

3. *G. harknessii*.

Seeds with long loose wool, sometimes also with a close covering of short hairs.

Seeds covered with long, loose, easily detachable hairs, without a covering of short hairs. Leaves glabrous or nearly so-----4. *G. barbadense*.

Seeds with a double coat, consisting partly of short matted hairs and partly of long, not easily detachable hairs.

Leaves entire, or deeply lobed (three-fourths the distance to the base or more), the lobes mostly narrowly oblong and often constricted below; petals usually not purple on the claws.

Leaves all entire-----5. *G. lanceolatum*.
Leaves 3 or 5-lobed.

Flowers about 3 cm. long-----6. *G. palmerii*.
Flowers about 6 cm. long.

Leaves subcordate at base; fuzz of the seeds brown.

7. *G. schottii*.

Leaves deeply cordate at base; fuzz of seeds usually greenish.

8. *G. microcarpum*.

Leaves 3 to 7-lobed, the lobes usually extending less than halfway to base, broad, not constricted below; petals usually purple on the claws.

Leaves glabrous, with 3 to 7 radiating lobes-----9. *G. mexicanum*.

Leaves pilose, usually with 3 ascending lobes-----10. *G. hirsutum*.

1. *Gossypium gossypioides* (Ulbrich) Standl.

Sclera gossypioides Ulbrich, Verh. Bot. Ver. Brand. 55: 51. 1913.

Oaxaca; type from San Bartolo Yautepec.

Shrub; leaves cordate at base, 3-lobed to about the middle, 8 to 13 cm. long, glabrous except along the veins; the lobes ovate-lanceolate, very long-acuminate; bractlets ovate-cordate, acute, entire, covered with large purple dotlike glands; calyx 8 to 9 mm. long, purple-dotted; petals 5 to 5.5 cm. long, purplish when dry.

In a general way the specimens agree with a tracing of the plate which served as the basis of De Candolle's description of *Ingenhouzia triloba*.¹ The writer feels convinced, however, that the two plants are different. The identification of *Ingenhouzia* is still uncertain, and it may well be that the plant has never been recollected. By many authors it has been held to be the same as *Thurberia thespesioides* A. Gray, but that view is undoubtedly incorrect.

2. *Gossypium davidsonii* Kellogg, Proc. Calif. Acad. 5: 82. 1873.

Southern Baja California and western Sonora.

Shrub, 1 to 2.5 meters high; leaves broadly ovate-cordate, 2.5 to 6.5 cm. long, acute or acuminate, rarely shallowly trilobate; petals 3 to 3.5 cm. long, bright yellow, with purple claws; bractlets densely stellate-pubescent.

Watt states that this is probably identical with *G. klotzschianum* Anderss., a native of the Galápagos Islands.

3. *Gossypium harknessii* T. S. Brandeg. Proc. Calif. Acad. II. 2: 136. 1889.

Ingenhouzia harknessii Rose, U. S. Dept. Agr. Bur. Pl. Ind. Bull. 131: 54. 1908.

Baja California; type from Santa Margarita Island.

Shrub, 0.5 to 2 meters high, forming dense rounded clumps; leaves reniform or broadly cordate, 1.5 to 5 cm. long, acute, deeply cordate at base, shallowly trilobate, glabrous except when very young; bractlets broadly ovate, acuminate; petals 2.5 to 3 cm. long, sulphur-yellow, with purple claws; fruit 3-celled, the cells 4-seeded.

4. *Gossypium barbadense* L. Sp. Pl. 693. 1753.

Cultivated and sometimes growing wild; specimens seen from Veracruz, Jalisco, Sinaloa, and Baja California. Widely cultivated in warm regions.

Plants herbaceous or often becoming fruticose; leaves 7 to 13 cm. long, cordate at base, 3 or 5-lobed, the lobes acute or acuminate, ascending or spreading, glabrous or nearly so; bractlets free; petals pale yellow, tinged with purple, about 5.5 cm. long; seeds covered with long white cotton.

This species includes most of the cultivated forms of sea-island and other long-staple cottons.

5. *Gossypium lanceolatum* Tod. Rel. Cult. Cot. 185. pl. 5, f. 1. 1877-78.

Described from wild Mexican plants.

Leaves lanceolate, acuminate, pinnate-nerved; bractlets large, ovate, deeply cordate, deeply toothed above, exceeding the corolla.

The plant is known only from the data afforded by the original description.

6. *Gossypium palmerii* Watt, Wild & Cult. Cotton 204. pl. 34. 1907.

Known only from the type locality, Acapulco, Guerrero.

Shrub with dark red branches; leaves mostly trilobate but partly entire, the lobes narrowly oblong, long-acuminate, glabrous or nearly so; pedicels with 3 large glands at apex; bractlets with glands within at base; petals pale yellow; seeds covered with green fuzz and long white cotton.

Gossypium fruticosum Tod.² may be a form of the same species. It was described from Mexico.

¹ DC. Prodr. 1: 474. 1824.

² Rel. Cult. Cot. 187. pl. 12, f. 3. 1877-78.

7. *Gossypium schottii* Watt, Wild & Cult. Cotton 206. *pl.* 35. 1907.

Yucatán; type from Mérida. Reported from Paraguay.

Leaves usually 3 or 5-lobed, the lobes mostly oblong or narrowly oblong, long-acuminate, glabrous or nearly so, spreading; bractlets free; petals yellow, tinged with purple. "Xchup" (Yucatán, Maya).

8. *Gossypium microcarpum* Tod. Hort. Panorm. 1: 63. *pl.* 14. 1876.

Described from plants believed to be of Mexican origin. The species has been found in cultivation in Peru, Brazil, Africa, and the Philippines.

Lobes of the leaves ovate, acute; bractlets large, glabrous, deeply cordate; petals pale yellow, without purple spots; seeds with greenish or brownish fuzz and dirty-white coarse cotton.

9. *Gossypium mexicanum* Tod. Rel. Cult. Cot. 193. *pl.* 6. 1877-78.

Cultivated in Mexico and probably growing also without cultivation. Widely cultivated in other regions.

Plants shrubby; petioles and pedicels usually pilose at first; leaves 7 to 15 cm. wide, the lobes broadly ovate; petals pale yellow or white, flushed with pink, scarcely exceeding the bractlets; seeds with ashy fuzz and dull white to reddish cotton. "Ichcaxihuitl" (Nahuatl; "wool-plant").

The plant is treated by Hernández¹ in a chapter entitled "De Ychcaxihuitl seu Gossypio."

10. *Gossypium hirsutum* L. Sp. Pl. ed. 2. 975. 1763.

Cultivated in Mexico and growing without cultivation in many localities. Cultivated in many parts of the earth.

Plants herbaceous or often woody, with reddish stems, the branches and leaves sparsely or densely hirsute; petals yellow or pale yellow, often purplish at base; capsule usually 4-celled.

19. **THURBERIA** A. Gray, Mem. Amer. Acad. n. ser. 5: 308. 1854.1. *Thurberia thespesioides* A. Gray, Mem. Amer. Acad. n. ser. 5: 308. 1854.

Gossypium thurberi Tod. Prodr. Gossyp. 7. 1878.

Chihuahua, Sonora, and Jalisco; type collected near Cocospera and Ymurís, Sonora. Southern Arizona.

Plants herbaceous or fruticose, 1 to 3 meters high, glabrous or nearly so; leaves long-petiolate, the blades mostly 3-parted or deeply 3-lobate, the divisions lanceolate, entire, long-acuminate, gland-dotted; flowers axillary or subcorymbose; bractlets 3, longer than the truncate calyx; petals about 2.5 cm. long, white, turning purplish, black-dotted; capsule 3-celled, 12 to 20 mm. long; seeds woolly. "Algodoncillo" (Sonora).

This plant has been referred erroneously by some authors to *Ingenhouzia triloba* DC..

20. **ERIOXYLUM** Rose & Standl. Contr. U. S. Nat. Herb. 13: 307. 1911.

Shrubs or trees; leaves long-petiolate, entire; flowers chiefly axillary, usually appearing before the leaves; bractlets 3, much shorter than the calyx; petals purple; capsule 3-celled, ovoid, covered with large black glands; seeds woolly.

Calyx with 5 triangular acuminate lobes; pedicels 10 to 15 mm. long.

1. *E. palmeri*.

Calyx obscurely repand-dentate; pedicels 2 to 5 mm. long-----2. *E. aridum*.

¹ Thesaurus 308. 1651.

1. *Erioxylum palmeri* Rose, Contr. U. S. Nat. Herb. 13: 308. 1911.

Cienfugosia palmeri Rose, Contr. U. S. Nat. Herb. 1: 308. 1895.

Known only from Colima, the type locality.

Shrub, 1.5 to 2.5 meters high; leaves broadly ovate, 5 to 12 cm. long, long-acuminate, subcordate at base, sparsely and minutely stellate-pubescent; petals 6 cm. long, minutely pubescent outside; capsule 2 to 2.5 cm. long.

2. *Erioxylum aridum* Rose & Standl. Contr. U. S. Nat. Herb. 13: 307. 1911.

Sinaloa, in coastal thickets; type from Culiacán.

Slender shrub or tree, 3 to 6 meters high; bark gray; leaves broadly ovate, 1.5 to 3 cm. long, acute or obtuse, rounded at base, sparsely and minutely stellate-pubescent; petals about 5 cm. long, nearly black within below the middle; capsule 2.5 cm. long. "Amapola."

The wood is sometimes used for fencing. The trunk is often 30 to 35 cm. in diameter.

96. BOMBACACEAE. Cotton-tree Family.

Trees; leaves simple or digitately compound, deciduous; pubescence chiefly of stellate hairs; flowers small or large, often bracteolate; calyx 5-lobate or truncate or opening irregularly; petals 5; stamens 5 to many, the filaments free or united into a tube; fruit dry or fleshy, 2 to 5-celled, dehiscent or indehiscent; seeds 2 to many in each cell.

Leaves simple.

Stamen tube short-----1. **HAMPEA.**

Stamen tube elongate-----2. **QUARARIBEA.**

Leaves digitately compound.

Seeds winged; flowers in one-sided racemes-----3. **BERNOULLIA.**

Seeds not winged; flowers mostly solitary.

Stamen tube dividing into 5 parts, each of these bearing several sessile anthers at the summit; trunk often spiny; leaflets often serrate.

4. **CEIBA.**

Stamen tube dividing into many fascicles or filaments, the anthers borne on long filaments; trunk unarmed; leaflets entire.

Seeds 1.5 cm. or more in diameter; flowers usually 20 cm. long or larger; stamen tube elongate, the fascicles repeatedly branched.

5. **PACHIRA.**

Seeds 6 mm. or less in diameter; flowers usually less than 15 cm. long; stamen tube short, the fascicles dividing into simple filaments.

6. **BOMBAX.**

1. **HAMPEA** Schlecht. Linnaea 11: 371. 1837.

Trees or shrubs; leaves long-petiolate, entire or shallowly trilobate; flowers on axillary pedicels, usually fasciculate; bractlets 3 or more, very small; calyx truncate or obscurely 5-lobate; capsule 3-celled, the cells few-seeded; funicle dilated into a large fleshy aril.

Capsule densely villous within; calyx truncate-----1. **H. integerrima.**

Capsule glabrous within or hairy only along the sutures.

Capsule 1.5 cm. long, the cells about 3-seeded-----2. **H. trilobata.**

Capsule 3 cm. long, the cells many-seeded-----3. **H. tomentosa.**

1. **Hampea integerrima** Schlecht. Linnaea 11: 372. 1837.

Veracruz; reported from Tabasco; type from Josocola, Veracruz. Central America.

Small tree; leaves ovate to rounded-ovate, 10 to 22 cm. long, acute or acuminate, rounded or subcordate at base, entire, glabrous in age or nearly so:

flowers long-pedicellate; calyx and corolla minutely stellate-tomentulose outside; bractlets 3, caducous; petals nearly 2 cm. long, whitish; capsule about 1.5 cm. long. "Jonote blanco" (Veracruz, *Seler*); "majagua" (Tabasco, *Rovírosa*).

2. *Hampea trilobata* Standl., sp. nov.

Yucatán and Campeche; type from Apazote, Campeche (*Goldman* 488; U. S. Nat. Herb. no. 396850).

Leaves 8 to 13 cm. long, 7 to 9.5 cm. wide, rounded or subcordate at base, with 3 very short, triangular, acute or obtuse lobes near the apex, glabrate above, minutely stellate-pubescent beneath; calyx 5 mm. long, stellate-tomentulose, the lobes ovate-oval, obtuse, nearly as long as the tube; bractlets 3; capsule finely tomentose outside, glabrous within except along the sutures.

The type specimen consists of a fruiting branch. A flowering specimen from Izamal, Yucatán (*Gaumer* 845) is probably conspecific, but it has more copious and looser pubescence. The petals are about 13 mm. long.

3. *Hampea tomentosa* (Presl) Standl.

Thespesia tomentosa Presl, Rel. Haenk. 2: 136. 1836.

Oaxaca; type from western Mexico.

Leaves ovate to rounded-ovate, 8 to 20 cm. long, acute or acuminate, sometimes shallowly trilobate, stellate-pubescent on both surfaces, densely so beneath, in age sometimes glabrate; calyx lobes oval-ovate, obtuse, shorter than the tube, the calyx with 3 large dark glands at base; bractlets 3 to 6, caducous; petals white (?), about 1.5 cm. long.

Specimens collected recently in Oaxaca by Conzatti and by Reko agree well with Presl's description of *Thespesia tomentosa*, but they appear referable rather to *Hampea*. Presl's species was based upon flowering specimens.

2. *QUARARIBEA* Aubl. Pl. Guian. 691. 1775.

Trees or shrubs; leaves entire or nearly so, pinnate-nerved; peduncles 1-flowered, solitary opposite the leaves; calyx tubular-obconic, 3 to 5-dentate; petals narrow, white; stamen column elongate, antheriferous at the apex; fruit 2-celled, hard, indehiscent, sometimes by abortion 1-celled.

The dried plants have the odor of slippery elm (*Ulmus fulva* Michx.).

Leaves conspicuously barbate beneath in the axils of the veins...1. *Q. funebris*.
Leaves not barbate beneath.....2. *Q. fieldii*.

1. *Quararibea funebris* (Llave) Standl.

*Lexarza*¹ *funebris* Llave; Llave & Lex. Nov. Veg. Descr. 2: 12. 1825.

¹ Juan José Martínez de Lexarza was born at Valladolid (now Morelia) in 1785. At the age of 12 he became a student in the Colegio de Minería in the City of Mexico and later graduated with great distinction, his synodic being no less a person than Humboldt. He was unable to continue his mineralogical studies, and returned to Michoacán, where he became a member of the provincial militia and rose to the rank of first captain. He made the acquaintance of La Llave, who was established at the Cathedral of Morelia, and that distinguished naturalist interested him in botany. In 1824-25 they published jointly descriptions of a number of new genera of Mexican plants and various species of orchids. Lexarza became an enthusiastic student of orchids, and devised a special classification for them, based upon seed and pollen characters. He explored various regions of Mexico, and promised to become one of the accomplished botanists of his day, but his great industry proved his undoing and he died in 1824.

Myrodia funebris Benth. Journ. Linn. Soc. Bot. 6: 115. 1862.

Reported from Oaxaca and Veracruz; originally described from Izúcar, Puebla. Guatemala and El Salvador.

Tree, often 20 meters high, with broad dense crown; leaves oval or elliptic, short-petiolate, 13 to 40 cm. long, obtuse to acuminate, rounded at base, glabrous except for the tufts of hairs in the axils of the veins beneath; flowers short-pedicellate; calyx bracteolate, tomentulose; petals pure white, linear-oblong, the slender claws as long as the calyx; stamen tube twice as long as the calyx; fruit subglobose. "Cacahuaxochitl," "cacaoxochitl," "flor de cacao," "madre de cacao," "rosa de cacao."

In connection with the original description of the genus *Lexarza*, La Llave¹ gives the following account of the tree: "The President of the Republic, Guadalupe Victoria, while on a military expedition to the southern region, between Oaxaca and Angelopolis, passing through Izúcar and admiring the funereal majesty of *Lexarza*, had sent to me a branch with flowers and fruit, that a description might be drawn of it; afterward my colleague, Doctor José Ignacio Luna, sent a drawing of the tree, with accurate measurements, adding the information that to the splendid shelter formed by the lower branches of the tree, the primitive inhabitants were wont to come to mourn their dead. He stated also that flowers were added to the *pozonque* (a cold drink made of cacao) which they use at weddings and festivals, to give flavor to it, for which reason, perhaps, the tree is given the vernacular name of *cacahoaxochitl*, which may be rendered into Spanish as *flor de cacao*. According to the same authority, no other tree of the same sort is found at Izúcar or elsewhere in the region, but Doctor Miguel Valentín, of Huamantla, no mean student of natural history, after reading the description of the tree, assured me that when he was making a journey through the Mixteca he observed trees similar to this."

In Costa Rica the young shoots of some species (known as "garrocho" and "molenillo"), which develop their branches, like cacao, in whorls of 5, are used to make "molenillos," the utensils with which chocolate is beaten to a froth.

2. *Quararibea fieldii* Millsp. Field Mus. Bot. 1: 309. 1898.

Yucatán; type from Hacienda de Chabenché.

Leaves oblong-obovate, 15 to 30 cm. long, acute, obtuse or broadly cuneate at base, glabrous; flowers subsessile; calyx 2.5 cm. long, tomentulose; petals

¹ Don Pablo de La Llave was born in the city of Córdoba, Mexico, in 1773. He was educated in the Colegio de San Juan de Letran, in that city, and later gave courses in philosophy in the same institution. He pursued ecclesiastical studies and received the degree of doctor of theology when he was scarcely 19 years of age. In 1801 he went to Spain to continue his studies, this course being necessary during the Spanish domination, since at that time the offices of the church were given only to those who had been born in Spain or educated there. He became deeply interested in natural history, especially botany, and was finally appointed director of the botanical garden at Madrid. He took an interest in political affairs, also, and in 1812 was elected a deputy of the Cortés. In 1823 he returned to Mexico, and was appointed Minister of Justice and Ecclesiastical Affairs, a position which he filled until 1825. In 1830 he was president of the Senate chamber. La Llave died in 1833. He published numerous biographical and patriotic papers and treatises upon natural science. He was associate author, with Lexarza, of the *Novorum Vegetabilium Descriptiones*, published in 1824-25. He described several new genera of plants, most of which were dedicated to the heroes of the Mexican war of independence.

nearly twice as long as the calyx, 6 to 8 mm. wide; fruit ovoid, 3 cm. long, tomentose. "Maha."

The flowers are employed to flavor chocolate.

DOUBTFUL SPECIES.

MYBODIA VERTICILLARIS DC. Prodr. 1: 447. 1824. Described from Mexico, the description based upon a plate by Sessé and Mocino.¹ The illustration suggests *Quararibea turbinata* (Swartz) Poir., a species of South America and the West Indies, which has been reported from Mexico.

3. *BERNOULLIA*² Oliver in Hook. Icon. Pl. 12: 62. 1873.

1. *Bernoullia flammea* Oliver in Hook. Icon. Pl. 12: 62. *pl.* 1169, 1170. 1873.

Oaxaca. Type from "Costa Grande," Guatemala.

Tree, sometimes 40 meters high, with broad crown; leaflets usually 5 or 6, oblong-oblongate, petiolulate, 10 to 22 cm. long, acute or acuminate, glabrous; whole inflorescence bright red, obscurely puberulent; calyx 1 cm. long, shallowly bilobate; petals recurved; stamen tube long-exserted, the anthers clustered at the apex; fruit brown, ellipsoid, 20 cm. long, glabrous within; seeds (including the long wing) about 5 cm. long. "Palo calabaza," "palo de perdiz" (Oaxaca).

The wood is described as soft and spongy.

4. *CEIBA* Medic. Malvenfam. 15. 1787.

Trees, often very large, the trunk and branches often armed with spines; leaves digitate, the leaflets 5 to 7, usually serrate; peduncles axillary, 1-flowered, the flowers large or small; calyx truncate or 5-lobate; petals oblong or linear-oblong, hairy outside; stamen tube short, dividing into 5 long branches, each of these bearing a few crowded anthers at the apex; capsule woody, 5-celled, densely lanate within, the seeds small.

The species of *Ceiba* (of which *Eriodendron* is a synonym), *Pachira*, and *Bombax* have been much confused in Mexican literature and in botanical publications in general. The following Mexican names are reported for plants whose identity is doubtful, although they belong to one of these three genera: "Escobetilla," "pitón" (Morelos); "thura" (Michoacán, Tarascan); "kuy-ché" (Yucatán, Maya); "tumbile" (Michoacán); "yaga-xeni" (Oaxaca, Zapotec).

The trees of this group are well known in Mexico as well as elsewhere in tropical America, particularly because of their large size, broad crowns, and extensive buttresses. One of the earliest references to the ceiba trees in Mexican literature is by Bernal Díaz del Castillo who, in his True History of the Conquest of Mexico, relates how, in 1519, in the Indian town of Tabasco on the Río de Grijalva, after having defeated the natives in battle, Cortés took possession of the country in the King's name by drawing his sword and making three cuts in a great ceiba tree which stood in the central plaza of the town. Later Díaz states that on Palm Sunday "a cross was made in a large ceiba tree on the spot where the battle was fought, in order to afford a long memorial thereof, for this tree has the quality of preserving scars on its bark."

Oviedo (Lib. IX, Cap. XI) gives an interesting account of the ceiba or cotton trees, as follows: "In the chapters in which I treated of the oak and mahogany I spoke of their size, and on the mainland there are many such

¹ DC. Calq. Dess. Fl. Mex. *pl.* 99.

² Named for G. Bernoulli, a native of Switzerland, who resided for some time in Guatemala, where he made botanical collections.

trees and others still larger. If I should speak of these things without having seen them I should be afraid to mention them; for it is the custom of fault-finders not to content themselves with repudiating those things which in themselves are doubtful, but to contradict things that are publicly known. But since I know that I speak the truth, it does not bother me if the ignorant revile me, for barking dogs do not bite. I may say then that at a league's distance from the city of Darién, otherwise known as Santa María del Antigua, runs a very wide and deep river called Cutí. Before the Christians took possession of that country, the Indians had thrown down a stout tree which crossed that river from bank to bank; it was in a place where we were constantly crossing to go to our mines and plantations. The tree was very long and thick, but it had been there for some time and had sunk in the middle. Although we passed along the upper side, there was one stretch where the water came to the knees, and every year it lowered a little more, because the stream wore away the banks on which the trunk rested. Wherefore in the year 1522, when I was magistrate and captain in that city, I had another tree growing on the bank thrown across the stream a few paces below. When cut down it stretched clear across the river, and 50 feet besides; and the river was more than 100 feet wide. This tree where it was thickest was 16 palms or more in diameter. * * * In comparison with many other trees in the region, this was a small one." * * * "In Hispaniola there was a tree, eight leagues from this city, where it had the name of the *árbol gordo*, of which I have often heard the Admiral Don Diego Colón speak, and I have heard him say that he and fourteen other men, taking hold of hands, could not reach around it. * * * To me this is not remarkable, remembering still larger *ceyba* trees that I have seen on the mainland. In the province of Nicaragua are the largest trees I have yet seen, which greatly surpass those I have mentioned; I shall speak only of a *ceyba* which I saw many times, less than half a league from the residence of the Cacique of Thecoatega, beside a river of the town of the Cacique of Guacama, which belongs to the grant of a man called Miguel Lucas, or his companions Francisco Núñez and Luis Farfán. This tree I measured with my own hands by a *cabuya* cord, and found its circumference at the base to be 33 varas, or 132 spans [88 feet]; and since it stood on the bank of a river it was not possible to measure the lowest portion of the roots; if properly measured, I judge its circumference would have been 36 varas or 144 spans [96 feet]. This had the thickest trunk of all the trees I have seen. The wood of the *ceyba* trees is spongy, easily cut, and light, and the tree is unimportant except for two things: One is its wool and the other its vast shade, for the branches are very wide-spreading, and the shade is wholesome, not oppressive like that of other trees of the Indies, which is notoriously harmful. * * * The wool is short and I do not believe it could be spun; but for pillows and cushions it is unique in its softness, and no feathers, wool, or cotton equal it; but if wet it forms into balls and is spoiled. * * * The Indians of Nicaragua have places set aside for the *tiangües* or market, and there they have two, three, or four of these *ceyba* trees for shade, which are sufficient to shelter one to two thousand people. * * * In the province of Nicaragua this tree is called *pozot*, and in other places it has other names."

Flowers 3 to 3.5 cm. long. Leaflets glabrous, even when young.

1. *C. pentandra*.

Flowers 8 to 15 cm. long or larger.

Leaflets 1.5 to 3.5 cm. long, usually rounded or very obtuse at apex and mucronate-----

2. *C. parvifolia*.

Leaflets usually much larger, mostly acuminate.

Mature leaflets copiously stellate-tomentose beneath; young branches mostly unarmed-----3. *C. acuminata*.

Mature leaflets glabrous beneath or nearly so, the pubescence, if any, chiefly of simple hairs; young branches usually very prickly.

4. *C. aesculifolia*.

1. *Ceiba pentandra* (L.) Gaertn. Fruct. & Sem. 2: 244. 1791.

Bombax pentandrum L. Sp. Pl. 511. 1753.

Ceiba casearia Medic. Malvenfam. 16. 1787.

Eriodendron anfractuosum DC. Prodr. 1: 479. 1824.

Eriodendron occidentale Don, Hist. Dichl. Pl. 1: 513. 1831.

Sonora (cultivated), Tepic, Guerrero, Yucatán, Veracruz, and Tamaulipas.

Widely distributed in tropical America, Asia, and Africa.

Large tree, sometimes 40 meters high, with spreading crown; trunk often with large buttresses at base, the bark gray or green, smooth but covered with large conical spines; leaflets 5 to 7, oblanceolate, oblong, or obovate-oblong, 8 to 20 cm. long, acuminate; calyx 1 to 1.5 cm. long; flowers white or pink; petals silky-hairy outside; fruit elliptic-oblong, 10 to 12 cm. long, the brown seeds imbedded in the silky "cotton." "Ceiba," "ceibo" (Yucatán, Oaxaca, Veracruz, Tamaulipas, Guerrero, Guatemala, Costa Rica, Cuba); "yaxché," "piim," "peem" (Yucatán, Maya); "pochote" (Jalisco, Veracruz); "árbol de algodón" (Veracruz, Morelos); "pochote," "pochotl," "pochotle" (Veracruz, Campeche, etc.); "cabellos de ángel," "pitón," "xiloxochitl" (Herrera); "ceibón" (Nicaragua).

The usual English name is "silk-cotton tree." The tree grows very rapidly. The wood is white and soft, with a specific gravity of about 0.520. The trunks are often used for canoes, because the wood is so easily worked, and the wood is employed also for making packing boxes and matches. The most important product of the tree is the silky fiber enveloping the seeds, which is very fine, light, and elastic, and does not become matted under pressure. Large quantities of it are exported from the East Indies and West Africa under the names "kapok," "kapoc," and "kapok fiber." It is employed for stuffing mattresses, pillows, life preservers, and other articles. The silk is employed locally in Mexico and is exported in small quantities. It is said to be worth about \$1.50 (silver) per kilogram. The silk has been used in England for making beaver hats.

The seeds yield an oil used for illumination and for the manufacture of soap. The buttresses at the base of the trunk are often very wide and so thin that they are sawed into large pieces to be used as doors for native houses. The leaves are reported to be cooked and eaten at times. The large flowers are eaten by stock as they fall to the ground. The bark is applied to wounds, and taken internally it is reputed to have emetic, diuretic, and antispasmodic properties.

For illustrations of *C. pentandra* see Contr. U. S. Nat. Herb. 8: pl. 24; 9: pl. 42.

2. *Ceiba parvifolia* Rose, Contr. U. S. Nat. Herb. 8: 320. 1905.

Guerrero to Morelos, Puebla, and Oaxaca; type from Matamoros, Puebla.

Small or medium-sized tree, the young branches usually armed with stout prickles; leaflets 5 or 6, obovate-elliptic or rounded-obovate, often long-petiolulate, stellate-tomentose or in age glabrate; calyx 1.5 to 2.5 cm. long; petals about 13 cm. long, covered outside with yellow hairs; fruit oblong-ellipsoid, 8 cm. long.

3. *Ceiba acuminata* (S. Wats.) Rose, Contr. U. S. Nat. Herb. 8: 320. 1905.

Eriodendron acuminatum S. Wats. Proc. Amer. Acad. 21: 418. 1886.

Eriodendron tomentosum Robinson, Proc. Amer. Acad. 29: 314. 1894.

Ceiba tomentosa Britt. & Baker, Journ. Bot. Brit. & For. 34: 175. 1896.

Baja California and Sonora to Chihuahua, Tamaulipas, and Zacatecas, and probably southward to Oaxaca and Chiapas; type from Hacienda San Miguel, Chihuahua.

Large or medium-sized tree, the greenish trunk covered with large conic spines; leaflets usually 7, lance-elliptic or oblanceolate, 7 to 15 cm. long, cuspidate-acuminate, thin, sharply serrate; calyx 3 to 4 cm. long, tomentose or glabrous; petals 10 to 14 cm. long, densely covered outside with yellow hairs; fruit very thick and hard, 15 to 18 cm. long, the "cotton" brownish or nearly white. "Ceiba" (Tamaulipas); "pochote" (Sinaloa, Chihuahua).

A flowering specimen from Chiapas, which probably belongs here, is accompanied by the vernacular name "mosmote." The cotton is used for stuffing pillows and for candlewicks. Hartman reports that the fleshy roots are eaten.

Eriodendron tomentosum is a form with tomentose calyx, but this character appears to be variable and to be merely a matter of degree.

4. *Ceiba aesculifolia* (H. B. K.) Britt. & Baker, Journ. Bot. Brit. & For. 34: 175. 1896.

Bombax aesculifolium H. B. K. Nov. Gen. & Sp. 5: 298. 1821.

Eriodendron aesculifolium DC. Prodr. 1: 479. 1824.

Ceiba grandiflora Rose, Contr. U. S. Nat. Herb. 1: 308. 1895.

Ceiba schottii Britt. & Baker, Journ. Bot. Brit. & For. 34: 173. 1896.

Ceiba pallida Rose, Contr. U. S. Nat. Herb. 8: 320. 1905.

Sinaloa and Jalisco to Oaxaca, Yucatán, and Querétaro; type from Campeche, Guatemala.

Large or medium-sized tree, the trunk armed with stout conic spines; leaflets 5 to 7, elliptic, obovate, or oblanceolate, 5 to 15 cm. long, acuminate or cuspidate-acuminate, serrate or rarely entire, usually glaucescent beneath; calyx 2 to 4 cm. long, glabrous, often glaucous; petals 10 to 16 cm. long, yellow-hairy outside; fruit ellipsoid-oblong, 12 to 18 cm. long, the "cotton" brownish or white. "Pochote" (Oaxaca, Yucatán, Morelos, Colima, Guerrero, Sinaloa); "pochotl" (Nahuatl); "piim," "yaxché" (Yucatán, Maya); "ceiba," "ceibo" (Morelos, Yucatán, Guatemala, etc., a name probably of Carib origin).

The flowers are white at first but turn brown in age. The species is slightly variable, but none of the forms appear worthy of specific rank; indeed, it is rather doubtful whether *C. acuminata* is really a distinct species.

5. *PACHIRA* Aubl. Pl. Guian. 725. 1775.

Large trees; leaves digitate, the leaflets 3 to 9, entire; peduncles axillary, 1-flowered; calyx truncate; petals linear or linear-oblong, more than 15 cm. long; stamen tube 4.5 to 10 cm. long, the fascicles of stamens repeatedly branched; fruit large and woody, 5-valvate, naked within; seeds 1.5 cm. or more in diameter.

Petals 18 to 19 cm. long; stamen tube 4.5 cm. long-----1. *P. macrocarpa*.

Petals 23 to 30 cm. long; stamen tube 6 to 10 cm. long-----2. *P. aquatica*.

1. *Pachira macrocarpa* (Schlecht. & Cham.) Walp. Repert. Bot. 1: 329. 1842.

Carolinea macrocarpa Schlecht. & Cham. Linnaea 6: 423. 1831.

Pachira longifolia Hook. in Curtis's Bot. Mag. 76: pl. 4549. 1850.

Veracruz and Oaxaca; reported from Tabasco; type from Papantla and Tecolutla, Veracruz. Central America.

Large tree with rounded crown; leaflets 6 to 8, elliptic-oblong or obovate-oblong, 8 to 10 cm. long, obtuse or acutish, coriaceous, glabrous; calyx 1.5 cm. long, minutely tomentulose; petals 7 to 11 mm. wide, minutely tomentulose outside; stamens purplish; fruit subglobose. "Apompo," "zapote reventador" (Veracruz); "sapotón" or "zapotón" (Guatemala, El Salvador); "pumpum-juche" (El Salvador).

The fruit is said to be as large as a coconut. The tree usually grows along river banks. The seeds fall into the water, where they germinate and float about with expanded cotyledons until they reach the bank and take root. The leaves and flowers are said to be employed to relieve inflammation of the eyes, and the seeds to be employed as a substitute for cacao.

Pachira longifolia appears to be intended as a new name for *P. macrocarpa*, but the plant illustrated is probably *P. aquatica*. For illustrations of *P. macrocarpa* see Contr. U. S. Nat. Herb. 18: pl. 68, 69.

2. *Pachira aquatica* Aubl. Pl. Guian. 725. pl. 291, 292. 1775.

Carolinea princeps L. f. Suppl. Pl. 314. 1781.

Veracruz and probably elsewhere; reported from Tabasco and Chiapas, Central and South America; type from French Guiana.

Large or small tree; leaflets 5 to 7, oblong, elliptic, or oblanceolate, 8 to 20 cm. long, acute to rounded at apex, coriaceous, glabrous or nearly so; calyx 1.5 to 2 cm. long; petals 10 to 15 mm. wide, greenish and tomentulose outside, yellowish within; fruit ovoid, 10 to 30 cm. long. "Zapote bobo" (Tabasco, Ramírez); "zapote de agua" (Chiapas, Roviroso); "ceibón de agua," "ceibón de arroyo," "castaño silvestre" (Cuba).

The tree is said to be known in British Honduras as "provision-tree." The large seeds are often eaten, usually after having been roasted, and it is said that in the Guianas the young leaves are sometimes cooked and eaten.

Here is to be referred Hemsley's report of *P. insignis* Savigny, a Brazilian plant. Hemsley also reports *P. minor* (Sims) Hemsl. from Mexico, but the original illustration¹ of that species is unlike any Mexican plant of which the writer has seen specimens. For illustrations of *P. aquatica* see Contr. U. S. Nat. Herb. 18: pl. 70, 71.

DOUBTFUL SPECIES.

PACHIRA AUREA Decaisne, Fl. Serr. Jard. 23: 47. 1880. Type from Xochicalco.

6. *BOMBAX* L. Sp. Pl. 511. 1753.

Large trees, unarmed; leaflets usually 5, entire; peduncles axillary, solitary or fasciculate, 1-flowered; calyx truncate; petals oblong-linear, usually less than 15 cm. long; stamen tube very short, the filaments simple and all rising directly from it; fruit a 5-celled woody capsule, densely lanate within; seeds small, buried in the wool or "cotton."

Leaves glabrous beneath or nearly so, at least in age-----1. *B. ellipticum*.
Leaves tomentose beneath, even in age-----2. *B. palmeri*.

1. *Bombax ellipticum* H. B. K. Nov. Gen. & Sp. 5: 299. 1821.

Carolinea fastuosa DC Prodr. 1: 478. 1824.

Bombax mexicanum Hemsl. Diag. Pl. Mex. 4. 1878.

Jalisco to San Luis Potosí, Veracruz, Yucatán, and Oaxaca; type from Chilpancingo, Guerrero. Guatemala.

¹ Sims in Curtis's Bot. Mag. 34: pl. 1412. 1811.

Large unarmed tree with smooth, green or gray bark; leaflets petiolulate, elliptic, oval, or obovate-elliptic, 10 to 24 cm. long, usually broadly rounded at apex, thinly tomentose when young but in age nearly glabrous, thin; calyx about 1.5 cm. long, commonly with 10 glands at base; petals 7 to 13 cm. long, purplish; stamens pink or white; fruit oblong or ellipsoid, 10 cm. long, the "cotton" dirty white. "Amapola," "amapola blanca," "amapola colorada" (Yucatán); "xcunché" (Yucatán, Maya); "xiloxochitl" (Nahuatl, "corn-silk flower," from the resemblance of the stamens to corn silk); "ceiba" (Veracruz, Guerrero); "chilochuchi," "chicochuchi" (corruptions of the Nahuatl name); "itztamatl," "titilamatl" (Guerrero, Veracruz, *Ramírez*); "pochote," "pochotl" (Mexico); "xanacol," "xihuicxan" (Veracruz); "yaco de la costa," "cabellos de ángel," "coquito," "disciplina," "jiquique," "lele," "pongolote," "tiata" (Oaxaca, *Reko*); "clavellina" (Guerrero); "doncella" (Guatemala); "chicochuchi" (*Conzatti*).

The tree blooms when leafless. The handsome flowers are often gathered for decorations in churches and for similar purposes, and they were esteemed by the Mexicans as one of their most beautiful flowers. The decoction of the bark and root is used as a remedy for toothache and to harden the gums.

This is probably the tree illustrated by Hernández¹ and described in a chapter entitled "De Xiloxochitl, Flore Capillaceo." He states that the bark was highly valued as a remedy for ulcers, and for its diuretic properties.

Bombax ellipticum has been reported from Yucatán as *Pachira fastuosa* Decaisne and *P. alba* (Lodd.) Walp., and Mexican reports of *Bombax ceiba* L., an Old World species, are probably referable here. Hemsley gives no reasons for his segregation of *B. mexicanum*. The numerous specimens seen by the writer exhibit some variation, especially in the size of the flowers, but all (including some from the type locality of *B. mexicanum*) appear to be conspecific.

2. *Bombax palmeri* S. Wats. Proc. Amer. Acad. 22: 399. 1887.

Sonora to Jalisco; type from the barranca near Guadalajara, Jalisco.

Tree, 8 to 10 meters high or larger, the trunk 60 to 70 cm. in diameter, covered with smooth green bark; leaflets nearly sessile, obovate to nearly orbicular, mostly 10 to 25 cm. long, rounded to acute at apex but usually apiculate, tomentose on both surfaces when young but glabrate above in age; petals 10 to 17 cm. long, whitish-tomentulose outside; stamens pink or purplish; fruit oblong or ellipsoid, 10 to 12 cm. long, the "cotton" brownish. "Cuajilote," "guajilote," "clavellina" (Sinaloa); "clavellina de la barranca" (Jalisco).

The tree flowers when leafless. The burned and powdered bark is applied to wounds.

EXCLUDED GENUS.

MONTEZUMA DC. Prodr. 1: 477. 1824. The single species, *M. speciosissima* DC., was based upon one of Sessé and Mocíño's drawings. No similar plant has been found among recent Mexican collections, and it appears that *Montezuma* is the Porto Rican plant, *Thespesia grandiflora* DC., which was made the type of a new genus, *Maga*, by Urban.²

97. STERCULIACEAE. Cacao Family.

Trees, shrubs, or herbs, sometimes scandent, the pubescence chiefly stellate; leaves alternate, simple or rarely compound, stipulate; flowers small or large, chiefly in cymes, usually perfect, regular or sometimes zygomorphic; calyx

¹ Thesaurus 68. 1651.

² Symb. Antill. 7: 281. 1912.

gamosepalous, usually 5-parted; petals 5 or none, free or united with the stamen tube; stamens connate, at least at base, the tube usually with 5 staminodia, the anthers borne in the sinuses; fruit dry or rarely baccate, usually 5-celled, variously dehiscent.

The genus *Brotera* Cav. was originally described from Mexico, but incorrectly, or else it was based upon a cultivated plant. The name is considered a synonym of *Melhanla* Forsk. and the species described by Cavanilles is an African one.

Flowers unisexual; fruit of distinct carpels; leaves simple and deeply lobed or often compound -----1. **STERCULIA**.

Flowers perfect; fruit not of distinct carpels; leaves simple, rarely lobed.

Petals none. Leaves lobed.

Flowers zygomorphic; anthers sessile-----2. **CHIRANTHODENDRON**.

Flowers regular; anthers on long filaments----3. **FREMONTODENDRON**.

Petals present.

Androgynophore very long, in age equaling or longer than the fruit; carpels often spirally twisted -----4. **HELICTERES**.

Androgynophore short, always shorter than the fruit; carpels never twisted.

Petals flat; anthers 5.

Seeds numerous in each cell-----5. **HERMANNIA**.

Seeds 2 in each cell or, by abortion, only 1.

Capsule 1-celled -----6. **WALTHERIA**.

Capsule 5-celled.

Staminodia present; calyx in fruit 1.5 to 4 cm. long.

Staminodia none; calyx in fruit 1 cm. long or less.

8. **MELOCHIA**.

Petals concave or cucullate; anthers 5 to 15.

Anthers 2 or more in each sinus of the stamen tube.

Blade of the petal entire; fruit not muricate-----9. **THEOBROMA**.

Blade of the petal deeply bifid; fruit muricate-----10. **GUAZUMA**.

Anthers 1 in each sinus.

Petals free from the stamen tube-----11. **NEPHROPETALUM**.

Petals united at the apex with the stamen tube.

Petals naked on the back or furnished with a gland; plants unarmed, never scandent-----12. **AYENIA**.

Petals produced dorsally into a ligulate blade; plants often prickly and scandent-----13. **BUETTNERIA**.

1. **STERCULIA** L. Sp. Pl. 1007. 1753.

Trees; leaves simple and lobate or digitately compound; flowers unisexual or polygamous, paniculate, usually axillary; calyx 5-lobate, commonly colored and corolla-like; petals none; stamen column with usually 15 anthers at the apex; fruit 5-carpellate, the carpels distinct, spreading, woody, dehiscent along the inner side; seeds 1 to many in each carpel, large.

Leaves simple, palmately lobed-----1. *S. apetala*.

Leaves digitately compound-----2. *S. mexicana*.

1. *Sterculia apetala* (Jacq.) Karst. Fl. Columb. 2: 35. 1869.

Helicteres apetala Jacq. Stirp. Amer. 238. pl. 181. 1763.

Sterculia carthaginensis Cav. Monad. Diss. 353. 1790.

Sterculia punctata DC. Prodr. 1: 483. 1824.

Chichaea acerifolia Presl, Rel. Haenk. 2: 141. 1836.

Sterculia acerifolia Hemsl. Biol. Centr. Amer. Bot. 1: 126. 1879.

Chiapas, Tabasco, and Yucatán, and probably elsewhere. West Indies, Central America, and South America; type from Cartagena, Colombia.

Tree, 12 to 15 meters high; leaves long-petiolate, 5-lobate, 15 to 30 cm. broad or larger, deeply cordate at base, glabrate above, stellate-tomentose beneath when young but often glabrate in age, the lobes rounded to acutish at apex, entire; panicles longer or shorter than the petioles, many-flowered, the calyx open-campanulate, 2.5 to 3 cm. wide, yellow spotted with purple; carpels of the fruit 10 cm. long, tomentulose, hispid within; seeds oval, about 2 cm. long, castaneous. "Bellota" (Tabasco); "castañas" (the seeds; Tabasco); "castaño" (Guatemala, Honduras); "Panamá" (Nicaragua, Costa Rica); "camajón duro" (Colombia); "camaruca" (Cuba); "anacagüitas" (Porto Rico).

The plant is employed locally for catarrhal and pectoral affections. For an illustration of this species see Contr. U. S. Nat. Herb. 8: *pl.* 56.

2. *Sterculia mexicana* R. Br. in Horsf. Pl. Jav. Rar. 227. 1838-52.

Chiapas and Tabasco; type from Chiapas.

Leaves long-petiolate; leaflets 7 to 9, narrowly oblong-lanceolate, 12 to 30 cm. long, acute or acuminate, petiolulate, sparsely stellate-pubescent at first but soon glabrate, pinnate-nerved; panicles about 30 cm. long, many-flowered; calyx 2 cm. broad, lobed nearly to the base, densely pubescent.

EXCLUDED SPECIES.

STERCULIA OBLONGIFOLIA DC. Prodr. 1: 482. 1824. Described from Mexico, the description based upon one of Sessé and Mocino's drawings. According to Horsfield and Bennett, this is *Cola acuminata* (Beauv.) Horsf. & Benn., the cola nut, an African tree which is cultivated in tropical America. The writer has seen specimens from Jamaica and Costa Rica but none from Mexico.

2. *CHIRANTHODENDRON* Larreategui, Descr. Chiranthod. 17. 1805.

The genus consists of a single species.

1. *Chiranthodendron pentadactylon* Larreategui, Descr. Chiranthod. 17. 1805.

Cheirostemon platanoides Humb. & Bonpl. Pl. Aequin. 1: 82. *pl.* 24. 1808.

Chiranthodendron platanoides Baill. Hist. Pl. 4: 69, 1873.

Mountains of Oaxaca, and often cultivated elsewhere. Guatemala.

Tree, 12 to 15 meters high, the trunk often 40 cm. in diameter; leaves long-petiolate, 12 to 30 cm. long, acutish to acuminate, deeply cordate at base, irregularly and shallowly 3 to 7-lobate or nearly entire, glabrate above, stellate-tomentose beneath; peduncles short, 1-flowered, opposite the leaves; calyx campanulate, 3.5 to 4.5 cm. long, deeply 5-lobate, green, streaked with red, with a large pit inside at the base of each lobe; petals none; stamen column elongate, dividing into usually 5 branches, these linear, simulating long 2-celled anthers; capsule narrow, about 15 cm. long, deeply sulcate, loculicidally 5-valvate, hispid within; seeds small, black and shining, with a fleshy appendage at the hilum. "Mapasúchil" (the flower; from the Nahuatl, *macpal-xochitl*, "hand-flower"); "macpalxochicuahuatl" (the tree; Nahuatl); "árbol de las manitas," "flor de manitas," "manita de león," "mano de león" (Mexico); "teyaqua" (Michoacán, León); "palo de tayuyo," "mano de mico" (Guatemala).

The hand-flower tree is one of the most celebrated of Mexican plants, and was well known to the early inhabitants. It is restricted in its distribution, and for a long time the only tree known to the residents of the Valley of Mexico was one growing at Toluca. Even long after the Conquest this was believed

to be the only tree of its kind, except for its progeny planted elsewhere in the valley. The stamens bear a striking resemblance to a hand and wrist with outspread fingers, and because of the remarkable form of the flowers the tree was viewed with veneration. Trees of this species are of frequent occurrence in the gardens of the City of Mexico and elsewhere.

The tree is figured by Hernández¹ under the name "Macpalxochi Quahuitl," but without description. Cervantes reports that the infusion of the flowers was employed by the Indians of Toluca as a remedy for inflammation of the eyes and for hemorrhoids.²

3. FREMONTODENDRON Coville, Contr. U. S. Nat. Herb. 4: 74. 1893.

1. *Fremontodendron mexicanum* Davidson, Bull. South. Calif. Acad. 16: 50. 1917.

Fremontia mexicana Macbride, Contr. Gray Herb. n. ser. 53: 14. 1918.

Mountains and foothills of Baja California; described from a cultivated plant, from Ensenada. Southern California.

Shrub or small tree with red-brown branches; leaves long-petiolate, palmately 3 or 5-lobate, 2 to 4.5 cm. long; deeply cordate at base, green above, sparsely stellate-pubescent, whitish or yellowish beneath and covered with a dense close stellate tomentum, the lobes rounded, sometimes again lobate; flowers solitary, opposite the leaves, on short peduncles; calyx open-campanulate, 2.5 to 3.5 cm. long, corolla-like, yellow tinged with red, stellate-pubescent, the lobes rounded and apiculate, each with a large glabrous gland at base; petals none; capsule 4 or 5-valvate, densely hairy.

Fremontodendron californicum (Torr.) Coville is distinguished from *F. mexicanum* by the densely hairy glands at the base of the calyx. It has hard close-grained red-brown wood, with a specific gravity of about 0.71. In California the tree is sometimes known as slippery elm, because of the resemblance of its inner bark to that of *Ulmus fulva*. The genus is named for Col. John Charles Frémont, one of the earliest explorers of the western United States.

4. HELICTERES L. Sp. Pl. 963. 1753.

Trees or shrubs, with stellate pubescence; leaves serrate; flowers axillary, solitary or fasciculate; calyx tubular, 5-dentate; petals 5, equal or unequal, clawed; stamen column elongate, truncate or 5-lobate at apex, each sinus with 1 or 2 anthers; fruit long-stipitate, composed of 5 many-seeded carpels, these straight or usually spirally twisted.

The bark yields a good quality of fiber, suitable for cordage and paper. The plants are mucilaginous and have emollient properties. In Brazil the roots have been used as a remedy for syphilitic affections.

Flowers erect, regular or nearly so; fruit erect on its stipe and pedicel.

1. *H. guazumaefolia*.

Flowers horizontal, zygomorphic; fruit recurved or pendent.

Carpels spirally twisted; leaves tomentose beneath.....2. *H. baruensis*.

Carpels straight; leaves glabrate beneath.....3. *H. rekol*.

1. *Helicteres guazumaefolia* H. B. K. Nov. Gen. & Sp. 5: 304. 1821.

Helicteres mexicana H. B. K. Nov. Gen. & Sp. 5: 305 1821.

Helicteres carpinifolia Presl, Rel. Haenk. 2: 138. 1836.

¹ Thesaurus 383, 459. 1651.

² See Mariano Bárcena, El árbol de manitas, Naturaleza 3: 114-117. 1876.

Sinaloa to Oaxaca, Tabasco, and Veracruz. Cuba, Central America, and South America; type from the Orinoco River.

Shrub, 1 to 3 meters high; leaves short-petiolate, often nearly sessile, oblong-ovate or elliptic-ovate, 5 to 9 cm. long, acute or acuminate, rounded or subcordate at base, dentate, finely or coarsely stellate-pubescent; calyx 1.5 to 2.2 cm. long, hirsute or finely stellate-pubescent; petals spatulate, red, longer than the calyx; gynophore long-exserted; fruit 2 to 3 cm. long, about 8 mm. thick, finely stellate-pubescent. "Majagüilla" (Veracruz, *Ramírez*); "tornillo" (Veracruz); "monacillo colorado" (Oaxaca); "sacatrapo" (Tabasco); "capitanejo" (Michoacán, Guerrero); "palo de capulín" (Guatemala, Honduras); "rabo de puerco" (Costa Rica); "cola de chancho" (Nicaragua); "monecillo" (Guatemala); "guácimo torcido," "guacimillo," "torcidillo" (Panama); "guacimilla" (Sinaloa).

This, apparently, is the species reported by Sessé and Mocifio¹ as *H. isora* L.

2. *Helicteres baruensis* Jacq. Enum. Pl. Carib. 30. 1760.

Helicteres mollis Presl, Rel. Haenk. 2: 139. 1836.

Guerrero and Yucatán, and doubtless elsewhere. Central America and northern South America; type from Baru Island.

Shrub, 2.5 meters high; leaves short-petiolate, oval-ovate or elliptic-ovate, obtuse or acute, cordate at base, pale-tomentose beneath, denticulate; flowers numerous; calyx about 3 cm. long; petals red, linear, 4 cm. long; fruit 4 to 5 cm. long, fulvous-tomentose, the gynophore 8 to 12 cm. long, curved.

This is related to *H. jamaicensis* Jacq., which is known in Porto Rico as "cuernecillo," "huevo de gato," and "gato."

3. *Helicteres reko* Standl., sp. nov.

Type from Pochutla, Oaxaca, altitude 100 meters (*Reko* 3443; U. S. Nat. Herb. no. 842527).

Branches slender, minutely stellate-pubescent; petioles slender, 2 to 3 cm. long; leaf blades broadly ovate, elliptic, or ovate-elliptic, 8 to 15 cm. long, acute or abruptly acute, rounded or subcordate at base, dentate, thin, green, nearly glabrous above, with scattered stellate hairs beneath; calyx 2.5 cm. long, muricate, minutely stellate-tomentulose, the lobes triangular, 6 to 7 mm. long; petals oblanceolate, 4 cm. long; fruit about 7 cm. long, recurved, the carpels straight, minutely stellate-tomentulose; gynophore 5.5 to 7 cm. long, glabrous.

5. **HERMANNIA** L. Sp. Pl. 673. 1753.

Low shrubs or herbs, with stellate pubescence; leaves dentate, the stipules foliaceous; flowers small, axillary; calyx 5-lobate; petals 5, obovate, persistent; stamens 5, connate at base; fruit a luculicidal 5-valvate capsule, the cells often cristate dorsally.

Calyx large, inflated, nearly covering the capsule.....1. *H. inflata*.
Calyx small and inconspicuous, spreading at the base of the fruit.

Anthers 5 mm. long, nearly sessile; spines on the angles of the capsule 3 to 4 mm. long.....2. *H. palmeri*.

Anthers 2 mm. long, on long filaments; spines of the fruit usually 2 mm. long or less.

Flowers solitary in the axils.....3. *H. pauciflora*.

Flowers in axillary cymes.....4. *H. texana*.

¹ Pl. Nov. Hisp. 157. 1887.

1. *Hermannia inflata* Link & Otto, Icon. Pl. Rar. 55. pl. 28. 1828.

Puebla and Oaxaca.

Shrub 1 to 2 meters high, densely stellate-pubescent throughout; leaves short-petiolate, rhombic-ovate, 2 to 6 cm. long, acute to rounded at apex, rounded at base, crenate-dentate; flowers subracemose, short-pedicellate, solitary in the upper axils; petals about 1 cm. long; calyx in fruit 1 cm. long, purplish; capsule 10 to 12 mm. long, densely hairy, the angles unarmed.

2. *Hermannia palmeri* Rose, Contr. U. S. Nat. Herb. 1: 67. 1890.

Baja California; type from La Paz.

Plants low, suffrutescent or herbaceous, densely stellate-pubescent and glandular-pubescent; leaves short-petiolate, 1 to 3 cm. long, rhombic-ovate to rounded-cordate, obtuse or rounded at apex, crenate-dentate; flowers solitary or cymose; petals yellow, 8 to 10 mm. long; anthers connivent; capsule 12 mm. long, the spines slender, glochidiate.

3. *Hermannia pauciflora* S. Wats. Proc. Amer. Acad. 17: 368. 1882.

Sonora. Southern Arizona, the type from the Santa Catalina Mountains.

Plants low, herbaceous, or suffrutescent at base, rather thinly stellate-pubescent; leaves slender-petiolate, rhombic-ovate, 1 to 3.5 cm. long, obtuse or rounded at apex, truncate or subcordate at base, dentate; pedicels slender; petals yellow, 8 mm. long; capsule 8 to 12 mm. long, thinly pubescent, the marginal spines very short.

4. *Hermannia texana* A. Gray, Gen. Fl. Amer. 2: 88. pl. 155. 1849.

Tamaulipas, Coahuila, Nuevo León, and San Luis Potosí. Western Texas.

Plants herbaceous or suffrutescent, 60 cm. high or less, densely stellate-pubescent; leaves oblong-ovate to rounded, usually rounded at apex, rounded or subcordate at base, dentate or sinuate-dentate; petals dull red, 8 mm. long; capsule 10 to 12 mm. long, densely hairy.

6. *WALTHERIA* L. Sp. Pl. 673. 1753.

REFERENCE: Rose, Synopsis of the North American species of *Waltheria*, Contr. U. S. Nat. Herb. 5: 183-185. 1899.

Shrubs or herbs, sometimes small trees, the pubescence mostly stellate; leaves serrate or dentate; flowers small, glomerate, the glomerules axillary, sessile or pedunculate; calyx 5-lobate; petals 5, persistent in fruit; stamens 5, the filaments wholly or partially connate; fruit a 1-seeded capsule.

The only other Mexican species of the genus, *W. operculata* Rose, is an annual plant with broad stipules, the capsule opening by a lid. In the species listed below the stipules are linear and the capsule is loculicidally dehiscent.

Leaves long-acuminate, acutely dentate, glabrous or nearly so.

1. *W. acuminata*.

Leaves acute to rounded at apex, crenate or obtusely dentate.

Leaves large, mostly 7 to 15 cm. long, distichous; large shrubs.

Filaments united to the summit leaves broadly ovate.....2. *W. brevipes*.

Filaments united only at base; leaves elliptic-oblong or obovate-oblong.

3. *W. glomerata*.

Leaves small, mostly 2 to 7 cm. long, not conspicuously if at all distichous; small shrubs or herbs.

Lobes of the calyx much shorter than the tube.

Petals much exceeding the calyx.....4. *W. preslii*.

Petals not exceeding the calyx.

Leaves glabrous beneath in age; flowers in large panicles.

5. *W. alamosana*.

Leaves pubescent beneath in age; flowers in small dense clusters.

Calyx 4 to 4.5 mm. long; leaves green beneath, thinly stellate-pubescent -----6. *W. pringlei*.

Calyx 6 mm. long; leaves whitish beneath, densely stellate-tomentulose -----7. *W. conzattii*.

Lobes of the calyx nearly or quite as long as the tube.

Filaments united to form a tube -----8. *W. americana*.

Filaments free above.

Leaves acute; petals purple -----9. *W. hirsuta*.

Leaves obtuse or rounded at apex; petals yellow --10. *W. acapulcensis*.

1. *Waltheria acuminata* Rose, Contr. U. S. Nat. Herb. 5: 183. 1899.

Known only from the type locality, Culiacán, Sinaloa.

Slender shrub; leaves ovate-cordate, thin, green, 8 to 12 cm. long, shallowly cordate at base, long-petiolate; flower clusters short-pedunculate; calyx lobes half as long as the tube; filaments united to above the middle.

2. *Waltheria brevipes* Turcz. Bull. Soc. Nat. Moscou 31⁴: 213. 1858.

Veracruz and Oaxaca; type from San Pedro Nolasco, Oaxaca. Costa Rica.

Shrub or small tree, 2.5 to 7.5 meters high; leaves short-petiolate, acute or obtuse, subcordate at base, rugose, finely stellate-tomentulose, pale beneath; flower clusters large, dense, mostly sessile; calyx 6 to 7 mm. long, the lobes half as long as the tube.

3. *Waltheria glomerata* Presl, Rel. Haenk. 2: 152. 1836.

Veracruz. Panama (type locality).

Shrub, 1.5 to 3 meters high; leaves short-petiolate, acute, obtuse or rounded at base, rugose, finely stellate-pubescent, pale beneath, at least when young, finely dentate; flower clusters large, sessile; calyx 6 mm. long, the lobes short; petals white, exserted.

The leaves are said to be used in Panama as a hemostatic.

4. *Waltheria preslii* Walp. Repert. Bot. 1: 340. 1842.

Waltheria rotundifolia Presl, Rel. Haenk. 2: 151. 1836. Not *W. rotundifolia* Schrank, 1828.

Known only from the vicinity of Acapulco, Guerrero, the type locality.

Stems suffrutescent, usually prostrate; leaves broadly ovate or rounded, long-petiolate, obtuse or rounded at apex, cordate at base, densely stellate-tomentose; flower clusters mostly pedunculate; calyx 4 to 5 mm. long; petals yellow.

5. *Waltheria alamosana* Standl., sp. nov.

Type from Alamos, Sonora (*Rose, Standley & Russell* 12714; U. S. Nat. Herb. no. 635525).

Shrub, 1 to 1.5 meters high, the branches dark reddish brown, very minutely and sparsely stellate-pubescent or glabrate; leaves ovate, 3 to 6 cm. long, long-petiolate, obtuse to acuminate, cordate or subcordate at base, coarsely crenate, when young minutely stellate-pubescent but soon becoming glabrous; flowers loosely cymose-paniculate, sessile; calyx cylindric, 6 mm. long, 5-angulate, costate between the angles, minutely stellate-pubescent, the lobes half as long as the tube, narrowly triangular, acuminate.

6. *Waltheria pringlei* Rose & Standl., sp. nov.

Guerrero and Morelos; type from limestone mountains above Iguala, Guerrero, altitude 1,200 meters (*Pringle* 8422; U. S. Nat. Herb. no. 381847).

Shrub, 1 to 2.5 meters high; leaves short-petiolate, lance-ovate or ovate, 3.5 to 7 cm. long, acute, rounded or subcordate at base, coarsely and obtusely den-

tate, thin, green, minutely stellate-pubescent; flower clusters dense, mostly sessile; calyx 4 to 4.5 mm. long, the lobes short, narrowly triangular, acute, minutely tomentose; petals much shorter than the calyx; filaments free above; capsule loculicidal.

Collected also at Yautepec, Morelos, by Pringle (no. 9691).

7. *Waltheria konzattii* Standl., sp. nov.

Type from Salina Cruz, Oaxaca, altitude 50 meters (*Konzatti* 3682; U. S. Nat. Herb. no. 989568).

Shrub; leaves long-petiolate, rounded-ovate or rhombic-ovate, 3 to 8 cm. long, obtuse, rounded or shallowly cordate at base, crenate-dentate, thick, densely velvety-tomentose; flower clusters loose, few-flowered, short-pedunculate; calyx 6 mm. long, velutinous-tomentose, the lobes half as long as the tube, narrowly triangular, acute; petals nearly as long as the calyx; filaments united for less than half their length.

8. *Waltheria americana* L. Sp. Pl. 673. 1753.

Waltheria indica L. Sp. Pl. 673. 1753.

Waltheria detonsa A. Gray, Pl. Wright. 2: 24. 1853.

Nearly throughout Mexico. Widely distributed in the warmer parts of both hemispheres.

Shrub, sometimes 2.5 meters high, or often herbaceous, frequently decumbent; leaves on long or short petioles, oblong to rounded-ovate, obtuse to rounded at apex, obtuse to subcordate at base, crenate-dentate, usually thick and densely tomentose, but the pubescence variable in amount and quality; flower clusters usually dense, sessile or often long-pedunculate; petals yellow, longer than the calyx. "Malva" (Sinaloa); "malva del monte" (Yucatán); "hierba del soldado" (Tamaulipas); "malva blanca" (Cuba); "basora prieta," "malvavisco" (Porto Rico); "bretónica" (Venezuela).

The flowers are sweet-scented. The plant is mucilaginous and emollient, and febrifuge and antisiphilitic properties have been ascribed to it. In Tamaulipas a decoction is employed as a remedy for eruptions of the skin, and in Colima the decoction is used to wash wounds. The plant is said to possess some forage value.

9. *Waltheria hirsuta* Presl, Rel. Haenk. 2: 152. 1836.

Described from western Mexico.

Leaves ovate-cordate, acute, obtusely dentate, whitish-tomentose beneath, about 3.5 cm. long; flower clusters, long-pedunculate; petals exserted.

No material referable to this species has been seen by the writer.

10. *Waltheria acapulcensis* Rose, Contr. U. S. Nat. Herb. 5: 184. 1899.

Known only from the type locality, Acapulco, Guerrero.

Leaves slender-petiolate, oblong or oblong-ovate, 2.5 to 6 cm. long, rounded or cordate at base, green, stellate-pubescent; flower clusters small, mostly pedunculate; calyx 3 to 4 mm. long; petals yellow, exserted.

7. **PHYSODIUM** Presl, Rel. Haenk. 2: 150. 1836.

Shrubs or small trees; flowers cymose-paniculate, terminal; calyx campanulate, 5-dentate, 5-angulate, accrescent, inflated, reticulate-veined; petals 5; stamen column dividing above into 5 short filaments; capsule small, stipitate, included in the calyx, loculicidally 5-valvate, the cells 1-seeded.

Pubescence not glandular; petals exserted from the calyx-----1. *P. dubium*.

Pubescence of the inflorescence chiefly of gland-tipped hairs; petals included.

2. *P. corymbosum*.

1. *Physodium dubium* Hemsl. Diag. Pl. Mex. 4. 1878.

Morelos, Guerrero, Puebla, and Oaxaca; type collected between Acatlán and Chila, Puebla.

Shrub or small tree, 2 to 6 meters high; leaves slender-petiolate, broadly ovate or ovate-cordate, 5 to 12 cm. long, acute to cuspidate-acuminate, subcordate and oblique at base, serrulate, densely stellate-pubescent, green; calyx in fruit 1.5 to 2 cm. long, pale red or purple; petals pale blue; capsule about 6 mm. long.

The calyx in this and the following species is similar to that of the genus *Physalis*. In its form and coloration it suggests also the showy bracts of the genus *Bougainvillea*.

2. *Physodium corymbosum* Presl, Rel. Haenk. 2: 150. pl. 72. 1836.

Jalisco, Colima, and Guerrero.

Shrub, 3 meters high; leaves similar to those of *P. dubium*, but less pubescent; calyx in fruit 2.5 to 3.5 cm. long, purple, the lobes obtuse or acute; petals oblanceolate, much shorter than the calyx; capsule 6 mm. long.

2a. *Physodium corymbosum acuminatum* Rose, Contr. U. S. Nat. Herb. 1: 309. 1895.

Sinaloa, Jalisco, and Michoacán; type from Jalisco.

Shrub or small tree, 2 to 4 meters high, with gray bark; leaves like those of the species; calyx in fruit 3 to 4 cm. long, yellowish or purple, the lobes acuminate. "Rechinador" (Sinaloa).

The form of the calyx is decided different from that of typical *P. corymbosum*, but there appear to be intermediate forms, and no other distinctive character is apparent.

8. MELOCHIA L. Sp. Pl. 774. 1753.

Shrubs or herbs, the pubescence of simple or stellate hairs; leaves dentate; flowers mostly small, cymose or in dense axillary glomerules; calyx 5-lobate; petals 5, spatulate, persistent; stamens 5, connate at the base or higher; capsule 5-celled, loculicidally 5-valvate, the cells 1-seeded, the carpels easily separating, sometimes indehiscent.

Capsule pyramidal.

Leaves glabrous or nearly so, green; capsule glabrous or glabrate, very short-stipitate-----1. *M. pyramidata*.

Leaves densely stellate-tomentose, usually whitish beneath; capsule densely pubescent, on a comparatively long stipe-----2. *M. tomentosa*.

Capsule depressed-globose.

Flowers all or mostly on long pedicels, the pedicels glabrous except for a few weak gland-tipped hairs.

Carpels of the fruit splitting along the back from apex to base; bractlets present at the base of the calyx and exceeding it in length.

3. *M. glandulifera*.

Carpels splitting along the back from the apex halfway to the base; bractlets none at base of calyx-----4. *M. interrupta*.

Flowers sessile or nearly so, densely glomerate in the leaf axils; gland-tipped hairs absent, or mixed with stellate ones.

Bracts of the inflorescence linear-subulate, green-----5. *M. hirsuta*.

Bracts lanceolate or broader, dry, brown.

Stamens shorter than the styles.

Leaves glabrous beneath or with scattered appressed hairs; inflorescence without viscid pubescence-----6. *M. nodiflora*.

Leaves densely pubescent beneath with minute spreading hairs; inflorescence viscid-pubescent.....7. *M. tragiaefolia*.

Stamens longer than the styles.

Lower surface of leaves covered with rather long, appressed hairs, or rarely glabrate8. *M. urticaefolia*.

Lower surface of leaves covered with minute spreading hairs.

9. *M. tomentella*.

1. *Melochia pyramidata* L. Sp. Pl. 774. 1753.

Nearly throughout Mexico. Widely distributed in the warmer portions of both hemispheres.

Slender shrub, 1 to 2 meters high, or often herbaceous; leaves slender-petiolate, oblong to rounded-ovate, acute or obtuse, rounded at base, serrate, green, often glabrous but frequently sparsely pubescent; flowers in axillary corymbs, mostly pedicellate; petals violet, about 7 mm. long; capsule 5 to 6 mm. long and somewhat broader, the lobes broadened at the base, acute and spreading. "Suponite" (Oaxaca); "malva común," "malva cimarrona" (Cuba); "bretónica" (Porto Rico).

The plant is eaten by stock.

2. *Melochia tomentosa* L. Syst. Nat. ed. 10. 1140. 1759.

Melochia plicata Presl, Rel. Haenk. 2: 145. 1836.

Melochia speciosa S. Wats. Proc. Amer. Acad. 24: 42. 1889.

Melochia arida Rose, Contr. U. S. Nat. Herb. 8: 321. 1905.

Nearly throughout Mexico. Widely distributed in the warmer parts of the Western Hemisphere.

Shrub, 0.5 to 2.5 meters high; leaves on long or short petioles, oblong to broadly rhombic-ovate, rounded to acutish at apex, rounded or subcordate at base, crenate or dentate, thick, usually densely and finely tomentose on both surfaces; flowers in loose cymes, mostly pedicellate; petals pink to violet, 8 to 18 mm. long; fruit 7 to 9 mm. long, long-beaked, the lobes rounded to acutish below. "Malvavisco" (Porto Rico); "bretónica" (Porto Rico, Venezuela); "malva," "varita de San José" (Nicaragua).

The plants vary considerably in size of flowers and leaves, in density of pubescence, and in form of the fruit, but none of the proposed segregates seem worthy of recognition. *M. arida* is a small-leaved form of dry regions. *M. speciosa* is a form with unusually large flowers and rather scant pubescence. Watson compared the latter, in his original description, with *M. pyramidata*, from which, of course, it is amply distinct. To the present writer it seems not improbable that *M. pyramidata* and *M. tomentosa* may at times hybridize.

3. *Melochia glandulifera* Standl., sp. nov.

Type from Tonalá, Chiapas (*Purpus* 6925; U. S. Nat. Herb. 567212).

Branches slender, sparsely furnished with short weak simple gland-tipped hairs; leaves slender-petiolate, deltoid-lanceolate or lance-ovate, acute or acuminate, rounded at base, serrate-dentate, thin, glabrous beneath, with a few scattered hairs above; flowers in lateral cymes, mostly long-pedicellate, the bractlets linear, ciliate, more than twice as long as the calyx; calyx lobes shorter than the tube, cuspidate-acuminate; petals purple, 5 mm. long; fruit subglobose, 4.5 mm. in diameter, setulose-hirtellous and also with slender gland-tipped hairs.

4. *Melochia interrupta* (Schlecht.) Hemsl. Biol. Centr. Amer. Bot. 1: 131. 1879.

Riedlea interrupta Schlecht. Linnaea 11: 375. 1837.

Veracruz; type from Hacienda de la Laguna.

Plants about 1 meter high, sometimes wholly herbaceous, the stems hirsute and glandular-pilose; leaves short-petiolate, narrowly lanceolate to broadly ovate, acute or acuminate, serrate, thinly pilose or glabrate; inflorescence chiefly terminal, open; petals 6 mm. long; fruit 5 mm. in diameter.

5. *Melochia hirsuta* Cav. *Monad. Diss.* 323. *pl.* 175. *f.* 1. 1788.

Riedlea serrata Vent. *Choix Pl. Cels pl.* 37. 1803.

Melochia serrata St. Hil. & Naud. *Ann. Sci. Nat.* II. 18: 36. 1842.

? *Riedlea jurgensenii* Turcz. *Bull. Soc. Nat. Moscou* 31¹: 211. 1858.

Riedlea heterotricha Turcz. *Bull. Soc. Nat. Moscou* 31¹: 211. 1858.

Jalisco to Veracruz and Oaxaca. West Indies, Central America, and South America.

Low shrub or herb; leaves short-petiolate, oblong to rhombic-ovate, 2 to 7 cm. long, rounded to acuminate at apex, rounded or cordate at base, serrate, green, pilose or glabrate; flowers in dense sessile clusters, these usually forming a terminal spike; bracts hirsute; petals purple, 8 to 12 mm. long. "Rafz de toro" (Costa Rica); "estancadera" (Colombia); "bretónica" (Porto Rico); "malva mora" (Cuba).

6. *Melochia nodiflora* Swartz, *Prodr. Veg. Ind. Occ.* 97. 1788.

Guerrero to Veracruz and Oaxaca. West Indies and Central America.

Slender shrub, sometimes 2 meters high; leaves slender-petiolate, mostly ovate, acute or acuminate, rounded or subcordate at base, serrate, thin, green, usually glabrous or nearly so; flowers mostly in dense axillary glomerules; petals pink or purple. "Malva colorada" (Cuba); "mozote de monte" (Nicaragua); "bretónica," "bretónica prieta" (Porto Rico).

7. *Melochia tragiaefolia* Standl., *sp. nov.*

Type from La Salada, Michoacán (*Nelson* 6927; U. S. Nat. Herb. 399266).

Branches red-brown, glandular-pilose when young; leaves slender-petiolate, ovate-cordate, acute or acuminate, 4 to 5.5 cm. long, coarsely dentate, thin, green, minutely velutinous-pilosulous on both surfaces; bracts ovate, brown; calyx densely glandular-pubescent, the lobes ovate-lanceolate, acuminate, about as long as the tube; petals 6 mm. long; fruit glandular-pubescent, the 5 carpels easily separating, tardily dehiscent.

8. *Melochia urticaefolia* (Turcz.) Standl.

Riedlea urticaefolia Turcz. *Bull. Soc. Nat. Moscou* 31¹: 209. 1838.

Jalisco to Morelos and Oaxaca; type from Oaxaca.

Slender shrub, 1 to 2 meters high; leaves slender-petiolate, ovate-lanceolate to broadly ovate, acute or acuminate, rounded or subcordate at base, dentate, thin, green, sparsely appressed-pilose on the upper surface or glabrate; petals purple, 7 to 10 mm. long.

It is doubtful whether the name *urticaefolia* really belongs to this plant, or whether it is not rather a synonym of *M. nodiflora*. In the latter case the present plant appears to be without a name, unless it may be *M. corymbosa* (DC.) Hemsl.

9. *Melochia tomentella* (Presl) Hemsl. *Blot. Centr. Amer. Bot.* 1: 132. 1879.

Riedlea tomentella Presl, *Rel. Haenk.* 2: 148. 1836.

Sinaloa to Oaxaca; type from Acapulco, Guerrero.

Slender shrub; leaves mostly short-petiolate, ovate-lanceolate, long-acuminate, rounded or subcordate at base, coarsely dentate, thin, green; flowers all in dense axillary glomerules; petals 5 to 8 mm. long. "Malva de los cerros" (Sinaloa).

The plant is said to yield a good quality of fiber.

DOUBTFUL SPECIES.

MELOCHIA CORYMBOSA (DC.) Hemsl. Biol. Centr. Amer. Bot. 1: 130. 1879.
Riedlea corymbosa DC. Prodr. 1: 491. 1824. Described from Mexico.

MELOCHIA SCUTELLARIOIDES (Turcz.) Hemsl. Biol. Centr. Amer. Bot. 1: 131.
 1879. *Riedlea scutellarioides* Turcz. Bull. Soc. Nat. Moscou 31¹: 210. 1858.
 Type from Mirador, Veracruz.

MELOCHIA TENELLA (Turcz.) Hemsl. Biol. Centr. Amer. Bot. 1: 132. 1879.
Riedlea tenella Turcz. Bull. Soc. Nat. Moscou 31¹: 212. 1858. Type from Sierra
 San Pedro Nolasco, Oaxaca. Probably a synonym of *M. hirsuta*.

9. THEOBROMA L. Sp. Pl. 782. 1753.

Trees; leaves large, entire, pinnate-nerved, or 3 or 5-nerved at base; flowers
 small, in axillary or lateral clusters, often along the trunk; calyx 5-lobate;
 petals 5, clawed, cucullate at base, produced above into a spatulate blade;
 calyx tube 5-lobate, the anthers 2 or 3 in each sinus; fruit large, sessile, fleshy,
 5-celled, the seeds surrounded by pulp.

Leaves green beneath, glabrous or nearly so-----1. *T. cacao*.
 Leaves minutely whitish-tomentulose beneath.

Leaves obtuse at base; petals longer than the calyx----2. *T. angustifolium*.
 Leaves deeply or shallowly cordate at base; petals shorter than the calyx.

3. *T. bicolor*.

1. *Theobroma cacao* L. Sp. Pl. 782. 1753.

In forests from Colima to Chiapas and Tabasco, and cultivated extensively
 in the warmer parts of Mexico. Central America; cultivated in the Tropics
 of both hemispheres.

Small evergreen tree, 6 to 8 meters high, or sometimes larger, with spreading
 branches, the lateral branches in clusters of 5, rarely 4 or 6, the young shoots
 hirsute or hirtellous; leaves short-petiolate, elliptic-oblong or obovate-oblong,
 15 to 30 cm. long, rounded or obtuse at base, abruptly acuminate at apex,
 thick; inflorescences small, fleshy, borne along the trunk and main branches;
 flowers long-pedicellate, the calyx pink, its lobes lance-acuminate, 6 to 7 mm.
 long; petals yellowish; fruit 30 cm. long and 10 cm. thick or smaller,
 elliptic-ovoid, with a thick fleshy rind, longitudinally ridged and furrowed, red,
 yellow, purplish, or brown, each cell containing 5 to 12 large, brown or purple
 seeds embedded in white or pinkish, acid pulp.

The word "cacao" is the name of the plant and of the crude product from it.
 Cocoa and chocolate are manufactured products obtained from the seeds.
 The word "cacao" is derived from the Nahuatl "cacahuatl" (written also *caca-*
hoatl), a term which in modern Mexican has been corrupted into "cacahuate,"
 the name applied to the peanut, the application evidently because of the
 resemblance of the peanut to cacao fruit. The Nahuatl name for the cacao
 tree is "cacahuacuahuatl," which has been written also as "cacaotlquahuatl,"
 "cacauquauitl," and in various other ways. The following additional names
 are reported from Mexico: "Bizoya," "yagabizoya" (Oaxaca, Zapotec, *Reko*);
 "dēqhy" (Otomí, *Buelna*); "caocauatzaua" (Zoque, *Gonzales*); "kako"
 (Mixe); "cahequa" (Tarascan, *León*); "chudechu" (Otomí).

Of all the numerous vegetable productions of the New World, and especially
 of Mexico, none is more celebrated than the product of the cacao plant, which
 attained high favor in Europe immediately after the Conquest. Oviedo, who
 describes the plant at great length, states that it was not found in the West
 Indies, but only on the continent, especially in Mexico, and he terms it "the
 most precious tree of the Indians and the most highly esteemed."

Cacao in its wild state was well known to the early inhabitants of Mexico, and it was also cultivated, although to what extent is uncertain. The use of the drink made from the seeds was confined chiefly to the higher classes, but the use of the seeds as money was a matter of importance to all classes, for cacao seeds were the basis of the Mexican financial system. They are still used locally in Mexico as a substitute for small coins. Jourdanet, in his translation of Sahagún,¹ gives the following account of the use of cacao as currency: "It would be idle to call attention to this plant, whose fruit is so widely used to-day, if it were not of interest to recall the fact that cacao was unknown in Europe before the discovery of America. The Mexicans at the time of the Conquest made much use of it, in various forms, none of which was the equivalent of our chocolate. This precious fruit was besides, for the richest among them, a means of treasuring their wealth, and a medium of exchange, which facilitated commerce as does our money. This custom was even extended after the Conquest in certain parts of the country, so long, in fact, that I myself observed in Yucatán, before 1850, that cacao seeds were used in place of copper coins.

"It would be very difficult to determine what was the value set upon the cacao employed as money in ancient Mexico. * * * However, in the part of the country where cacao has continued in use as currency up to the present time, its value in ordinary market transactions is not the same as that assigned to it when it is sold at wholesale as a food. The cacao seed, as money, keeps a conventional value which, as a rule, is much greater than its market price. That is to say, its usage in this sense is limited to transactions of little importance, as a means of making small change, in the Provinces where copper coins are not in circulation.

"To return to ancient times, we may take the judicious and always reliable accounts of M. García Icazbalceta, and state that, 'in accordance with the numeral system of the Mexicans, the base for counting cacao seeds was the number 20. Thus, 400 seeds (20×20) formed a *tzontli*. We know that *tzontli* in the Nahuatl language means four hundred. Even to-day it is the custom in the City of Mexico to sell fire-wood by *tzontles* of 400 sticks. Twenty *tzontlis*, that is 8,000, made a *xiquipilli*, and three *xiquipilli* a load, which therefore consisted of 24,000 seeds. Since this system of accounting was clumsy and could result in abuses, it was forbidden by an official order of January 28, 1527. It was forbidden to sell cacao by count of the seeds, and ordered that the sale should take place by full measure, guaranteed by the municipal seal. Later, by an order of October 24, 1536, it was decreed, on the contrary, that the seeds should be counted for sale, and that no other method should be followed.'

"We have stated above that the Mexican nobles used cacao as a means of hoarding their fortunes. The twofold use made of it, as food and as money, caused it to rank as a basic element of wealth. The districts which produced cacao paid it as tribute to the rulers, in vast quantities. Torquemada states that in the palace of the famous King of Tetzcucó, Netzahualcoyotl, there was expended every year 2,744,000 *fanegas* of cacao (the *fanega* is the equivalent of about 40 kilograms). That is scarcely credible, although this author assures us that he had seen the book of accounts approved by a grandson of the King. Both Torquemada and the chronicler Herrera report that the Indian auxiliaries of Cortés pillaged a cacao granary belonging to Monteuhcōma, where they found more than 4,000 loads. The seeds were stored in osier baskets so large that six men taking hold of hands could not span them. The amount carried away was 600 loads, for which it was necessary to empty only six baskets.

¹ Histoire générale des choses de la Nouvelle-Espagne, p. 866. 1880.

"It would be difficult to give an exact idea of the extent and character of the lands employed to advantage by the ancient Mexicans for the culture of cacao. It is certain that the chief places of production were to the south of the country, bordering on Guatemala. It is there that this precious plant is still cultivated, and to-day as in former times it is the district of Soconusco which gives the product of best quality."

Oviedo states that those persons who had cacao trees growing upon their lands were considered rich. "In the province of Nicaragua," he relates, "a rabbit is worth 10 seeds, and for four you can buy eight *nisperos*; a slave is worth a hundred, more or less. * * * Even with these seeds there are ways of cheating, such as putting false or empty shells among a quantity of them. These spurious ones are prepared by separating the shell and filling it with earth or some other substance, then the shell is closed so carefully that the substitution is not perceptible. He who receives them, when he counts them, touches them one by one with the forefinger, and no matter how well the counterfeit has been performed, it is detected by the touch." Acosta mentions the fact that cacao seeds were given as alms to the poor. Bernal Díaz del Castillo relates how upon his return to Mexico after his long journey back from Guatemala, Cortés "sent us presents of necessities, likewise gold and cacao for our expenses."

Theobroma cacao is the principal source of the chocolate and cocoa of commerce, but other species also are planted, some of them extensively. Cacao is grown commercially in Mexico, especially in Chiapas and Tabasco. At an early date it was introduced into the Canaries and Philippines, and now it is grown extensively in many parts of the Old World tropics. Numerous minor varieties, differing in the form of the fruit, are known. The quality of the product varies greatly in different countries. The young trees must be grown under shade. Chocolate is the term applied to sweetened preparations of the roasted and ground cacao seeds, with a large proportion of the original fat retained. Cocoa is prepared in the same way, but most of the fat is removed from it.

The original inhabitants of Mexico sometimes ate the seeds either green or dry, but the seeds were used chiefly for the preparation of a drink known as "xocoatl," this being the term from which the word chocolate is obtained. The word *xocoatl* signifies "sour water," the unsweetened decoction of the seeds being unpleasantly bitter. The drink as prepared by the Mexicans was different from the chocolate as now usually prepared. It consisted of a strong decoction of the seeds, flavored with chile, maize, honey, ceiba seeds, and many other substances, and the beverage was beaten into a foam which dissolved almost imperceptibly upon the tongue. It was often colored with *Bixa orellana*. It was the favorite drink of the Mexican nobility, who consumed immense quantities of it. It was a favorite also of the emperor, for whom almost incredible quantities were prepared every day. A drink still much used in some parts of Mexico is "chilate" (in Nahuatl *chilatl*, chile-water, or *chil-cacohuatl*), which is made from cacao, chile, and water. Similar drinks are prepared also by the addition of other substances.

Chocolate was one of the first Mexican products to come to the notice of the Spanish invaders of Mexico, all of whom were enthusiastic in its praises. Cortés mentions it in his letters to the King of Spain. After the Conquest it was an esteemed drink among the Spanish settlers, and it is related that in Chiapas the ladies had it brought to them even in the churches, until the bishop forbade the servants who brought it to enter the church buildings. Acosta is a unique exception to the Spanish proponents of chocolate. He says:

"They esteem it highly in this country, foolishly and for no good reason, for it injures the hearts of those who are not accustomed to it, and there is a froth on top of it which is very unpleasant if one is not accustomed to it. * * * Those who are not accustomed to it from childhood care little for it." Acosta, however, found little to praise in the New World.

Cacao seeds contain 45 to 50 per cent of oil, or cacao butter, which is much used in pharmacy for making ointments. They also contain an alkaloid, theobromine. The oil was used by the inhabitants of Mexico for treating wounds, and the beverage made from the seeds was considered beneficial to the health. Oviedo reports a belief that if a person drank chocolate for breakfast, the bite of a poisonous serpent would not be fatal to him.

Cacao is illustrated and described at length by Hernández.¹

2. *Theobroma angustifolium* DC. Prodr. 1: 484. 1824.

Chiapas and Tabasco, and perhaps elsewhere. Central America.

Small tree with spreading crown, the bark smooth; leaves oblong or oblong-ob lanceolate, 13 to 25 cm. long, abruptly acuminate, somewhat oblique at base, green above, glabrous or nearly so, whitish beneath; flowers yellow, borne on the young branches, the clusters few-flowered; petals about 1 cm. long; fruit oval, dark chestnut or cinnamon-brown, smaller than in *T. cacao*. "Cushta" (El Salvador); "cacao de mico," "cacao silvestre" (Costa Rica).

This species is one of the important cacao plants of Mexico, and the notes given above under *T. cacao* apply in large part to it also. In Chiapas *Theobroma angustifolium* is the species generally grown. The region of Soconusco has long been famous for its chocolate, derived from this species, and for many years the supply for the royal family of Spain was brought from Soconusco.

3. *Theobroma bicolor* Humb. & Bonpl. Pl. Aequin. 1: 104. pl. 30. 1808.

Theobroma ovatifolia DC. Prodr. 1: 485. 1824.

Tribroma bicolor Cook, Journ. Washington Acad. Sci. 5: 288. 1915.

Chiapas and Tabasco, and perhaps elsewhere. Central America and northern South America; type from Colombia.

Slender tree, the upright shoots each ending in a cluster of 3 lateral branches; leaves dimorphous, those of the upright shoots rounded-cordate, very large (sometimes 50 cm. long), long-petiolate, deeply cordate at base; leaves of lateral branches short-petiolate, oblong-ovate, 15 to 30 cm. long, abruptly short-pointed, shallowly cordate at base, green and nearly glabrous above, whitish beneath; flowers borne on the young branches, in loose panicles, reddish purple; fruit ellipsoid, about 15 cm. long, ribbed and irregularly netted, dark, with a thick woody shell, the pulp white.² "Cacao blanco," "pataste" (Chiapas); "patatle" (Tabasco); "pataxte" (Tabasco, Guatemala); "bacao" (Colombia); "pataste," "pataiste," "cacao silvestre," "teta negra" (Costa Rica).

This plant is cultivated in some parts of tropical America, and the seeds are used like those of *T. cacao*. Their product is variously known in commerce as "tiger," "wariba," or "patashte" cacao. The seeds are used locally for the preparation of sweetmeats.

¹ Thesaurus 79-81. 1651.

² For a full account of this species see O. F. Cook, Branching and flowering habits of cacao and patashte, Contr. U. S. Nat. Herb. 17: 609-625. pl. 44-54. 1916.

10. *GUAZUMA* Adans. Fam. Pl. 2: 382. 1763.1. *Guazuma ulmifolia* Lam. Encycl. 3: 52. 1789.*Theobroma guazuma* L. Sp. Pl. 782. 1753.*Guazuma polybotrya* Cav. Icon. Pl. 3: 51. pl. 299. 1794.*Guazuma tomentosa* H. B. K. Nov. Gen. & Sp. 5: 320. 1821.*Guazuma guazuma* Cockerell, Bull. Torrey Club 19: 95. 1892.

Nearly throughout Mexico except Baja California. Widely distributed in tropical America.

Shrub or tree, 2 to 20 meters high; leaves short-petiolate, oblong to broadly ovate, 4 to 16 cm. long, acute to long-acuminate, rounded to deeply cordate and usually very oblique at base, serrulate, green and glabrate, or more commonly stellate-tomentose, at least beneath; flowers small, yellowish green or whitish, sweet-scented, in axillary cymes; calyx 2 or 3-parted, stellate-tomentose; petals 5, about 3 mm. long, cucullate; short-clawed, produced above into a bifid ligule; fruit a globose or oval, woody capsule, 2 to 4 cm. long, densely tuberculate, imperfectly 5-valvate at apex; seeds numerous in each cell. "Tablote" (Michoacán, Guerrero); "cuaulote" or "cuahulote" (Guerrero, Oaxaca, Chiapas; from the Nahuatl, *cuau-olotl*); "pixoi" or "pixoy" (Yucatán, Maya); "palote negro" (Chiapas); "majahua de toro" (Sinaloa); "guácima" or "guácimo" (Sinaloa, Tabasco, Tamaulipas, Jalisco, Veracruz, Colima, Oaxaca, Durango, Porto Rico, Santo Domingo, Costa Rica, Colombia, Venezuela; a Carib name, often written incorrectly as "guásima" or "guázima"); "aquiche" (Tamaulipas, *Escontria*); "vácima" (Michoacán, León); "yaco granadillo" (Oaxaca, *Reko*); "bulines" (*Nueva Farm. Mex.*); "guácima boba" (Cuba); "caulote" (Guatemala); "guácimo colorado" (Colombia); "cablote" (Guatemala, Honduras); "guácimo macho" (Venezuela); "guacimillo" (Nicaragua). The name "guayacán" has been reported as in use in Mexico for this species, but the report is probably incorrect.

The trunk is often 30 to 40 cm. in diameter, and is covered with rough or smooth, gray or blackish bark. The wood is light, fibrous and coarse-grained, grayish, slightly tinged with red or pink, with a specific gravity of 0.552 to 0.580. It is rather strong and resistant, and has been employed for ribs of small boats, shoe lasts, barrel staves, house furniture, paneling, firewood, and other purposes, and as a source of charcoal for gunpowder. The young stems yield a strong fiber, suitable for making rope. The juice has been employed to clarify syrup in the manufacture of sugar. Silkworms have been fed on the leaves and stock browse upon the leaves and young shoots.

The fruit is green at first but black at maturity. When fresh it is rather fleshy or pulpy and mucilaginous, and has a pleasant, sweet flavor. It is sometimes eaten by people, especially in times of scarcity, either raw or cooked. Sometimes, when dry, it is ground and then cooked. Pigs are said to be fond of it. The flowers are said to furnish a good quality of honey.

The plant is much employed in domestic medicine. The bark and other parts are administered for malaria, cutaneous and syphilitic affections, elephantiasis, diseases of the chest, leprosy, and other diseases. The plant has emollient and astringent properties.

Oviedo (Lib. VIII, Cap. VII) gives the following account of the tree: "The Guacuma is a large tree that bears fruit like mulberries, and the leaves are like those of the mulberry-tree, but smaller. From the fruit the Indians make a beverage on which they fatten like pigs; for this they mash the fruit and put it in water, and after using it for a few days the Indians appear fat, and likewise horses, if they will drink it, for other animals do not like it. The wood of this tree is very light, and of it the Indians of Tierra-Firme make their

carrying-sticks. This tree is common in all the Indies; I say common, for it is found in these islands and in Tierra-Firme, and it is one of the best trees for wood that can be found, and excellent for making powder; this I have tried in making ammunition for the fortress of the city of Santo Domingo; and experienced powder makers say that no other wood is so good for making the best powder, not even German willow or filbert branches."

The tree is illustrated by Hernández¹ under the names of "quaucholotl" and "guácimo."

11. NEPHROPETALUM Robins. & Greenm. Bot. Gaz. 22: 168. 1896.

A single species is known.

1. Nephropetalum pringlei Robins. & Greenm. Bot. Gaz. 22: 168. 1896.

Known only from the Rio Grande Valley at Hidalgo, Texas, but certainly to be expected in Tamaulipas.

Low shrub, the stems cinereous-tomentulose, becoming glabrate; leaves petiolate, ovate, 9 to 13 cm. long, obtusely acuminate, deeply cordate at base, crenate-dentate, finely stellate-pubescent above, paler and tomentulose beneath; flowers greenish, 2 mm. broad, in 2 or 3-flowered axillary umbelliform cymes; calyx 5-parted; petals clawed, the blade free at apex, not appendaged; capsule sessile, globose, 5-celled, muricate, the cells 1-seeded.

12. AYENIA L. Syst. Nat. ed. 10. 1247. 1759.

Shrubs or herbs; leaves serrate or dentate; flowers small, long-pedicellate, axillary, fasciculate or in cymes or umbels; calyx 5-lobate; petals 5, long-clawed, cucullate, the apex inflexed, adnate to the stamen tube, often with a dorsal gland; anthers 2 or 3-celled, solitary in the sinuses of the stamen tube; fruit a 5-celled capsule, separating into 5 1-seeded carpels, these bivalvate.

Fruit and ovary long-stipitate, the stipe slender, in fruit 2 to 3 mm. long or sometimes longer; calyx lobes not reflexed.

Calyx 6 to 8 mm. long; leaves whitish-tomentose beneath.....1. *A. ovata*.

Calyx 2 to 4 mm. long; leaves never whitish-tomentose.

Capsule not muricate, glandular or covered with very short blunt tubercles.

Leaves narrowly lanceolate.....2. *A. manzanilloana*.

Leaves ovate or broadly ovate.....3. *A. wrightii*.

Capsule sharply muricate.

Blade of petals sagittate at base.....4. *A. rotundifolia*.

Blade of petals not sagittate at base.....5. *A. pusilla*.

Fruit and ovary nearly sessile, the stipe stout, in fruit less than 1.5 mm. long.

Leaves glabrous beneath or nearly so.....6. *A. glabra*.

Leaves densely stellate-pubescent beneath or tomentose.

Leaves small, 2 cm. long or less, rounded or obtuse at apex.

Leaves orbicular or rounded-obovate, broadest at or above the middle.

7. *A. fruticosa*.

Leaves ovate or rhombic-ovate, broadest near the base.

8. *A. microphylla*.

Leaves large, mostly 5 to 10 cm. long, acute or acuminate.

Lower surface of the leaves covered with a fine close minute pale tomentum.

Sepals 5 mm. long.....9. *A. paniculata*.

Sepals 2 to 2.5 mm. long.....10. *A. magna*.

¹ Thesaurus 401. 1651.

Lower surface of leaves stellate-tomentose, the hairs loose and spreading.

Sepals 5 to 7 mm. long-----11. *A. berlandieri*.

Sepals 2.5 to 3 mm. long.

Upper leaves long-petiolate; leaves conspicuously cordate at base.

10. *A. magna*.

Upper leaves nearly sessile; leaves rounded or subcordate at base.

Sepals green-----12. *A. palmeri*.

Sepals brown-purple-----13. *A. jaliscana*.

1. *Ayenia ovata* Hemsl. Diag. Pl. Mex. 4. 1878.

Ayenia mollis T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 385. 1909.

Hidalgo and Puebla; type from Zimapán, Hidalgo.

Shrub; leaves slender-petiolate, broadly ovate, acute, cordate at base, dentate, densely tomentose, 2.5 to 5 cm. long; flowers solitary or in pedunculate umbels, long-pedicellate; fruit about 1 cm. in diameter, covered with very long filiform hairy appendages.

2. *Ayenia manzanilloana* Rose, Contr. U. S. Nat. Herb. 1: 309. 1895.

Known only from the type locality, Manzanillo, Colima.

Leaves short-petiolate, 2 to 5 cm. long, long-acuminate, rounded at base, serrate, green, glabrate; fruit 5 mm. in diameter, glabrate, covered with brown glands.

3. *Ayenia wrightii* Robinson, Bot. Gaz. 16: 340. 1891.

Ayenia compacta Rose, Contr. U. S. Nat. Herb. 8: 321. 1905.

Ayenia peninsularis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 368. 1917.

Baja California and Sinaloa; type from head of Mazatlán River, Sinaloa.

Plants 30 to 60 cm. high, suffrutescent, slender, the branches pubescent; leaves slender-petiolate, 1 to 5 cm. long, acute or obtuse, finely pubescent or glabrate, serrate-dentate; fruit about 5 mm. in diameter.

4. *Ayenia rotundifolia* Hemsl. Diag. Pl. Mex. 4. 1878.

Known only from the type locality, Zimapán, Hidalgo.

Leaves slender-petiolate, ovate-rounded, 1 to 2.5 cm. wide, obtuse or retuse, sometimes cordate at base, crenate-dentate, soft-pubescent; sepals about 4 mm. long.

5. *Ayenia pusilla* L. Syst. Nat. ed. 10. 1247. 1759.

Ayenia filiformis S. Wats. Proc. Amer. Acad. 24: 42. 1889.

Ayenia dentata T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 56. 1914.

? *Ayenia reflexa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 369. 1917.

Ayenia cuneata T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 369. 1917.

Nearly throughout Mexico. Widely distributed in the warmer parts of the Western Hemisphere.

Plants slender, essentially annual but often becoming suffrutescent; leaves very variable in form, lanceolate to suborbicular, 1 to 5 cm. long, rounded to acuminate at apex, obtuse to cordate at base, dentate, pubescent or glabrous; fruit 5 to 6 mm. in diameter, pubescent or glabrate, covered with long or short spinelike processes.

The Mexican plants exhibit great variation in the shape and pubescence of the leaves, but the West Indian specimens are rather uniform. None of the segregates which have been described seem clearly differentiated from the mass of material from the West Indies and the southern United States generally referred to *A. pusilla*, and it has not appeared practicable to recognize any of them. The glands of the petals are so variable in size and form that they do not furnish a satisfactory basis for specific segregation.

6. *Ayenia glabra* S. Wats. Proc. Amer. Acad. 22: 399. 1887.

Ayenia truncata Rose, Contr. U. S. Nat. Herb. 1: 94. 1891.

Sonora and Sinaloa to Guerrero; type from Tequila, Jalisco.

Slender shrub, 1 to 4.5 meters high; leaves long-petiolate, lance-ovate to broadly ovate, 3.5 to 9 cm. long, acute to long-acuminate, subcordate at base, dentate; sepals green or purple-brown; capsule 8 mm. long, short-muricate.

7. *Ayenia fruticosa* Rose, Contr. U. S. Nat. Herb. 5: 95. 1899.

Puebla; type from Tehuacán; probably also in Oaxaca.

Slender shrub; leaves short-petiolate, dentate, green above, densely and very finely whitish-tomentulose beneath; fruit 8 mm. in diameter, pubescent, muricate.

8. *Ayenia microphylla* A. Gray, Pl. Wright. 1: 24. 1852.

Chihuahua and Coahuila. Western Texas and southern Arizona; type from El Paso.

Small, densely branched shrub, usually 30 cm. high or less; leaves short-petiolate, dentate, closely stellate-pubescent on both surfaces; capsule sparsely tuberculate.

9. *Ayenia paniculata* Rose, Contr. U. S. Nat. Herb. 1: 94. 1891.

Known only from the type locality, Alamos, Sonora.

Shrub, about 60 cm. high; leaves long-petioled, rounded-ovate, 6 to 7 cm. long, acute or acuminate, rounded or subcordate at base, dentate, sometimes obscurely trilobate, green above, whitish beneath; flowers in a nearly naked, thyriform panicle; capsule 8 to 10 mm. in diameter, minutely stellate-tomentulose, tuberculate.

10. *Ayenia magna* L. Syst. Nat. ed. 10. 1247. 1759.

Ayenia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 328. 1920.

Veracruz and Yucatán. Jamaica and northern South America; type from Caracas, Venezuela.

Shrub, 0.5 to 2 meters high; leaves cordate, acute or acuminate, dentate, often pale beneath; capsule 6 to 9 mm. in diameter, strongly muricate.

11. *Ayenia berlandieri* S. Wats. Proc. Amer. Acad. 21: 419. 1886.

Tamaulipas to Jalisco, Guerrero, and Morelos; type from Santander, Tamaulipas.

Plants suffrutescent, 1 to 2 meters high; leaves short-petiolate, ovate, acuminate, rounded or subcordate at base, denticulate, 3 to 7-nerved at base; sepals purple-brown, long-acuminate; capsule about 8 mm. in diameter, muricate.

12. *Ayenia palmeri* S. Wats. Proc. Amer. Acad. 21: 419. 1886.

Known only from the type locality, Hacienda San Miguel, southwestern Chihuahua.

Shrub, about 1.5 meters high; leaves broadly ovate, short-petiolate, 4 to 6 cm. long, acute or acuminate, serrate; fruit 7 mm. in diameter, stellate-tomentulose, muricate.

13. *Ayenia jaliscana* S. Wats. Proc. Amer. Acad. 26: 133. 1891.

Ayenia nelsoni Rose, Contr. U. S. Nat. Herb. 8: 321. 1905.

Chihuahua to Jalisco and Chiapas; type from southwestern Chihuahua.

Shrub, 1 to 2 meters high; leaves broadly ovate, 5 to 9 cm. long, acuminate, serrate-dentate; capsule 7 to 9 mm. broad, short-muricate.

DOUBTFUL SPECIES.

AYENIA CORDIFOLIA DC. Prodr. 1: 488. 1824. Described from Mexico.

AYENIA MEXICANA Turcz. Bull. Soc. Nat. Moscou 36¹: 569. 1863. *Cybiostigma sidaefolium* Turcz. Bull. Soc. Nat. Moscou 1852²: 156. 1852; *Ayenia sidaefolia* Hemsl. Biol. Centr. Amer. Bot. 1: 135. 1879, not *A. sidaefolia* DC. 1824.

AYENIA YUCATANENSIS Millsp. Field Mus. Bot. 1: 379. 1898. Type from Buenavista Xbac, Yucatán.

13. BUETTNERIA L. Syst. Nat. ed. 10. 939. 1759.

Scandent or procumbent shrubs, often armed with prickles; flowers small, pedicellate, mostly in lateral umbels or cymes; calyx 5-lobate; petals 5, cucullate, clawed, the limb bilobate, inflexed at apex, produced dorsally into a long ligule; anthers solitary in the sinuses of the stamen tube; fruit a 5-celled capsule, covered with long spines, the carpels easily separating, bivalvate, 1-seeded.

Stems armed with recurved prickles-----1. *B. aculeata*.

Stems unarmed.

Leaves entire-----2. *B. catalpifolia*.

Leaves dentate-----3. *B. salicifolia*.

1. *Buettneria aculeata* Jacq. Stirp. Amer. 76. 1763.

Chaetaea aculeata Jacq. Enum. Pl. Carib. 17. 1760.

Buettneria carthagenensis Jacq. Stirp. Amer. Pict. 41. 1780.

Buettneria lanceolata DC. Prodr. 1: 487. 1824.

Buettneria tiliaefolia Presl, Rel. Haenk. 2: 144. 1836.

Buettneria lateralis Presl, Rel. Haenk. 2: 144. 1836.

Buettneria rubricaulis Presl, Rel. Haenk. 2: 145. 1836.

Sinaloa to San Luis Potosí, Yucatán, Tabasco, and Chiapas. Central America and northern South America; type from Cartagena, Colombia.

Scandent or procumbent shrub, the stems obtusely angulate, green, very prickly, glabrous or pubescent; leaves on long or short petioles, the upper ones lanceolate to broadly ovate, the lower ones broader, acute to long-acuminate, obtuse to cordate at base, usually crenate or serrate toward the apex, thin, green, glabrous or sparsely pubescent; flowers small, black-purple, in small axillary cymes; fruit body 7 to 10 mm. in diameter, covered with long stout spines. "Arrendador" (Sinaloa); "varilla prieta" (Michoacán, Guerrero); "zarza" (Tabasco, El Salvador); "xtexak" (Yucatán, Maya) "uña de gato" (Costa Rica); "zarza hueca" (Venezuela).

Reported by Sessé and Mocino¹ as *Byttneria scabra*. In Venezuela the root is employed as a substitute for sarsaparilla in the treatment of cutaneous and syphilitic diseases, and emmenagogue properties also are ascribed to it.

2. *Buettneria catalpifolia* Jacq. Pl. Hort. Schönbr. 1: pl. 46. 1797.

Michoacán to Oaxaca and Veracruz. Central America and northern South America; type from Caracas, Venezuela.

Large vine, the branches terete, tomentulose when young; leaves long-petiolate, ovate-cordate, 10 to 25 cm. long, cuspidate-acuminate, thin, green, glabrous and lustrous above, pubescent or glabrous beneath; inflorescence axillary or terminal, lax, pedunculate, the flowers white; calyx 5 to 6.5 mm. long; fruit body 2.5 to 3.5 cm. wide, usually depressed, covered with long slender prickles.

"Bejuco cenizo" (Michoacán, Guerrero).

¹ Pl. Nov. Hisp. 39. 1887.

3. *Buettneria salicifolia* Presl, Rel. Haenk. 2: 144. 1836.

Described from western Mexico; known to the writer only from the original description.

Branches terete, tomentose; leaves lanceolate, acute or short-acuminate, sharply dentate, glabrous above, tomentose beneath; flowers umbellate, 2 mm. long, the umbels axillary.

98. DILLENACEAE. *Dillenia* Family.

Trees or shrubs, sometimes scandent; leaves alternate, simple, estipulate, commonly scabrous; flowers paniculate, terminal or axillary, usually perfect or polygamous; sepals 3 to 5, distinct or nearly so, strongly imbricate, persistent; stamens numerous, free, the anthers erect or versatile; fruit baccate, or usually of 1 to 5 dry carpels, these dehiscent on the inner or on the dorsal side; seeds usually arillate.

Anthers versatile; fruit baccate. Plants erect.....1. SAURAUIA.

Anthers erect; fruit 1 to 5 dry carpels.

Inner 2 sepals much larger than the others, accrescent and inclosing the fruit. Plants scandent.....2. DAVILLA.

Inner sepals similar to the others, not accrescent.

Inflorescence chiefly terminal; plants scandent; aril lacerate.

3. TETRACERA.

Inflorescence wholly axillary; plants erect; aril not lacerate.

4. CURATELLA.

1. SAURAUIA Willd. Ges. Naturf. Freund. Berlin Neue Schrift. 3: 407. 1801.

Shrubs or small trees, usually with setose or paleaceous pubescence; leaves commonly serrulate, the lateral nerves numerous and parallel; flowers in axillary pedunculate panicles, commonly perfect; sepals 5; petals 5, connate at base or nearly free; stamens numerous, adherent to the base of the corolla, the anthers versatile; fruit baccate, 3 to 5-celled, the seeds small, embedded in pulp.

A monograph of the genus by Buscalioni has been in the course of publication in *Malpighia* (volumes 25 to 28) for several years.

The name "pipicho" is reported for one of the Oaxaca species. The fruit is said to be sweet and mucilaginous, and a syrup made from it is administered for chest affections.

Leaves setose-pilose beneath, or sometimes scabrous, with short simple hairs.

Leaves densely setose-scabrous beneath.....16. *S. aspera*.

Leaves setose-pilose beneath.

Bracts of the inflorescence linear.....1. *S. konzattii*.

Bracts oval.....2. *S. pseudopeduncularis*.

Leaves glabrate or stellate-pilose beneath.

Leaves glabrate beneath.

Leaves without tufts of hairs beneath in the axils of the lateral nerves.

3. *S. leucocarpa*.

Leaves with conspicuous tufts of whitish hairs beneath in the axils of the lateral nerves.

Inflorescences short, 2.5 to 7 cm. long.....4. *S. barbiger*.

Inflorescences elongate, mostly 10 to 20 cm. long.

Leaf blades acute at base.....5. *S. serrata*.

Leaf blades obtuse or rounded at base.....6. *S. reticulata*.

Leaves stellate-pilose beneath, usually rather densely so.

Leaves entire toward the base, crenate toward the apex, densely tomentose beneath.....7. *S. radlkoferi*.

Leaves serrulate.

Leaves without tufts of hairs beneath in the axils of the nerves; panicles nearly or quite as long as the leaves.

Leaves pale beneath, stellate-tomentose-----8. *S. nelsoni*.

Leaves green beneath, thinly stellate-pilose.

Hairs of the petioles mostly 3 to 4 mm. long; leaves mostly 8 to 14 cm. wide-----9. *S. villosa*.

Hairs of the petioles about 1 mm. long; leaves mostly 6 to 7 cm. wide-----10. *S. scabrida*.

Leaves with dense tufts of whitish hairs beneath in the axils of the nerves; panicles usually much shorter than the leaves.

Flowers 22 to 30 mm. broad.

Panicles 4 to 7 cm. long; flowers 25 to 30 mm. broad.

11. *S. latipetala*.

Panicles 10 to 15 cm. long; flowers about 22 mm. broad.

12. *S. pauciflora*.

Flowers 10 to 16 mm. broad.

Hairs of the petioles appressed-----13. *S. pringlei*.

Hairs of the petioles spreading.

Sepals glabrous on the outer surface, ciliate--14. *S. willdemanni*.

Sepals covered with short stellate setae-----15. *S. buscalioniana*.

1. *Saurauia konzattii* Buscalioni, *Malpighia* 25: 403. *pl.* 6, *f.* 9. 1913.

Known only from the type locality, Cerro de la Raya, Cuyamecalco, Distrito de Cuicatlán, Oaxaca, altitude 2,800 meters.

Branchlets densely setose; leaves oblong-obovate, 12 to 18 cm. long, abruptly short-acuminate, cuneate at base, serrulate, green, yellowish-setose; panicles few-flowered, half as long as the leaves; flowers 2.3 to 2.5 cm. broad; sepals densely setose; stamens 10; ovary glabrous.

2. *Saurauia pseudopeduncularis* Buscalioni, *Malpighia* 26: 30. *pl.* 7, *f.* 13. 1913.

Known only from the type locality, Sierra de San Pedro Nolasco, Oaxaca.

Branchlets setose; leaves short-petiolate, the petiole villous, the blade ovate-lanceolate or obovate, 12 to 19 cm. long, acute, at base acute or subobtuse, serrulate, yellowish-setose; panicles few-flowered, equaling or shorter than the leaves; flowers 1.2 to 1.5 cm. broad; sepals setose; stamens 25 to 30; ovary glabrous.

3. *Saurauia leucocarpa* Schlecht. *Linnaea* 10: 249. 1836.

Saurauia angustifolia Turcz. *Bull. Soc. Nat. Moscou* 31¹: 242. 1858.

Michoacán and Guerrero to Veracruz and Oaxaca; type from Cuesta Grande de Chiconquiaco, Veracruz. Guatemala.

Tree, 5 to 6 meters high, the branchlets tuberculate-scabrous; leaves narrowly oblong-ob lanceolate, 9 to 15 cm. long, acute, cuneate at base, obscurely serrulate, nearly glabrous; panicles equaling or shorter than the leaves; sepals usually glabrous.

4. *Saurauia barbiger* Hook. *Icon. Pl.* *pl.* 331. 1840.

Veracruz.

Shrub or small tree, 4.5 meters high, the branchlets appressed-setose; leaves oblong-ob lanceolate, 4 to 11 cm. long, acute or acuminate, cuneate at base, serrate, sparsely setose above, green; panicles few-flowered, the flowers 12 mm. broad; sepals glabrous.

5. *Saurauia serrata* DC. *Mém. Soc. Phys. Hist. Nat. Genève* 1: 420. *pl.* 3. 1822.

Saurauia pedunculata Hook. *Icon. Pl.* *pl.* 331, 332. 1840.

Saurauia pedunculata leucocarpa Buscalioni, *Malpighia* 28: 237. 1917.

Michoacán to Veracruz and Oaxaca.

Shrub or small tree, the branchlets sparsely appressed-setose; leaves short-petiolate, cuneate-obovate, 10 to 20 cm. long, acute or obtuse, serrulate, glabrate; panicles equaling or shorter than the leaves; flowers about 18 mm. broad; sepals whitish-pulverulent. "Mameyito," "mameyito blanco" (Oaxaca).

6. *Saurauia reticulata* Rose, Contr. U. S. Nat. Herb. 8: 52. 1903.

Known only from the type locality, canyon near Cuernavaca, Morelos, altitude 1,950 meters.

Branchlets glabrate; leaves short-petiolate, oblong-ob lanceolate, 13 to 24 cm. long, subacute, serrulate, thick, glabrate; panicles 11 to 16 cm. long, many-flowered, the flowers about 2 cm. wide; sepals setulose-scabrous.

A similar plant from Sinaloa, known only from imperfect material, is said to bear the vernacular name "almendrillo."

7. *Saurauia radlkoferi* Buscalioni, Malpighia 27: 6. pl. 7, f. 14. 1915.

Described from somewhere in Mexico.

Branchlets setose; leaves lance-ovate or obovate, 9 to 19 cm. long, obtuse at base and apex, sparsely pilose above, smooth, fulvous-tomentose beneath; panicles shorter than the leaves, many-flowered; sepals puberulent and setulose.

8. *Saurauia nelsoni* Rose, Contr. U. S. Nat. Herb. 8: 52. 1903.

Oaxaca and Chiapas; type collected near Totontepec, Oaxaca. Guatemala.

Shrub; leaves oblong-obovate or elliptic-obovate, 14 to 25 cm. long, rounded at base and apex, scaberulous above, densely stellate-pilosulous beneath; panicles many-flowered, as long as the leaves; flowers about 12 mm. broad; sepals densely setose-paleaceous; petals pink.

9. *Saurauia villosa* DC. Mém. Soc. Phys. Hist. Nat. Genève 1: 420. 1822.

Obelanthera melastomacea Turcz. Bull. Soc. Nat. Moscou 20¹: 149. 1847.

Saurauia macrophylla Linden; Lindl. & Paxt. Fl. Gard. 2: 27. 1852.

Saurauia obelanthera Turcz. Bull. Soc. Nat. Moscou 31¹: 245. 1858.

Saurauia villosa hahni Buscalioni, Malpighia 26: 305. 1913.

Saurauia villosa macrantha Buscalioni, Malpighia 26: 310. 1913.

Saurauia villosa tuberculata Buscalioni, Malpighia 26: 312. 1913.

Saurauia villosa scabrida Buscalioni, Malpighia 26: 390. 1914.

Veracruz and Chiapas. Guatemala.

Shrub or small tree, 2 to 6 meters high; leaves oval to cuneate-obovate, 15 to 35 cm. long, acute or obtuse, rounded or rarely acute at base; panicles large and many-flowered, long-pedunculate, the flowers about 1 cm. broad; sepals densely setose; stamens 20 to 30.

10. *Saurauia scabrida* Hemsl. Diag. Pl. Mex. 3. 1878.

Saurauia scabrida hemsleyana Buscalioni, Malpighia 26: 409. 1914.

Veracruz; type from Valley of Córdoba.

Leaves lance-elliptic, 20 to 30 cm. long, acute, cuneate at base, coarsely dentate; panicles few-flowered, equaling or shorter than the leaves; petals 6 to 8 mm. long; sepals setose-paleaceous; fruit globose, 8 mm. in diameter.

11. *Saurauia latipetala* Hemsl. Diag. Pl. Mex. 4. 1878.

Chiapas (type locality). Guatemala.

Branchlets setulose; leaves lanceolate or oblanceolate, 7 to 17 cm. long, acute or acutish, obtuse at base, serrulate, thin; panicles 4 to 7 cm. long, few-flowered, the flowers 2.5 to 3 cm. wide; sepals pulverulent and sparsely setulose outside; stamens 30 to 35.

12. *Saurauia pauciflora* Rose, Contr. U. S. Nat. Herb. 8: 52. 1903.

Saurauia pauciflora ghiesebrechtii Buscalioni, Malpighia 26: 291. 1913.

Chiapas; type from San Cristóbal, altitude 2,100 to 2,640 meters.

Shrub, the young branches densely setose with subappressed hairs; leaves short-petiolate, oblong-ob lanceolate, 7 to 10 cm. long, acuminate, acute or obtuse at base, very rough; panicles 10 to 15 cm. long, few-flowered; flowers 22 mm. broad; sepals densely setose; stamens about 20.

13. *Saurauia pringlei* Rose, Contr. U. S. Nat. Herb. 8: 52. pl. 12. 1903.

Saurauia pringlei micrantha Buscalioni, Malpighia 26: 137. 1913.

Guerrero and Oaxaca; type from Sierra de San Felipe, Oaxaca, altitude 2,550 meters. Guatemala.

Shrub or small tree, 2 to 3 meters high or larger, the branchlets appressed-setose; leaves oblong-ob lanceolate, 10 to 25 cm. long, acute or short-acuminate, acute or obtuse at base, serrulate; panicles 9 to 13 cm. long, many-flowered; flowers 15 mm. broad; sepals pulverulent; stamens 20 to 25.

14. *Saurauia willdemanni* Buscalioni, Malpighia 26: 143. 1913.

Oaxaca; type from Juquila.

Branchlets setose; leaves obovate or lance-oval, 7 to 14 cm. long, acute or acuminate, acute at base, rough, serrulate; panicles half as long as the leaves, few-flowered; stamens 20.

15. *Saurauia buscalioniana* Blake, Contr. Gray Herb. n. ser. 52: 74. 1917.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,800 meters; perhaps also in Chiapas.

Tree, 5 to 6 meters high, the branchlets densely setose-pilose; leaves oblanceolate-oblong, 18 to 22 cm. long, acute or short-acuminate, cuneate at base; panicles 9 to 12 cm. long, many-flowered; flowers about 12 mm. broad; stamens about 30.

16. *Saurauia aspera* Turcz. Bull. Soc. Nat. Moscou 31¹: 242. 1858.

Known only from Oaxaca, the type locality.

Branchlets appressed-setulose; leaves broadly oblong-obovate, 10 to 20 cm. long, acute or short-acuminate, obtuse at base, serrulate, very scabrous; panicles nearly as long as the leaves, many-flowered; sepals densely setose-paleaceous; flowers white.

DOUBTFUL SPECIES.

SAURAUIA ANISOPODA Turcz. Bull. Soc. Nat. Moscou 31¹: 242. 1852. Type from Oaxaca.

2. *DAVILLA* Vand.; Roem. Script. Pl. 115. 1796.

1. *Davilla kunthii* St. Hil. Pl. Usuel. Bras. 6. 1824-28.

Davilla lucida Presl, Rel. Haenk. 2: 73. 1836.

Davilla ovata Presl, Rel. Haenk. 2: 73. 1836.

Veracruz, Tabasco, and Oaxaca. Central and South America.

Scandent shrub; leaves petiolate, oblong-elliptic to nearly orbicular, 6 to 18 cm. long, rounded at base and apex, or sometimes acute at apex, coriaceous, serrulate or nearly entire, scabrous above and often lustrous, densely short-pilose beneath; panicles large, chiefly terminal, the flowers yellow; sepals 5, the outer ones small, the 2 inner ones accrescent, inclosing the fruit, 7 to 10 mm. long, pilose; petals about as long as the inner sepals; carpel 1, bivalvate, the seed surrounded by a thin aril. "Bejuco de tachicón" (Tabasco); "chumico de bejuco" (Costa Rica, Panama); "bejuco chaparrón" (Guatemala, Honduras); "bejuco tomé" (Colombia); "chumisquillo" (Panama).

The tough stems are sometimes used in the construction of huts, for tying the larger timbers of the framework. The leaves are employed as a substitute for sandpaper.

The seeds of *Davilla rugosa* Poir, which is known in Nicaragua as "hoja-chigüe" and in Cuba as "bejuco castaño" are said to have violent and dangerous emetic-cathartic properties. The bark of one of the Brazilian species is reported to yield a black dye.

3. TETRACERA L. Sp. Pl. 533. 1753.

Scandent shrubs; leaves with numerous parallel lateral nerves; flowers paniculate, the panicles terminal or in the upper axils; sepals 4 to 6, spreading, the petals of the same number; fruit of 1 to 5 carpels, the ovules numerous but the seeds 1 to 5, surrounded by a thin aril.

The name "bejuco de agua" frequently applied to these plants is derived from the fact that the stems, when cut, yield a large amount of clear water. They are often a satisfactory source of water to travelers in the dry tropical forests when surface water is absent.

Fruit of 3 to 5 carpels; sepals sericeous within.....1. *T. volubilis*.

Fruit of a single carpel; sepals glabrous within.....2. *T. sessiliflora*.

1. *Tetracera volubilis* L. Sp. Pl. 533. 1753.

Tetracera erecta Sessé & Moc.; DC. Reg. Veg. Syst. 1: 404. 1818.

Tetracera alata Presl, Rel. Haenk. 2: 71. 1836.

? *Tetracera salicifolia* Presl, Rel. Haenk. 2: 71. 1836.

Veracruz and Oaxaca, and probably elsewhere. West Indies, Central America, and South America.

Large vine; leaves short-petiolate, obovate-oblong or obovate, 7 to 18 cm. long, rounded or short-pointed at apex, decurrent at base, serrulate or nearly entire, coriaceous, very scabrous; panicles usually large; sepals rounded, unequal, 3 to 5 mm. long; carpels 7 to 10 mm. long, short-beaked, sparsely hairy at the apex. "Hoja-chigüe" (Nicaragua); "raspa," "raspa-guacales" (Costa Rica); "bejuco chaparro," "bejuco tomé" (Colombia); "bejuco guará," "bejuco carey" (Cuba).

The seeds and leaves are used in domestic medicine, sudorific, antisyphilitic, febrifuge, and diuretic properties being attributed to them.

2. *Tetracera sessiliflora* Triana & Planch. Ann. Sci. Nat. IV. 17: 21. 1862.

Delima mexicana Sessé & Moc.; DC. Reg. Veg. Syst. 1: 407. 1818. Not (?)

Tetracera mexicana Eichl. 1863.

Delima dioica Sessé & Moc. Pl. Nov. Hisp. 89. 1887.

Tepic to Guerrero. Central America and Colombia; type from Colombia.

Large vine; leaves short-petiolate, oblong, oblanceolate-oblong, or obovate, 6 to 20 cm. long, rounded or obtuse at apex, decurrent at base, remotely dentate, very scabrous; panicles large and many-flowered; flowers white; sepals rounded, densely pubescent; carpels 6 to 8 mm. long, lustrous; wood very porous, pale brownish pink, coarse-grained, soft. "Bejuco de agua" (Michoacán, Guerrero).

The flowers are sweet-scented. The stems are often used as a substitute for rope, and the rough leaves for polishing wood.

DOUBTFUL SPECIES.

TETRACERA MEXICANA Eichl. in Mart. Fl. Bras. 13¹: 87. 1863. Based upon a specimen from "Onitaco," Mexico. No proper description of the plant has been

published. According to Gilg,¹ the sepals are glabrous outside, while in the two species listed above the sepals are hairy on the outer face.

4. *CURATELLA* L. Syst. Nat. ed. 10. 1079. 1759.

1. *Curatella americana* L. Syst. Nat. ed. 10. 1079. 1759.

Tepic to Chiapas. Cuba and Central and South America.

Shrub or small tree, 3 to 6 meters high, the trunk usually crooked, the bark scaly, brownish; leaves short-petiolate, oval or elliptic-ovate, 12 to 30 cm. long or larger, emarginate, abruptly short-decurrent at base, coriaceous, very rough on both surfaces, the margin somewhat sinuate, the lateral nerves numerous, parallel, extending to the margin; flowers white, ill-scented, in short dense lateral panicles; sepals 4 or 5, spreading; petals 4 or 5, 5 to 6 mm. long; carpels 2, hirsute, 6 to 7 mm. long; seeds black, surrounded by a thin aril; wood rather soft, light, coarse-grained, taking a poor polish, its specific gravity reported as 0.805, the sapwood thin, light brown, the heartwood somewhat darker. "Raspa-viejo" (Michoacán, Guerrero); "tlachicón" (Oaxaca; from the Nahuatl *tlachiquoni*, "thing that makes rough," *Reko*); "hoja man" (Oaxaca, *Seler*); "chumico de palo," "hoja-chigüe," "raspa-guacal" (Costa Rica); "chaparro" (Colombia, Venezuela, Guatemala, Honduras); "chumico," "chumico palo," "curatela" (Panama); "vaca-buey," "carecillo" (Cuba); "peralejo" (Colombia).

Seler states that in Oaxaca the ground seeds are mixed with chocolate to flavor it. The rough leaves, which contain silicon, are widely used as a substitute for sandpaper for polishing wood and metal, and for cleaning kitchen utensils. The wood is of little value. The bark is said to be rich in tannin and to be used in Brazil for tanning skins. A decoction of the leaves is employed in Brazil for treating wounds. In some parts of western Mexico the tree is abundant and forms dense thickets or low forests.

99. OCHNACEAE. *Ochna* Family.

1. *OURATEA* Aubl. Pl. Guian. 1: 397. 1775.

Glabrous trees or shrubs; leaves alternate, persistent, coriaceous, lustrous, serrulate or entire, stipulate; flowers yellow, in terminal or lateral racemes or panicles, the pedicels jointed at base; sepals 5, imbricate, thin; petals 5, obovate, clawed; stamens 10, the anthers dehiscent by pores; ovary 5-parted; fruit of 5, or by abortion fewer, sessile 1-seeded drupes.

Leaves 10 to 16 cm. long, bright green, the veinlets mostly parallel, not reticulate ----- 1. *O. mexicana*.

Leaves 4 to 9 cm. long, pale, the veinlets not parallel, irregularly reticulate.

2. *O. pallida*.

1. *Ouratea mexicana* (Humb. & Bonpl.) Engl. in Mart. Fl. Bras. 12³: 312. 1876.

Gomphia mexicana Humb. & Bonpl. Pl. Aequin. 2: 21. pl. 74. 1809.

? *Gomphia jurgensenii* Planch. Lond. Journ. Bot. 6: 11. 1847.

? *Ouratea jurgensenii* Engl. in Mart. Fl. Bras. 12³: 351. 1876.

Michoacán to Oaxaca; type collected between Acapulco and Chilpancingo, Guerrero. Central America.

Shrub or tree, 2 to 5 meters high; leaves short-petiolate, narrowly elliptic-oblong or oblong-oblongeolate, 2.5 to 4.5 cm. wide, acute or short-acuminate, acute to rounded at base, spinulose-serrulate toward the apex, lustrous; panicles 5 to 16 cm. long, many-flowered, the flowers pedicellate; sepals 5 to 7 mm.

¹ In Engl. & Prantl, Pflanzenfam. 3⁶: 111. 1893.

long, obtuse; petals slightly longer than the sepals. "Cinco negritos," "zapotillo de la costa" (Oaxaca).

2. Ouratea pallida Standl., sp. nov.

Sinaloa to Guerrero; type from Acaponeta, Tepic (*Rose, Standley & Russell* 14445; U. S. Nat. Herb. no. 637331).

Shrub or small tree, 2 to 4.5 meters high, with divaricate branchlets; petioles 2 to 5 mm. long; leaf blades oblong, lanceolate, ovate, oblong-obovate, or elliptic-oblong, acute or obtuse, acutish to rounded at base, finely serrulate throughout or subentire, coriaceous, pale green, the venation prominulous beneath; flowers in dense racemes or panicles 4 cm. long or shorter, the pedicels about as long as the ovoid buds; sepals 7 mm. long, obtuse; petals 8 to 9 mm. long; anthers 4 mm. long; carpels ellipsoid, 1 cm. long, very lustrous.

The shrub is common in dry places along the coastal plain of Sinaloa and Tepic.

100. MARCGRAVIACEAE. Marcgravia Family.

Epiphytic or scandent shrubs; leaves alternate, leathery, simple or entire, often dimorphous; inflorescence racemose, terminal, pendulous; bracts borne in the midst of the raceme or upon the pedicels, greatly modified, nectariferous; flowers perfect; sepals 5, imbricate; petals 5, connate at base, or throughout and forming a caplike mass; stamens 5 to 40; fruit globose, coriaceous or fleshy, indehiscent, 5 to many-celled.

Central (terminal) flowers sterile; petals united to form a caducous caplike corolla-----

1. MARCGRAVIA.

Central or terminal flowers, as well as the others, fertile; petals nearly distinct.

2. SOUROUBEA.

1. MARCGRAVIA L. Sp. Pl. 503. 1753.

1. Marcgravia mexicana Gilg, Bot. Jahrb. Engler **25**: Beibl. **60**: 26. 1898.

Veracruz and perhaps elsewhere; type from Mirador, Veracruz.

Glabrous shrub, epiphytic and more or less scandent; leaves of fertile branches lanceolate, 6 to 10.5 cm. long, nearly sessile, acuminate, acute or obtuse at base; inflorescence umbel-like, the pedicels 3 to 5 cm. long, the apex of the rachis bearing several nectaries, these tubular, 7 to 8 mm. long, stalked; sepals 4, orbicular, 2 mm. long; corolla cylindric.

The genus is represented by a large number of species in the humid forests of tropical America. The nectaries are usually bright-colored. They hang inverted and are filled with nectar, which is much sought by humming-birds and insects. The young sterile shoots are very slender and vinelike, and their leaves are decidedly different from those of the fertile branches. In sterile specimens which probably belong to *M. mexicana* the leaves are sessile, oblong or ovate, and only 1 to 3 cm. long. Specimens of these sterile branches were reported from Mexico by Liebmann¹ as *Urostigma scandens*, he believing that he was dealing with one of the wild figs (*Ficus*).

Imperfect Oaxaca specimens evidently represent a second species of the genus for Mexico, but the material is insufficient for identification or description. The Oaxaca plant is known locally as "gallitos."

2. SOUROUBEA Aubl. Pl. Guian. **1**: 244. 1775.

1. Souroubea exauriculata Delp. Att. Soc. Ital. Sci. Nat. Milan. **12**: 180. 1869.
Veracruz and Oaxaca.

Leaves short-petiolate, oblong-oblongeolate, 7 to 14 cm. long, 3 to 5 cm. wide, acute or obtuse, acute at base, thick, glabrous; racemes 10 to 15 cm. long or

¹ Dansk. Vid. Selsk. Skrivt. V. **2**: 330. 1851.

larger, puberulent, the pedicels stout, about 1 cm. long; bract borne at the apex of the pedicel, helmet-shaped, about 1 cm. long; sepals rounded, 3 to 4 mm. long; petals oval, about 7 mm. long, obtuse.

101. THEACEAE. Tea Family.

Trees or shrubs; leaves alternate, evergreen, simple; peduncles 1-flowered, axillary or lateral, solitary or fasciculate; flowers perfect; sepals 5, imbricate, free or slightly united at base; petals 5, imbricate, united at base or free; stamens numerous, the anthers erect; fruit indehiscent, 2 to 5-celled, globose or ovoid.

The best-known member of the family is the tea plant, *Thea sinensis* L., a native of China and India.

The loblolly bay, *Gordonia lasianthus* (L.) Ellis, a native of the southeastern United States, has been reported from Tepic, by Hemsley. No similar plant has been seen in the Mexican collections examined by the writer.

Seeds and ovules attached at the apex of the cell; sepals not ciliate, sometimes glandular-denticulate ----- 1. **TAONABO.**

Seeds and ovules attached at the side of the cell; sepals ciliate ---- 2. **EURYA.**

1. **TAONABO** Aubl. Pl. Guian. 569. 1775.

Evergreen glabrous trees or shrubs; leaves coriaceous, entire or serrulate, short-petiolate; penduncles axillary or lateral, 1-flowered, recurved, solitary or fasciculate, bibracteolate; sepals 5; petals 5, white, connate at base; stamens numerous; fruit indehiscent, globose or ovoid, 2 or 3-celled, tipped with the persistent style.

The species are closely related and it is doubtful whether all those listed below, or even any large proportion of them, deserve recognition as species. The names "hierba del cura" and "tepezapote" (from the Nahuatl *tepezapotl*, "mountain zapote") are applied to the various species, and the name "limoncillo" is reported from Hidalgo. A decoction of the leaves is used to bathe parts of the body affected with rheumatism.

Bractlets inserted somewhat below the base of the sepals, usually oblong or deltoid-oblong, after anthesis deciduous or becoming remote from the calyx.

Leaves mostly 2 to 3 cm. wide; sepals in fruit 7 to 10 mm. long.

1. **T. pringlei.**

Leaves 3 to 5.5 cm. wide; sepals 10 to 12 mm. long ----- 2. **T. maltbyana.**

Bractlets inserted at the base of the sepals, broadly ovate to orbicular, persistent at the base of the calyx.

Flowers short-pedicellate, the pedicels scarcely or not at all longer than the flower or fruit ----- 3. **T. sylvatica.**

Flowers long-pedicellate, the pedicels usually much longer than the flower or fruit.

Leaves crenate-serrulate ----- 4. **T. tepezapote.**

Leaves entire.

Fruit and ovary rounded at apex, abruptly contracted into the style.

5. **T. sphaerocarpa.**

Fruit and ovary acute at apex, gradually narrowed into the style.

6. **T. oocarpa.**

1. **Taonabo pringlei** Rose, Contr. U. S. Nat. Herb. 8: 322. 1905.

Mountains of Michoacán and Morelos; type from Sierra de Tepoztlán, Morelos, altitude 2,250 meters.

Small tree; leaves narrowly oblong-ob lanceolate, 4.5 to 10 cm. long, obtuse or rounded at apex, attenuate at base, obscurely serrulate, paler beneath; pedicels

equaling or longer than the flowers; sepals about 1 cm. long, entire; ovary acute.

Ternstroemia chalicophila Loesener,¹ described from Huitztan, Chiapas, is probably a synonym of this species.

2. Taonabo maltbyana Rose, Contr. U. S. Nat. Herb. 8: 322. 1905.²

Ternstroemia maltbyana Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 78. 1899. Sinaloa and the Tres Marias Islands; type from María Madre Island, Tepic.

Leaves oblong-obovate or obovate-elliptic, 5.5 to 11 cm. long, rounded or very obtuse at apex, acute at base, entire; pedicels slender, often 5 cm. long; sepals about 1 cm. long, entire; fruit subglobose, 1.5 cm. thick.

3. Taonabo sylvatica (Schlecht. & Cham.) Szysz. in Engl. & Prantl, Pflanzenfam. 3^o: 189. 1893.

Ternstroemia sylvatica Schlecht. & Cham. Linnaea 5: 220. 1830.

Veracruz and Hidalgo; type collected between Jalapa and San Andrés, Veracruz.

Small tree, 3 to 4.5 meters high; leaves slender-petiolate, oblanceolate or oblong-obovate, 4.5 to 8 cm. long, acute or acuminate at base and apex, thin, entire; sepals 5 to 7 mm. long, entire or obscurely glandular-denticulate; fruit ovoid, about 1.7 cm. long and 1 cm. thick. "Hierba del cura" (Veracruz).

4. Taonabo tepezapote (Schlecht. & Cham.) Szysz. in Engl. & Prantl, Pflanzenfam. 3^o: 189. 1893.

Ternstroemia tepezapote Schlecht. & Cham. Linnaea 6: 420. 1831.

Veracruz and Oaxaca; type from Tecolutla, Veracruz.

Small tree; leaves oblong-oblanceolate to obovate, 5 to 11 cm. long, 2 to 4.5 cm. wide, obtuse or acutish at apex, rarely rounded, acute at base, paler beneath; sepals about 7 mm. long, usually entire; ovary acute. "Tepezapote" (Veracruz).

5. Taonabo sphaerocarpa Rose, Contr. U. S. Nat. Herb. 8: 322. 1905.

Guerrero to Chiapas; type from Valley of Culcatlán, Oaxaca. Guatemala.

Leaves obovate or oblong-obovate, 7 to 11 cm. long, 3 to 5.5 cm. wide, rounded or obtuse at apex, acute at base, thick, pale beneath; sepals 7 to 9 mm. long, often glandular-denticulate; fruit subglobose, sometimes nearly 3 cm. in diameter.

6. Taonabo oocarpa Rose, Contr. U. S. Nat. Herb. 8: 322. 1905.

Oaxaca; type from Ocuilapa, altitude 1,020 to 1,140 meters.

Leaves obovate or oblong-obovate, 7 to 9 cm. long, 2.5 to 3.8 cm. wide, obtuse or acutish, acute at base, thick, pale beneath; sepals nearly 1 cm. long, glandular-denticulate; fruit about 1.5 cm. long, 1.5 cm. thick at base.

DOUBTFUL SPECIES.

TAONABO LINEATA (DC.) Rose, Contr. U. S. Nat. Herb. 8: 322. 1905. *Ternstroemia lineata* DC. Mém. Soc. Phys. Hist. Nat. Genève 1: 409. 1822. Type from Chalma, Veracruz. Reported by Sessé and Mocino³ as *Ternstroemia meridionalis*.

2. EURYA Thunb. Nov. Gen. Pl. 67. 1783.

Shrubs or trees; leaves thick, persistent; flowers small, the peduncles 1-flowered, solitary or fasciculate, bibracteolate; sepals 5; petals 5, distinct or nearly so, white; fruit indehiscent, 2 to 5-celled; the seeds few in each cell.

¹ Bull. Herb. Boiss. II. 3: 213. 1903.

² The specific name is given incorrectly here as "*maltbyi*."

³ Pl. Nov. Hisp. 86. 1887.

Leaves entire-----1. *E. mexicana*.
 Leaves serrulate-----2. *E. theoides*.

1. *Eurya mexicana* (Turcz.) Syzsz. in Engl. & Prantl, Pflanzenfam. 3^e: 189. 1893.

Freziera integrifolia Benth. Pl. Hartw. 6. 1839. Not *Eurya integrifolia* Blume, 1856.

Tristylum mexicanum Turcz. Bull. Soc. Nat. Moscou 31¹: 248. 1858.

Cleyera integrifolia Planch.; Hemsl. Biol. Centr. Amer. 1: 93. 1879.

Cleyera mexicana Planch.; Hemsl. Biol. Centr. Amer. Bot. 1: 93. 1879.

Ternstroemia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 187. 1915.

Michoacán to Chiapas and Morelos; type from Sierra San Pedro Nolasco, Oaxaca.

Small tree; leaves elliptic or elliptic-oblong, 4.5 to 13 cm. long, acute or short-acuminate, obtuse or acute at base, lustrous, paler beneath; pedicels much longer than the flowers; sepals suborbicular, 3 to 4 mm. long, ciliate; fruit ovoid-globose, 8 to 10 mm. long.

2. *Eurya theoides* (Swartz) Blume, Mus. Bot. Lugd. Bat. 2: 105. 1856.

Eroteum theoides Swartz, Prodr. Veg. Ind. Occ. 85. 1788.

Freziera theoides Swartz, Fl. Ind. Occ. 2: 972. 1800.

Veracruz, Oaxaca, and Chiapas. West Indies and Central America.

Shrub or small tree; leaves obovate-elliptic or elliptic-oblong, 4 to 13 cm. long, acute or acuminate, acute or acutish at base, paler beneath, coriaceous, yellowish green when dry; sepals 3 to 4 mm. long, ciliate, sericeous outside or glabrate; fruit globose-ovoid, 6 to 7 mm. long. "Tito" (Costa Rica).

102. HYPERICACEAE. St. John's-wort Family.

Shrubs or trees; leave opposite, entire, usually gland-dotted, herbaceous, estipulate; flowers perfect, terminal, cymose or paniculate, sometimes solitary; sepals 5 or 4, imbricate; petals 5 or 4; stamens numerous; fruit baccate or capsular, 3 to 5-celled.

Besides the genera listed below, the genus *Hypericum* is represented in Mexico by a large number of species, all of which are herbs.

Fruit capsular; petals 4, glabrous; sepals very unequal-----1. **ASCYRUM**.
 Fruit baccate; petals 5, villous within; sepals equal or nearly so---2. **VISMIA**.

1. **ASCYRUM** L. Sp. Pl. 787. 1753.

1. *Ascyrum hypericoides* L. Sp. Pl. 788. 1753.

Ascyrum crux-andreae L. Sp. Pl. ed. 2. 1107. 1763.

Veracruz, Oaxaca, and Chiapas. Guatemala, West Indies, and United States.

Glabrous shrub, usually less than 30 cm. high, much branched, the branches compressed; leaves obovate to nearly linear, 8 to 25 mm. long, obtuse, dotted with black glands; flowers terminal and axillary, pedicellate, 12 to 18 mm. broad, yellow; outer sepals oval or ovate, 8 to 12 mm. long, green, the inner narrow and shorter; stamens numerous; capsule ovoid, 4 mm. long, 1-celled. "Arrayanilla" (Porto Rico).

A decoction of the leaves is sometimes employed as a resolute and astringent. Purgative properties are ascribed to the seeds.

2. VISMIA Vand. Fl. Lusit. & Bras. 51. 1788.

Other species besides the following occur in Central America.

1. Vismia mexicana Schlecht. Linnaea 10: 245. 1828.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz. Central America.

Small tree with pyramidal crown; leaves slender-petiolate, lanceolate or lance-ovate, 8 to 18 cm. long, acute or acuminate, rounded to subacute at base, entire, very finely whitish or brownish-tomentulose beneath, glabrous above; flowers in terminal paniced cymes, pedicellate; sepals 5, equal, 6 to 7 mm. long; petals 5, 7 mm. long, black-lineate, villous within; stamens numerous, in 5 clusters; fruit baccate, globose-ovoid, 1.5 cm. long, 5-celled, containing many seeds.

Vismia ferruginea H. B. K. is known in Guatemala as "achiotillo" and "camparaguey."

103. CLUSIACEAE. Clusia Family.

Trees or shrubs, sometimes epiphytic, with resinous, usually yellow juice; leaves opposite, entire, coriaceous, pinnate-nerved, estipulate; flowers usually dioecious or polygamous, axillary or terminal, white, yellow, or pink; sepals 2 to 6, imbricate, decussate; petals usually 2 to 4; stamens numerous in the staminate flower; fruit capsular, baccate, or drupaceous.

Flowers terminal; fruit capsular but usually fleshy **1. CLUSIA.**

Flowers axillary; fruit baccate or drupaceous.

Peduncles several-flowered, the flowers racemose **2. CALOPHYLLUM.**

Peduncles 1-flowered.

Style elongate; calyx closed before anthesis **3 MAMMEA.**

Style very short or none; calyx of imbricate sepals **4 RHEEDIA.**

1. CLUSIA L. Sp. Pl. 509. 1753.

Glabrous trees or shrubs, often epiphytic, with resinous juice; leaves coriaceous, with numerous slender lateral nerves; flowers terminal, small or large, dioecious or polygamous; sepals 4 to 6, orbicular; petals 4 to 9, oblong or obovate; stamens numerous in the staminate flower; ovary 5 to 12-celled; fruit capsular, coriaceous or fleshy, septicidally dehiscent; seeds usually numerous, arillate.

Leaves rounded-obovate, less than one and one-half times as long as broad, very thick **1. C. rosea.**

Leaves oblanceolate to oval-obovate, usually fully twice as long as broad, thinner.

Petioles about 5 cm. long **2. C. ovigera.**

Petioles 0.5 to 3 cm. long.

Staminate flowers 3.5 to 4 cm. broad **3. C. orizabae.**

Staminate flowers less than 3 cm. broad.

Petioles very stout, marginate to base; leaves broadly rounded at apex.

4. C. salvinii.

Petioles comparatively slender, not marginate; leaves rounded to acute at apex.

Leaves rounded at apex.

Fruit about 12-celled; leaves mostly 8 to 10 cm. **5. C. flava.**

Fruit about 7-celled; leaves mostly 5 to 6 cm. long.

6. C. parvicapsula.

Leaves, at least most of them, acute or obtuse **7. C. mexicana.**

1. *Clusia rosea* Jacq. Enum. Pl. Carib. 34. 1760.

Chiapas. Central America, West Indies, and northern South America.

Shrub or tree, 3 to 10 meters high, usually epiphytic when young and destroying the host plant in age; leaves short-petiolate, 7 to 15 cm. long and nearly as wide, broadly rounded at apex, rounded or cuneate at base, very thick, with numerous close parallel lateral nerves; flowers polygamous; petals 6, white or tinged with pink; fruit 8 to 12-celled, 5 to 6 cm. in diameter. "Cupey" (Porto Rico, Panama); "copey" (Cuba).

The wood is said to be reddish and to have a specific gravity of 0.876. An infusion of the leaves is sometimes employed for chest affections and a decoction of the bark (in Venezuela) as a lotion for rheumatism. A gum or resin obtained from the fruit was used by the South American Indians as a resolute in treating fractures and dislocation.

Oviedo (Lib. VIII, Cap. XIV) gives the following account of a tree which must be *Clusia rosea* or some closely related species: "The *copey* is a fine tree with good wood, and it has leaves such as I have described above for the *guiabara* or *uvero*. But the *copey* is a much larger tree, with smaller leaves, and the leaves are twice as thick or more, and better for writing on with a pin or a sharp point; the veins of the leaves are more delicate and hinder writing less than those of the *uvero*. In the early times of the conquest of Hispaniola and other islands, the Christians made playing-cards of *copey* leaves, and lost or gained much money with them, for lack of better ones; on the leaves they drew the kings, knights, knaves, and spots, and all the other figures and values that there usually are on cards, just as I have painted here the five of diamonds (plate 3, figure 6). As these leaves are very thick they held the drawings well, and shuffling did not break them. The fruit of this tree I have not seen, although I have often seen the leaves and the trees themselves."

For an illustration of *Clusia rosea* see Contr. U. S. Nat. Herb. 8: pl. 28.

2. *Clusia ovigera* Triana & Planch. Ann. Sci. Nat. IV. 13: 354. 1860.

Known only from the type collection, from somewhere in southern Mexico.

Leaves obovate-oblong, 15 to 20 cm. long, obtuse or obtuse-acuminate, acute at base, coriaceous; cymes with 3 or more long-pedicellate flowers; sepals 4; petals 4; fruit ovoid, 9 cm. long or larger.

3. *Clusia orizabae* Hemsl. Diag. Pl. Mex. 3. 1878.

Type from Izhuatlancillo, region of Orizaba, Veracruz.

Leaves elliptic or lanceolate, 10 to 15 cm. long, obtuse, cuneate at base, the petiole 2.5 cm. long or less; staminate flowers bibracteolate, the cymes with 3 or more flowers; sepals 4; petals 4.

4. *Clusia salvinii* Donn. Smith, Bot. Gaz. 35: 1. 1903.

Michoacán to Oaxaca, and probably also in Sinaloa and Veracruz. Guatemala; type from Volcán de Agua.

Leaves oblong-obovate or oval-obovate, 10 to 20 cm. long, 5.5 to 10 cm. wide, cuneate at base, with numerous fine nerves divergent at an angle of about 60°; cymes few-flowered; sepals 4, 7 to 9 mm. long; petals 5, slightly longer than the sepals; fruit globose, 5-celled, 1.5 to 2 cm. in diameter. "Palo de águila" (Oaxaca).

5. *Clusia flava* Jacq. Enum. Pl. Carib. 34. 1760.

Specimens from Yucatán perhaps belong here. Jamaica.

Tree, about 10 meters high; leaves cuneate-obovate, 4 to 8 cm. wide, cuneate at base, short-petiolate, the lateral nerves ascending at a very acute angle;

flowers 2 to 2.5 cm. wide; sepals 4, the bractlets 4 to 8; petals 4, yellow; fruit subglobose, large. "Chunup" (Yucatán).

Used in Yucatán as a remedy for syphilitic affections.

6. *Clusia parvicapsula* Vesque, Epharm. 3: 10. pl. 34. 1892.

Veracruz. Colombia and Peru.

Leaves obovate, usually 2 to 3.5 cm. wide, cuneate at base, the nerves ascending at a very acute angle; cymes 3 to 6-flowered; sepals 4, rounded; fruit about 1.5 cm. in diameter, globose.

7. *Clusia mexicana* Vesque, Epharm. 3: 9. pl. 24, 25. 1892.

Veracruz and Oaxaca; type from Córdoba, Veracruz. Probably also in Central America.

Leaves oblanceolate or oblong-oblanceolate, 6 to 15 cm. long, acute at base, the lateral nerves ascending at a very acute angle; cymes with 3 or several flowers; bractlets 2 or 4; sepals 4; petals 4, white; fruit subglobose, 5 or 6-celled, 3 to 4 cm. in diameter. "Zapotillo" (Oaxaca).

2. **CALOPHYLLUM** L. Sp. Pl. 513. 1753.

Glabrous trees; leaves coriaceous, lustrous, the lateral nerves very numerous and close; flowers cymose-paniculate or racemose, axillary, small, polygamous; sepals 4; petals 2 to 8 or more; stamens numerous; fruit drupaceous; 1-seeded.

Petioles 22 to 32 mm. long; leaves 10 to 16 cm. long.----- 1. *C. rekol*.

Petioles 8 to 10 mm. long; leaves 6.5 to 8.5 cm. long.----- 2. *C. chiapense*.

1. *Calophyllum rekol* Standl. Contr. U. S. Nat. Herb. 20: 192. 1919.

Known only from the type locality, Cerro Espino, Oaxaca, altitude 600 meters.

Tree, 20 to 25 meters high; leaves elliptic or elliptic-oblong, 4 to 6 cm. wide, acute at base and apex; racemes about 7-flowered, 2.4 to 3.5 cm. long, puberulent; flowers white, fragrant, 8 mm. broad; stamens 7 to 12; fruit globose, 4 to 5 cm. in diameter. "Cimarrón," "cedro cimarrón."

The tree is valued because of its excellent wood, which resembles mahogany. When cut, the branches yield a yellow sticky sap.

2. *Calophyllum chiapense* Standl. Contr. U. S. Nat. Herb. 20: 192. 1919.

Known only from the type locality, Los Pinos, near Tonalá, Chiapas.

Leaves elliptic or obovate-elliptic, 2 to 4 cm. wide, obtuse or acutish, acute at base; racemes mostly 5-flowered, 2.5 cm. long, obscurely puberulent; flowers 8 to 10 mm. broad; stamens numerous. "Leche de María."

The wood is used for making cart wheels.

3. **MAMMEA** L. Sp. Pl. 512. 1753.

Only the following species is known.

1. *Mammea americana* L. Sp. Pl. 512. 1753.

? *Mammea emarginata* DC. Prodr. 1: 561. 1824.

Cultivated in Veracruz and Tabasco, and perhaps elsewhere. West Indies and northern South America; cultivated in many tropical regions.

Large tree, 12 to 20 meters high; leaves short-petiolate, oval, elliptic, or elliptic-obovate, 10 to 15 cm. long or larger, rounded at apex, rounded or obtuse at base, leathery, lustrous, with numerous parallel lateral nerves; flowers polygamous, fragrant, axillary, solitary or fasciculate, pedicellate; calyx closed at first, rupturing into 2 sepals; petals usually 5, oblong, about 2 cm. long, white; stamens numerous; fruit baccate, 2-celled, 8 to 20 cm. in diameter, subglobose, brownish, the flesh yellow or reddish; seeds 1 to 4, ellipsoid, 4.5 to 7 cm. long. "Zapote mamey," "zapote niño," "zapote de Santo

Domingo," "zapote Domingo" (Veracruz); "mamey" (Tabasco, Costa Rica, Cuba, Porto Rico).

The English name for the fruit is "mammee-apple." The tree has been introduced into Mexico from the West Indies. The trunk is sometimes as much as a meter in diameter; the crown is broad, and the leaves of a deep rich green. The fruit varies somewhat in shape, being either globose or ellipsoid; its thick leathery skin is russet-colored, and when cut a yellowish sap exudes from it. The flesh is firm but juicy; its flavor somewhat resembles that of the apricot, especially when cooked. The fruit is eaten raw, often being served with wine or sugar and cream; it is also made into preserves or jam. A liqueur, known as "eau de créole" or "crème de créole," is distilled from the flowers in the French West Indies. The wood is hard, durable, and beautifully grained, and takes a high polish. It is used for building purposes and cabinetwork.

The gum obtained from the bark is used to extract chiggers from the skin and to kill ticks and other parasites upon domestic animals. In Venezuela the powdered seeds are used in the same way, and also for cutaneous diseases. Febrifuge properties have been ascribed to the leaves.

4. *RHEEDIA* L. Sp. Pl. 1193. 1753.

1. *Rheedia edulis* (Seem.) Triana & Planch. Ann. Sci. Nat. IV. 14: 310. 1860.

Calophyllum edule Seem. Bot. Voy. Herald 89. 1853.

Oaxaca. Central America; type from Panama.

Tree, about 15 meters high; leaves short-petiolate, lance-oblong or narrowly oblong, 6 to 13 cm. long, obtuse or acutish at base and apex, glabrous, coriaceous; peduncles axillary, usually fasciculate, 1-flowered, 1.5 to 2 cm. long; sepals 2; petals 4, about 6 mm. long; stamens 10 to 12; fruit olive-like, about 2.5 cm. long, 1 or 2-seeded, with scant flesh. "Jorco" (Costa Rica); "sastra" (Panama).

The fruit is sweet and edible. This is probably the plant reported by Sessé and Mocifio¹ as *Rheedia lateriflora*, a name which belongs to a West Indian species.

104. FRANKENIACEAE. Frankenia Family.

1. *FRANKENIA* L. Sp. Pl. 331. 1753.

Small much-branched shrubs with jointed stems; leaves small, opposite, estipulate, entire, often fasciculate; flowers perfect, solitary, sessile, pink; calyx tubular, persistent, 4 to 6-lobate; petals 4 to 6, free, imbricate; stamens usually 6; fruit a capsule, 1-celled, usually with 3 parietal placentae, included in the calyx, the seeds 2 to several.

Leaves flat when fresh; style 3-cleft; ovules numerous-----1. *F. grandifolia*.

Leaves with strongly revolute margins; style 2-cleft; ovules 2 or 3.

2. *F. palmeri*.

1. *Frankenia grandifolia* Cham. & Schlecht. Linnaea 1: 35. 1826.

In saline or alkaline soil, northern Baja California. California.

Plants chiefly herbaceous, suffrutescent at base, 30 cm. high or less, puberulent; leaves obovate to oblong, mostly 8 to 15 mm. long, obtuse, short-petiolate; calyx 6 to 7 mm. long, angulate, pilosulous; petals usually 5, purple; stamens 4 to 7. "Hierba reuma" (California).

The plant has a salty flavor and contains a large amount of sodium chloride. It also contains about 6 per cent of tannin. The extract of the plant is applied topically and also taken internally for catarrhal affections, especially those of the nasal and genito-urinary passages.

¹ Pl. Nov. Hisp. 86. 1887.

Frankenia grandifolia campestris A. Gray.¹ is a form with smaller narrower leaves and shorter pubescence. It has been collected in Coahuila and occurs also in Nevada and southern California.

2. *Frankenia palmeri* S. Wats. Proc. Amer. Acad. 11: 124. 1876.

Chiefly in salt marshes, Baja California and upon the adjacent islands; type from the east coast. Southern California.

Stems woody almost throughout, gray; leaves linear or filiform, mostly 2 to 6 mm. long but sometimes as much as 10 mm., scaberulous, usually with a white incrustation; calyx 3 to 4 cm. long; stamens 4.

105. TAMARICACEAE. Tamarisk Family.

1. TAMARIX L. Sp. Pl. 270. 1753.

The species are all natives of the Old World, chiefly of the Mediterranean region. Several of them have medicinal properties and some yield dyestuffs. Some of the species, when punctured by a scale insect, produce an exudate known as manna.

1. *Tamarix gallica* L. Sp. Pl. 270. 1753.

Cultivated for ornament especially in the arid portions of northern Mexico; sometimes escaping. Native of southern Europe and northern Africa; cultivated in the southern part of the United States.

Glabrous shrub or small tree, sometimes 9 meters high, with slender branches; leaves alternate, minute, scalelike, sessile, acute; flowers pink or white, in dense bracted spikes; sepals 4 or 5; petals 4 or 5, scarcely more than 1 mm. long; anthers yellow or purple; fruit a small capsule containing numerous seeds.

The English names are tamarisk and salt-cedar. In Spain the shrub is known as "tamarisco," "tamariz," "taray," "atarfe," and "talaya." The shrub will thrive under the most varied conditions, in either dry or wet ground. In the southwestern United States it is a favorite ornamental plant because it grows well in the most arid places. It is able also to endure salt and alkali in the soil. Frequently it is planted for hedges, and if kept trimmed it forms a dense handsome hedge of pale green. The branches suggest those of cedar (*Juniperus*), but they are much more slender. The plant is easily grown from cuttings.

In its native countries the tamarisk is prized as a source of charcoal. The branches are used for basketry and wattlework. All parts of the shrub are bitter and the bark contains tannin. Tonic, astringent, sudorific, and diuretic properties are ascribed to it. In Europe the leaves and branches are sometimes employed in the preparation of a kind of beer.

106. FOUQUIERIACEAE. Ocotillo Family.

REFERENCE: Nash, A revision of the family Fouquieriaceae, Bull. Torrey Club 30: 449-459. 1903.

Shrubs or trees; spines developing within the petioles on young branches, becoming apparent after the fall of the leaves; leaves alternate, entire, petiolate; flowers perfect, spicate, racemose, or paniculate, terminal; sepals 5, imbricate; corolla gamopetalous, the lobes imbricate; stamens 10 to 15, unequal, exserted; fruit a 3-celled capsule, 3-valved; ovules 4 to 6 in each cell; seeds compressed, at first broadly winged, the wing breaking up into long filaments.

¹ Syn. Fl. 1¹: 208. 1895.

Styles wholly united, stout, short, included; tree with a thick, columnar, usually simple trunk; corolla yellow-----1. **IDRIA**.
 Styles free at apex, slender, exserted; shrubs or trees with branched trunks; corolla usually red-----2. **FOUQUIERIA**.

1. **IDRIA** Kellogg, *Hesperian* 4: 101. 1860.

A single species is known.

1. *Idria columnaris* Kellogg, *Hesperian* 4: 101. 1860.

Fouquieria columnaris Kellogg; Curran, *Bull. Calif. Acad.* 1: 133. 1885.

Fouquieria gigantea Orcutt, *West Amer. Sci.* 2: 48. 1886.

Baja California; type locality, Sebastián Bay.

Trunk 3 to 18 meters high, tapering from base to apex, with numerous slender lateral branches, these leafy, covered with slender spines 2 to 3.5 cm. long; leaves oblanceolate or obovate, 1.5 to 2 cm. long; flowers in large panicles borne at the summit of the trunk, nearly sessile, 12 to 14 mm. long; sepals 4 mm. long, rounded; corolla 6 to 7 mm. long; stamens 10; capsule 8 to 10 mm. long. "Cirio."

This is one of the most curious and remarkable plants of Baja California, because of its weird appearance and strange habit of growth. It grows on sandy flats and rocky hills at low altitudes, and in many places is abundant, forming regular forests. The trunks sometimes send forth a few large erect branches above the middle; at the base they are often nearly a meter in diameter. The older trees frequently become topheavy and lop over, thus assuming fantastic forms. The wood is soft and spongy. The trunks are often hollow, and sometimes inhabited by bees. For illustrations of the plant see *Contr. U. S. Nat. Herb.* 16: pl. 121, 122.

The following account of the tree by Clavígero (*Historia de la California*, 1789) is doubtless the first published description of it: "Much more curious is another tree, called by the Cochimi *milapá*, which is common from the twenty-ninth to the thirty-first degree, and had not been seen by the missionaries before the year 1751, for they had not entered that part of the country; nor is it, as I believe, known even yet among naturalists. It is so large that it rises perpendicularly to a height of 70 feet; its trunk, proportionately thick, is not woody but soft and juicy, like the branches of the *pitahayo* and *cardón*; its branches are certain twigs, a foot and a half long, adorned with small leaves and with a spine at the tip; the direction of the branches is not upward or horizontal, like those of most trees, but they hang down like beard from tip to the base of the trunk, and upon them are bunches of flowers, but no fruit has ever been seen. This great tree is of no use, for even when dry it is not good for fuel; nevertheless, in the mission of San Francisco de Borja they used to burn it for lack of other firewood."

2. **FOUQUIERIA** H. B. K. *Nov. Gen. & Sp.* 3: 452. 1819.

Spiny shrubs or trees, with a distinct trunk, or often dividing at the base into slender erect branches, leafless for most of the year; flowers usually red, spicate or paniculate; corolla cylindric or campanulate, the tube equaling or longer than the lobes; stamens 10 to 15.

The following species are the only ones known.

Leaves nearly linear, 2 to 3 mm. wide-----1. *F. purpusii*.

Leaves oblong to broadly obovate, usually more than 5 mm. wide.

Corolla tube campanulate, little if at all exceeding the lobes.

Capsule about 2 cm. long; filaments not appendaged-----2. *F. burragei*.

Capsule 1 to 1.5 cm. long; filaments appendaged-----3. *F. fasciculata*.

Corolla tube cylindric, more than twice as long as the lobes.

Inflorescence spicate, the flowers sessile-----4. *F. formosa*.

Inflorescence paniculate, the flowers pedicellate.

Filaments with a scalelike appendage near base; panicle long and narrow; plants usually without a trunk-----5. *F. splendens*.

Filaments not appendaged; panicle broad or conic; plants commonly with a trunk.

Panicle corymbiform, the pedicels long and slender.

6. *F. macdougalii*.

Panicle conic, the pedicels short and stout-----7. *F. peninsularis*.

1. *Fouquieria purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 386. 1909.

Known only from Cerro de Coscomate, Oaxaca, on rocky slopes at an altitude of 2,000 to 2,200 meters.

Tree, 4 to 8 meters high, the trunk 50 cm. thick or more at base, tapering upward, gray, with spreading branches; leaves 3 to 5 cm. long; spines 3 to 4 cm. long; inflorescence corymbose-paniculate, the flowers short-pedicellate; corolla 1 cm. long, white, the lobes acuminate; stamens 10; capsule 1 cm. long.

For an account of the species, accompanied by two illustrations, see A. Purpus in Möller's *Deutsche Gärtner-Zeitung* 25: 8-9. 1910. In habit the plant resembles *Idria columnaris*, the trunk suggesting an inverted carrot.

2. *Fouquieria burragei* Rose, Journ. N. Y. Bot. Gard. 12: 267. 1911.

Known only from the type locality, Pichilique Island, Baja California.

Shrub or tree, 3 to 7 meters high, with very short trunk and long simple spiny branches; spines about 1 cm. long; inflorescence simple or with few branches, the flowers subsessile; corolla 10 to 12 mm. long, pale purple or nearly white.

3. *Fouquieria fasciculata* (Roem. & Schult.) Nash, Bull. Torrey Club 30: 452. 1903.

Cantua fasciculata Roem. & Schult. Syst. Veg. 4: 369. 1819.

Fouquieria spinosa H. B. K. Nov. Gen. & Sp. 3: 452. 1820.

Bronnia spinosa H. B. K. Nov. Gen. & Sp. 6: 84. pl. 528. 1823.

Fouquieria campanulata Nash, Bull. Torrey Club 30: 457. 1903.

Fouquieria splendens micrantha Loesener, Repert. Sp. Nov. Fedde 9: 357. 1911.

Durango to Querétaro and Hidalgo; type from Puente de la Madre de Dios (Hidalgo ?); perhaps also in Coahuila.

Shrub or tree, 4 meters high or larger; leaves oblong-obovate or spatulate, 2 to 3 cm. long, obtuse or rounded at apex; panicle usually narrow, the flowers short-pedicellate; corolla red, 10 to 14 mm. long. "Ocotillo," "teocotillo," "albarda," "alabarda," "barda" (Durango).

It is probably this species which, according to Altamirano, is known in Querétaro as "chiquiña." The pulverized seeds are used in Durango as a remedy for toothache, and the stems for fences and sides of huts.

The species was described from fruiting material, and the inflorescence is described and illustrated as being corymbose-paniculate. It may be, therefore, that the name *fasciculata* does not apply to the plants placed here by the writer. Material from Hidalgo agrees with Durango specimens upon which *Fouquieria campanulata* is based, and since no other species is represented in recent collections from Hidalgo, it seems probable that the names *F. fasciculata* and *F. campanulata* refer to the same species.

4. *Fouquieria formosa* H. B. K. Nov. Gen. & Sp. 6: 83. pl. 527. 1823.

Philetaeria horrida Liebm. Dansk. Vid. Selsk. Skrivt. V. 2: 283. 1851.

Jalisco to Oaxaca, Morelos, and Mexico.

Shrub or tree, 2 to 6 meters high or larger, much branched, with a thick trunk, very spiny; leaves elliptic or obovate, 2 to 3 cm. long, rounded at apex; spikes 15 cm. long or shorter; corolla bright red, about 2.5 cm. long and 7 mm. thick. "Palo santo" (Puebla); "rosalillo" (Jalisco, *Oliva*).

5. *Fouquieria splendens* Engelm. in Wisliz. Mem. Tour North. Mex. 98. 1848.

Northern Baja California to Sonora, Chihuahua, and Coahuila; probably also in Zacatecas. Western Texas to southern California; type from Jornada del Muerto, New Mexico.

Shrub, 2 to 6 meters high, with numerous simple slender branches rising from the base; leaves oblanceolate to rounded-obovate, 2 to 3 cm. long; panicles 5 to 20 cm. long; corolla bright red (very rarely white), 2 to 2.5 cm. long. "Ocotillo" (Chihuahua, Coahuila, Zacatecas, Baja California, Texas, New Mexico); "albarda" (Zacatecas, Coahuila); "barda" (Coahuila).

In the United States the plant has been called "coachwhip," "vine-cactus," and "Jacob's-staff," but the word "ocotillo" is more generally used and is a better name. It is sometimes corrupted into "ocotilla" and "ochotilla."

This is one of the most common and characteristic plants of the desert regions of northern Mexico and the southwestern United States, growing upon plains and rocky hillsides. For most of the year the plants are leafless spiny sticks, apparently dead, but in summer when rains fall they put out their bright green leaves and, at the tip of the branch, dense masses of vivid red flowers. The leaves soon fall. The wood is heavy and resinous. The branches are frequently made into walking-sticks, and they are employed to make fences or the sides of huts. If planted in the ground they often grow and form a living hedge.

The bark contains gum, resin, and wax. Palmer reports that the flowers are employed in Coahuila as a remedy for coughs. The Coahuilla Indians of southern California eat the flowers and seed pods, and prepare a sweet beverage by soaking the flowers in water.

6. *Fouquieria macdougalii* Nash, Bull. Torrey Club 30: 454. 1903.

Fouquieria jaboncillo Loesener, Repert. Sp. Nov. Fedde 9: 356. 1911.

Sonora and Sinaloa; type locality, Torres, Sonora.

Tree, sometimes 7 meters high, the trunk 10 to 20 cm. thick, short, yellowish green, the branches brown, their spines 1 to 2 cm. long; leaves lanceolate to broadly obovate, 2 to 4 cm. long, acute to rounded at apex; panicles usually fully as broad as long, lax; corolla bright red, 2.5 cm. long. "Palo verde," "jaboncillo," "chunari," "torotillo" (Sinaloa); "torote verde" (Sonora, Sinaloa).

The bark is employed as a substitute for soap, especially in washing woolen goods.

7. *Fouquieria peninsularis* Nash, Bull. Torrey Club 30: 455. 1903.

Southern Baja California and adjacent islands, Sonora, and Sinaloa, usually near the coast; type from La Paz, Baja California.

Shrub, 2 to 3 meters high, with very short trunk; panicles 5 to 15 cm. long, many-flowered; corolla bright red, 2 cm. long. "Palo de Adán," "cirlo" (Baja California).

This grows with *F. splendens* in Baja California, but is distinguished from that species by the definite trunk. It is abundant there in many places, usually growing in sandy places. For an illustration of a plant see Contr. U. S. Nat. Herb. 16: pl. 120.

The plant is mentioned first by Clavigero (Historia de la California, 1789), who writes of it as follows: "There is also another small tree bristling with long spines, and almost always naked, for which reason the Spaniards gave it

the name of *palo Adán* [Adam's tree]. When there is rain it sends forth a few small leaves, but after a month it sheds them and remains naked all the year."

107. CISTACEAE. Rock-rose Family.

REFERENCE: Grosser in Engl. Pflanzenreich IV. 193. 1903.

The only other genus represented in Mexico is *Lechea*, of which two species occur. They are distinguished from *Halimium* by having 3 instead of 5 petals.

1. HALIMIUM Spach, Ann. Sci. Nat. II. 6: 365. 1836.

Plants herbaceous or suffrutescent, slender; leaves alternate, narrow, entire, estipulate; flowers racemose, subumbellate, paniculate, or glomerate, all petaliferous or partly cleistogamous; sepals 5, the 3 outer ones much narrower than the others; petals 5 in the petaliferous flowers, yellow, fugacious; stamens numerous; fruit a glabrous capsule, 3-valvate, many-seeded.

The plants of this genus have usually been referred to *Helianthemum*, but recent writers restrict that to certain Old World plants.

Some of the United States species are known as frostweed and rock-rose. They contain a volatile oil, tannin, and apparently a glucoside, having a bitter and astringent taste and tonic and astringent properties. Formerly they were employed as a remedy for diarrhea and scrofulous affections, and as a gargle in the treatment of scarlatina.

Leaves linear, mostly 1 to 3 cm. long, green. Flowers all petaliferous and pedicellate-----1. *H. aldersonii*.

Leaves broader or, if linear, less than 1 cm. long and grayish-pubescent.

Stems hirsute or pilose with long spreading hairs-----2. *H. chihuahuense*.

Stems covered with a close, usually appressed, stellate pubescence.

Pedicels of the petaliferous flowers much longer than those of the cleistogamous flowers; cleistogamous flowers sessile or nearly so.

Leaves linear-----3. *H. argenteum*.

Leaves oblanceolate or broader.

Sepals of the petaliferous flowers 3 to 4 mm. long; leaves covered beneath with a dense grayish tomentum-----4. *H. glomeratum*.

Sepals of the petaliferous flowers 5 to 6 mm. long; leaves green beneath, with scattered stellate hairs-----5. *H. exaltatum*.

Pedicels all elongate, those of the two kinds of flowers subequal, or the flowers sometimes all petaliferous.

Flowers subumbellate at the ends of the branches; leaves mostly 5 to 15 mm. wide-----6. *H. coulteri*.

Flowers scattered along the upper part of the branches, not umbellate; leaves mostly 2 to 5 mm. wide.

Leaves oblanceolate-linear, broadest at the apex; flowers probably all petaliferous-----7. *H. nutans*.

Leaves mostly oblong or oblong-oblanceolate, broadest about the middle; flowers partly cleistogamous.

Pedicels about as long as the calyx; stems simple below, strict.

8. *H. pringlei*.

Pedicels usually twice as long as the calyx; stems usually branched below, weak-----9. *H. patens*.

1. *Halimium aldersonii* (Greene) Standl.

Helianthemum aldersonii Greene, Erythea 1: 259. 1893.

Dry hillsides, northern Baja California. Southern California, the type from San Diego County.

Plants suffrutescent, 30 to 60 cm. high, with numerous erect branches; leaves sessile, 1 to 2 mm. wide, obscurely stellate-puberulent but green; flowers all

on long filiform pedicels; inner sepals ovate-acuminate, 6 to 7 mm. long in anthesis; petals 8 to 13 mm. long.

By Grosser this is considered a synonym of *H. scoparium* (Nutt.) Grosser, but it appears to be fairly distinct from that (California) species in its much larger flowers.

2. *Halimium chihuahuense* (S. Wats.) Grosser in Engl. Pflanzenreich IV. 193: 45. 1903.

Helianthemum chihuahuense S. Wats. Proc. Amer. Acad. 23: 268. 1888.

Chihuahua and Hidalgo; type from pine plains at base of the Sierra Madre, Chihuahua.

Plants suffrutescent at base, 30 cm. high or less; leaves oblong or oblanceolate-oblong, 1 to 2 cm. long, obtuse or acute, ciliate and pilose; pedicels subequal, shorter than the calyx; inner sepals of the petaliferous flowers in fruit 6 mm. long; petals twice as long as the sepals.

Besides the type collection, the writer has seen only a single specimen, one collected between Somoriel and Las Lajas, Sinaloa. This represents a taller, more strict plant, but does not appear to differ otherwise from the Chihuahua plant. Grosser gives as a synonym "*Cistus ciliaris* Moc. in sched.," so he must have seen at least one Mexican specimen besides the type, although he cites no other.

3. *Halimium argenteum* (Hemsl.) Grosser in Engl. Pflanzenreich IV. 193: 47. 1903.

Helianthemum argenteum Hemsl. Diag. Pl. Mex. 20. 1879.

Region of San Luis Potosí, the type locality.

Plants much branched, suffrutescent, about 10 cm. high; leaves sessile, crowded, acute, 1 to 1.5 mm. wide, densely white-pilosulous; pedicels 1.5 mm. long or less; inner sepals of petaliferous flowers 5 mm. long in fruit; capsule 4 mm. long.

4. *Halimium glomeratum* (Lag.) Grosser in Engl. Pflanzenreich IV. 193: 47. 1903.

Cistus glomeratus Lag. Gen. & Sp. Nov. 16. 1816.

Trichasterophyllum hyssopifolium Link, Jahrb. Gewächsk. 1^a: 69. 1820.

Helianthemum glomeratum Lag.; DC. Prodr. 1: 269. 1824.

Helianthemum astylum Dunal; DC. Prodr. 1: 284. 1824.

Helianthemum obcordatum Dunal; DC. Prodr. 1: 284. 1824.

Taeniostemma micranthum Spach; Hook. Comp. Bot. Mag. 2: 289. 1836.

Heteromeris mexicana Spach, Hist. Nat. Vég. Phan. 6: 104. 1838.

Sonora and Chihuahua to San Luis Potosí, Morelos, and Oaxaca; types from Acapulco and Zimapan. Guatemala and Costa Rica.

Plants suffrutescent, usually 50 cm. high or less, branched above, minutely stellate-tomentulose; leaves short-petiolate, oblanceolate-oblong or lance-spatulate, 1 to 3 cm. long; pedicels of petaliferous flowers often 2 to 2.5 cm. long, the flowers sometimes all cleistogamous; sepals of cleistogamous flowers 1 to 1.5 mm. long; capsules 6 mm. long in the petaliferous and 2 mm. in the cleistogamous flowers. "Juanita" (San Luis Potosí, Jalisco, Valley of Mexico).

A decoction of the plants is used as a remedy for indigestion and diarrhea, and the dried plants are commonly sold in the markets for that purpose.

This is probably *Cistus mexicanus* Sessé & Moc.¹

5. *Halimium exaltatum* Rose & Standl., sp. nov.

Sinaloa and Michoacán; type from dry hills above Uruapan, Michoacán, altitude 1,500 meters (*Pringle* 10409; U. S. Nat. Herb. no. 463505).

¹ Pl. Nov. Hisp. 87. 1887.

Erect shrub, 1 meter high or less, the stems strict, coarsely stellate-pubescent; leaves short-petiolate, obovate or obovate-oblong, 2 to 3.5 cm. long, 5 to 13 mm. wide, acute or obtuse, green, sparsely stellate-pubescent on both surfaces; flowers crowded at the ends of the branches, numerous; pedicels of the petaliferous flowers equaling or shorter than the sepals, the inner sepals in anthesis 5 to 6 mm. long, stellate-pilosulous, the outer sepals linear, half as long, the petals nearly twice as long as the sepals; cleistogamous flowers sessile or subsessile, smaller; capsules 4 to 4.5 mm. long, brown, glabrous.

The type collection was distributed as a new species of *Helianthemum* under a specific name already employed in that genus. *Pringle* 13447 from Uruapan belongs to this species.

6. *Halimium coulteri* (S. Wats.) Grosser in Engl. Pflanzenreich IV. 193: 46. 1903.

Helianthemum coulteri S. Wats. Proc. Amer. Acad. 17: 323. 1882.

San Luis Potosí, Mexico, Hidalgo, and Puebla; type from Zimapán, Hidalgo.

Stems chiefly or wholly herbaceous, 10 to 20 cm. high, sparsely branched; leaves short-petiolate, elliptic, elliptic-oblong, or obovate, 1.5 to 3.5 cm. long, rounded to acute at apex, minutely pale-tomentulose beneath; pedicels equaling or longer than the calyx; inner sepals of petaliferous flowers 5 to 7 mm. long in anthesis, 7 to 9 mm. long in fruit. "Juanita" (San Luis Potosí).

This species was reported by Hemsley as *Helianthemum arenicola* Chapm.

7. *Halimium nutans* (T. S. Brandeg.) Standl.

Helianthemum nutans T. S. Brandeg. Proc. Calif. Acad. II. 2: 129. 1889.

Known only from the type locality, Llanos de San Julián, Baja California.

Slender branched shrub, densely leafy; leaves 2 to 6 mm. long, obtuse, very minutely stellate-pubescent; pedicels slender, recurved, longer than the calyx; sepals in fruit 6 to 7 mm long.

8. *Halimium pringlei* (S. Wats.) Grosser in Engl. Pflanzenreich IV. 193: 46. 1903.

Helianthemum pringlei S. Wats. Proc. Amer. Acad. 23: 268. 1888.

Chihuahua and Durango; type from plains at base of the Sierra Madre, Chihuahua. Guatemala.

Plants erect, 30 to 50 cm. high; leaves sessile or nearly so, oblong or oblong-ob lanceolate, 1 to 2.5 cm. long, obtuse or acute, minutely stellate-tomentose; sepals of petaliferous flowers 6 to 8 mm. long, the petals about twice as long; capsules of petaliferous flowers 7 mm. long.

9. *Halimium patens* (Hemsl.) Grosser in Engl. Pflanzenreich IV. 193: 46. 1903.

Helianthemum patens Hemsl. Diag. Pl. Mex. 20. 1879.

? *Halimium berlandieri* Briq. Ann. Cons. Jard. Genève 9-10: 99. 1907.

San Luis Potosí, Hidalgo, and Puebla; type from the region of San Luis Potosí.

Plants suffrutescent at base, 10 to 25 cm. high, slender, spreading; leaves sessile, mostly oblong or elliptic, 7 to 15 mm. long, obtuse or acute, stellate-pubescent, green; inner sepals of petaliferous flowers 4 to 5 mm. long, the petals nearly twice as long.

108. BIXACEAE. Arnotto Family.

1. BIXA L. Sp. Pl. 512. 1753.

The following is the only species.

1. *Bixa orellana* L. Sp. Pl. 512. 1753.

Sinaloa to Veraacruz, Yucatán, Tabasco, and Chiapas. West Indies, Central America, and South America.

Shrub or small tree, 2 to 9 meters high; leaves alternate, long-petiolate, broadly ovate, mostly 8 to 20 cm. long, acuminate, truncate, or rounded at base, entire, minutely lepidote beneath; flowers perfect, in terminal panicles, pink; sepals 5, imbricate, deciduous; petals 5, 1.5 to 2.5 cm. long; fruit a capsule, subglobose or ovoid, 2 to 3.5 cm. long, covered with long spinelike bristles, or rarely smooth; seeds numerous, with a fleshy, bright orange covering. "Achiote" (Michoacán, Guerrero, Sinaloa, Veracruz, Jalisco, Oaxaca, Guatemala, Costa Rica, Colombia, Cuba, Peru, Argentina, Ecuador; from the Nahuatl *achiotl*); "achiotillo" (Tabasco); "arnato," "urucu" (Yucatán); "chancanguarica," "pumacua" (Morelos, *Ramírez*); "bixa" or "bija" (Panama, Colombia, Cuba); "achuete" (Philippines, a corruption of *achiot*); "achote" (Guatemala, Colombia); "onoto" (Colombia, Venezuela); "cacicuto" (Cuba); "rocou" (Guiana); "bichet" (Carib, women); "emátabi" (Carib, men).

The arnotto tree or shrub is one of the best known of tropical American plants because of the yellow-red dye obtained from the fruit. This dye has long been employed by the aborigines and is now an article of commerce, and the plant is frequently cultivated. In order to obtain the coloring matter the seed pods are crushed and thrown in water, whereupon it is dissolved. The liquid is then strained, the coloring matter settles to the bottom, the water is drawn off, and the sediment is formed into cakes, in which form the dyestuff is shipped. Sometimes the fruits are placed in water and allowed to ferment, during which process the dyestuff separates and settles. The dye is used for coloring silk and cotton orange-yellow, but the color is said to be fugitive. It is employed extensively for coloring cheese and butter, as well as oils and varnish. Large quantities are imported into Europe and the United States, the supply coming largely from South America. In tropical America arnotto (written also anatto, and in various other forms) is employed for coloring food, especially rice, and for flavoring chocolate and other articles. By the Indians it has been and still is employed extensively for painting the face and body, partly for ornament and partly to prevent the attacks of mosquitoes and other insects. At an early date the plant was introduced into the Pacific islands, and the natives there soon learned to use the dye for painting their bodies. The coloring properties of the dye are dependent upon two principles, bixin and orellin.

The wood is described as nearly white, porous, and very soft, with a specific gravity of 0.399. It is of little or no use. The Indians employed it to obtain fire by friction. The stems, crushed and thrown in water, yield a gum somewhat resembling gum arabic. The bark contains a strong fiber, from which cordage is sometimes made.

Arnotto is much used in domestic medicine in tropical America. Astringent, febrifuge, antidysenteric, diuretic, aphrodisiac, and other properties are ascribed to it and it is employed for venereal diseases, erysipelas, intermittent fevers, epilepsy, and other affections. The pulp, if applied immediately to burns, is said to prevent the formation of blisters or scars. The leaves are applied as poultices to relieve headache. A decoction of them is employed as a gargle for sore throat. The seeds are said to be the best antidote for poisoning by yuca agria or yuca brava (*Manihot*).

Heckel¹ states that in Madagascar, where the plant is cultivated, the Malagaches who have to speak or dance in public take an infusion of the leaves to make themselves bold and courageous. In Brazil the pulp of the seeds has been given to bulls about to appear in the ring in order to make them more lively and dangerous. It may be that the plant contains some excitant principle which has not yet been investigated.

The specific name of the arnotto plant, *orellana*, was given in honor of Don Francisco Orellana, the disloyal but famous comrade of Pizarro, and discoverer

¹ Les plantes utiles de Madagascar, p. 183. 1910.

of the Amazon, who achieved one of the most remarkable explorations of history in his descent of that river from its headwaters.

For an illustration of *Bixa orellana* see Contr. U. S. Nat. Herb. 9: pl. 39.

The following interesting account of the arnotto plant is given by Oviedo (Lib. VIII, Cap. VI), who was probably the first to describe it: "*Bixa* is a wild shrub or plant, like the others I have mentioned, but like them it is sometimes cultivated by the Indians. This plant or *bixa* grows in Hispaniola and the other islands and in Tierra-Firme, and its about half as high again as a man. It has leaves like those of cotton and bears capsules resembling those of that plant, except that outside they are covered with coarse hairs and marked with veins that indicate the interior partitions, and on the inside are red seeds, sticky like wax or more so; and from these the Indians make balls with which they paint their faces, mixing the dye with certain gums, and from this they make a fine vermilion color with which they paint the face and body in such an elegant fashion that they resemble the devil himself. The women do likewise when they hold their feasts and dances, and the men when they wish to appear well and when they go to war, in order to appear fierce. It is very hard to remove the *bixa* until many days pass, but it is astringent and they say very comfortable, and even beneficial in this way, that when they are thus painted if they are wounded, since the paint and the blood are of the same color, the men are not frightened as much as they would be if they were not painted red, but this they attribute to the virtues of the *bixa*. The paint, besides its evil appearance, has a disagreeable odor because of the gums and other things mixed with it." The plant is figured and described also by Hernández.¹

109. COCHLOSPERMACEAE. *Cochlospermum* Family.

The only other genus of this family in Mexico is *Amoreuxia*, which is represented by three species of low herbs.

1. MAXIMILIANEA Mart. Flora 2: 451. 1819.

1. *Maximiliana vitifolia* (Willd.) Krug & Urb. Bot. Jahrb. Engler 15: 293. 1892.

Bombax vitifolium Willd. Enum. Pl. 720. 1809.

Cochlospermum hibiscoides Kunth, Syn. Pl. Aequin. 3: 214. 1824.

Cochlospermum serratifolium DC. Prodr. 1: 527. 1824.

Cochlospermum vitifolium Spreng. Syst. Veg. 2: 596. 1825.

Sonora to Veracruz, Yucatán, and Chiapas. Central America and South America; cultivated in the West Indies and elsewhere.

Tree, 5 to 12 meters high, with red-brown branches; leaves alternate, long-petiolate, 10 to 30 cm. wide, cordate at base, deeply and palmately 5-lobate, the lobes acuminate, crenate-serrate, glabrate; flowers in terminal clusters, pedicellate, 10 cm. broad or larger, bright yellow; sepals 5, imbricate, tomentulose, deciduous; petals 5, emarginate; stamens numerous; fruit a 5-valvate capsule, globose-obovoid, 7 to 8 cm. long, depressed at apex, finely velvety-pubescent, striate-nerved; seeds numerous, reniform, covered with long cotton-like white hairs. "Chuun," "chum," "chimu" (Yucatán, Maya); "cocito" (Chiapas); "rosa amarilla" (Sinaloa); "apompo," "pongolote," "pochote," "cojón de toro" (Oaxaca); "madera de pasta" (Veracruz, Ramírez); "tecomaxochitl" (Nahuatl); "palo amarillo," "palo de rosa amarilla" (Durango); "quie-riga," "quie-quega," "huarumbo," "flor izquierda" (Chiapas and Oaxaca, Seler); "panaco" (Guerrero); "bombón," "catamericuche" (Nicaragua); "poró-poró" (Nicaragua, Panama, Costa Rica, Colombia); "tecomasúchil" (Chiapas, Guatemala); "tecomasuche" (Guatemala); "botulo" (Ecuador);

¹Thesaurus 74. 1651.

"carnestolendas" (Colombia, Venezuela); "bototo," "flechero," "batabana" (Colombia); "botija" (Cuba).

When in flower this is one of the most showy of Mexican plants. The trees are usually quite leafless when they flower, but they are one great mass of showy yellow blossoms. The branches take root readily when stuck in the ground, and they are often planted to form hedges. The bark contains a fiber which is used locally for cordage. A decoction of the wood or leaves is a popular cure for jaundice, and the flowers are employed as a remedy for chest affections. The wood is soft and brittle.

110. VIOLACEAE. Violet Family.

(Contributed by S. F. Blake.)

Herbs or shrubs, sometimes scandent; leaves usually alternate, stipulate, entire or toothed; flowers variously arranged, regular or irregular; sepals 5; petals 5; stamens 5, the connectives (in ours) dilated and produced beyond the anther cells; ovary 1-celled, with 3 parietal placentae; ovules solitary to numerous; fruit (in ours) a 3-valved capsule.

Lower petal spurred.....1. **CORYNOSTYLIS**.

Lower petal not spurred.

Corolla somewhat irregular; stamens united.....2. **HYBANTHUS**.

Corolla regular; stamens free.....3. **RINOREA**.

1. **CORYNOSTYLIS** Mart. & Zucc. Nov. Gen. & Sp. 1: 25. 1823.

1. **Corynostylis arborea** (L.) Blake.

Viola arborea L. Syst. Nat. ed. 10. 1239. 1759.

Viola hybanthus L. Sp. Pl. ed. 2. 1328. 1763.

Corynostylis hybanthus Mart. & Zucc. Nov. Gen. & Sp. 1: 26. 1823.

Calyptrion berterii Ging. in DC. Prodr. 1: 289. 1824.

Calyptrion berterii β . *mexicanum* Ging. in DC. Prodr. 1: 289. 1824.

Corynostylis berterii Spreng. Syst. Veg. 1: 805. 1825.

Veracruz to Yucatán. Guatemala to South America; type from Venezuela.

"Scandent" shrub; leaves alternate, oval to elliptic-ovate, 5 to 9 cm. long, crenulate, firm, glabrous; petioles 6 mm. long; racemes terminal, leafy-bracted, the pedicels very slender, 3 to 4 cm. long; flowers whitish, strongly zygomorphic; lip with strongly dilated tip, the stout blunt spur about 1.8 cm. long, longitudinally half-twisted; capsule woody, many-seeded, the seeds subquadrate, compressed.

The root is used as an emetic in South America.

2. **HYBANTHUS** Jacq. Enum. Pl. Carib. 2. 1760.

Slender shrubs with whitish bark, often with spinescent branchlets; leaves alternate, often fascicled; flowers somewhat irregular, the lower petal larger than the others and more or less saccate at base; sepals subequal; dilated connectives of the anthers connate below; capsule 3-valved, 3-seeded.

Fascicles of flowers not pedunculate; connective appendages acuminate.

1. **H. mexicanus**.

Fascicles of flowers pedunculate; connective appendages rounded.

2. **H. yucatanensis**.

1. **Hybanthus mexicanus** Ging. in DC. Prodr. 1: 312. 1824.

Alsodeia parvifolia S. Wats. Proc. Amer. Acad. 25: 142. 1890.

San Luis Potosí; apparently also in the Cape Region, Baja California.

Leaves alternate, oblanceolate or rhombic-oblanceolate, crenate-serrate, 1.5 to 7 cm. long, long-cuneate at base, essentially glabrous; flowers whitish, about 2.5 mm. long, in few-flowered axillary clusters, on pedicels about 3 mm. long; capsule 4 mm. long.

2. Hybanthus yucatanensis Millsp. Field Mus. Bot. 1: 404. 1898.

Known only from the type locality, Izamal, Yucatán.

Shrub, about 2.5 meters high; leaves alternate or fascicled, the blades rhombic or rhombic-lanceolate, 2.5 to 3 cm. long, crenate-serrulate, glabrous; peduncles axillary, 1 cm. long, at apex bifurcate and bearing about 15 fascicled flowers; keel petal about 2.5 mm. long, with dilated apex.

3. RINOREA Aubl. Pl. Guian. 1: 235. 1775.

Shrubs or trees; leaves (in ours) opposite; stipules small, deciduous; flowers regular, in axillary racemes (in ours); sepals 5, equal; petals 5, lance-ovate, recurved at apex; stamens 5, free, the connectives dilated into a scale exceeding the anthers; fruit a capsule, in ours 3-seeded.

Anther cells not appendaged at apex; connective scales subentire.

1. R. pilosula.

Anther cells appendaged at apex; connective scales coarsely erose.

2. R. guatemalensis.**1. Rinora pilosula** Blake, sp. nov.

Type from San Juan Bautista, Tabasco (*Rovirosa* 100; U. S. Nat. Herb. no. 40190).

Pilosulous shrub, glabrate; leaf blades oval or obovate-oval, 7.5 to 11.5 cm. long, crenate or crenate-serrulate, nearly glabrous; petioles pilosulous, 6 mm. long; racemes rufidulous-pilosulous, 8 cm. long; petals 5 mm. long.

2. Rinorea guatemalensis (S. Wats.) Bartlett, Proc. Amer. Acad. 43: 56. 1907.

Alsodeia guatemalensis S. Wats. Proc. Amer. Acad. 21: 458. 1886.

Oaxaca, Guatemala and Honduras; type from Rió Chocón, Guatemala.

Branches puberulous, glabrate; leaf blades oval to elliptic-oblong, 7 to 14.5 cm. long, subentire; petals 5.5 mm. long; capsule 13 to 19 mm. long.

DOUBTFUL GENUS.

SCHWEIGGERIA MEXICANA Schlecht. Linnaea 12: 204. 1838. Described by Schlechtendal from specimens in Lehmann's herbarium said to be from Mexico. The genus is not definitely known outside of Brazil, and it is probable that the specimens seen by Schlechtendal were erroneously labeled.

111. FLACOURTIACEAE. Flacourtia Family.

Trees or shrubs; leaves alternate, petiolate, simple, entire or toothed, commonly distichous, frequently pellucid-punctate; flowers usually perfect, sometimes unisexual, mostly small and inconspicuous; sepals free or united, imbricate or valvate; petals free, as many as the sepals or more numerous, often absent; stamens usually numerous, distinct or united; fruits usually baccate or capsular, containing 1 to many seeds.

Petals present.

Stamens in fascicles opposite the petals. Flowers racemose... **1. HOMALIUM.**
Stamens distinct or nearly so, not fasciculate.

Fruit covered with long spinelike bristles..... **2. ONCOBA.**

Fruit not bristly.

Ovary at anthesis 1-celled. Seeds numerous..... **3. BANARA.**

Ovary at anthesis 3 to 5-celled.

Fruit usually 1-seeded; flowers in panicles..... **4. HASSELTIA.**

Fruit many-seeded; flowers fasciculate or umbellate at ends of branches **6. PROCKIA.**

Petals none.

Flowers terminal; sepals valvate.

Flowers racemose; stamens 7 to 9..... **5. LUNANIA.**

Flowers fasciculate or umbellate; stamens numerous..... **6. PROCKIA.**

Flowers axillary or lateral; sepals imbricate.

Disk of the flower without staminodia-like appendages.

Plants armed with spines; stamens hypogynous, the filaments free or nearly so-----7. **MYROXYLON**.

Plants unarmed; stamens perigynous, the filaments united to form a tube. 8. **SAMYDA**.

Disk with staminodia-like appendages.

Style none; stamens 30 or more-----9. **ZUELANIA**.

Style evident; stamens 6 to 22-----10. **CASEARIA**.

1. **HOMALIUM** Jacq. Enum. Pl. Carib. 5. 1760.

REFERENCE: Blake, The genus *Homalium* in America, Contr. U. S. Nat. Herb. 20: 221-235. 1919.

Shrubs or trees; leaves short-petiolate, crenate, coriaceous; flowers in axillary spikes or racemes; calyx tube turbinate, connate with base of ovary, the limb 6 or 7-lobate; petals 6 or 7, linear-oblong, persistent; stamens in fascicles opposite the petals; fruit a capsule, 2 to 5-valvate at apex.

Leaves pilosulous beneath over the whole surface-----1. **H. mollicellum**.

Leaves barbate beneath along the costa, otherwise glabrous.

2. **H. trichostemon**.

1. **Homalium mollicellum** Blake, Contr. U. S. Nat. Herb. 20: 226. 1919.

Known only from the type locality, Coquillo, Guerrero.

Leaves elliptic or oblong-elliptic, 5.5 to 9.5 cm. long, short-pointed, rounded at base, crenate, puberulous above; racemes 7 to 9.5 cm. long; calyx tomentulose; corolla in fruit 12 mm. wide; stamens 4 to 7 in a fascicle, the filaments pilose.

2. **Homalium trichostemon** Blake, Contr. Gray Herb. n. ser. 53: 60. 1918.

Michoacán to Oaxaca; type from Cafetal Montecristo, Pochutla, Oaxaca, altitude 800 meters.

Tree, 12 meters high; leaves elliptic or oval, 6 to 11.5 cm. long, obtuse or acute, cuneate or rounded at base, crenate-serrate; racemes 6 to 7 cm. long; calyx grayish-puberulous; corolla 11 to 13 mm. wide; stamens in fascicles of 5 to 7, the filaments pilose. "Palo de piedra" (Oaxaca).

DOUBTFUL SPECIES.

HOMALIUM SENARIUM Moc. & Sessé; DC. Prodr. 2: 54. 1825. Described from Mexico; probably the oldest name for *H. trichostemon*.

2. **ONCOBA** Forsk. Fl. Aegypt. Arab. 103. 1775.

1. **Oncoba laurina** (Presl) Warb. in Engl. & Prantl, Pflanzenfam. 3^{ea}: 19. 1894.

Lindackeria laurina Presl, Rel. Haenk. 2: 89. pl. 65. 1836.

Mayna laurina Benth. Journ. Linn. Soc. Bot. 5: Suppl. 81. 1861.

Originally described from western Mexico, but not since collected there; it is not improbable that the type came from Panama. Costa Rica, Panama, and Colombia.

Tree, 12 to 15 meters high, the trunk 30 to 35 cm. in diameter, the crown pyramidal; bark gray; leaves long-petiolate, lance-oblong or ovate-oblong, 12 to 30 cm. long, cuspidate-acuminate, entire, glabrous or nearly so; inflorescence terminal, racemose-paniculate; sepals 5, 7 mm. long; petals 5, 1 cm. long, white; stamens numerous; fruit globose, about 1 cm. in diameter, covered with long spinelike bristles, tardily dehiscent; seeds 1 to 4.

3. **BANARA** Aubl. Pl. Guian. 1: 547. 1775.

1. **Banara dioica** Benth. Journ. Linn. Soc. Bot. 5: Suppl. 94. 1862.

Veracruz.

Leaves elliptic-oblong or lanceolate, 5 to 7.5 cm. long, acuminate, remotely dentate, 3-nerved, subcoriaceous, glabrous or beneath pubescent; flowers dioe-

clous, 2 to 4 in a short raceme, the racemes terminal, shorter than the leaves, tomentose; pedicels 6 to 8 mm. long; sepals 3, valvate, ovate, 4 mm. long, tomentose; petals longer than the sepals, glabrate outside, sericeous-tomentose within; stamens very numerous.

Known to the writer only by the original description.

4. **HASSELLTIA** H. B. K. Nov. Gen. & Sp. 7: 231. 1825.

One or two other species occur in Central America, and others are found in South America.

1. **Hasseltia mexicana** (A. Gray) Standl.

Banara mexicana A. Gray, Proc. Amer. Acad. 5: 174. 1862.

Hasseltia pyramidalis Hemsl. Diag. Pl. Mex. 4. 1878.

San Luis Potosí, Veracruz, and Chiapas; type from Chiapas. Honduras.

Shrub or small tree, 4 to 6 meters high; leaves petiolate, oblong-lanceolate to oblong-elliptic, 7 to 15 cm. long, abruptly short-acuminate, obtuse at base and with 2 large glands at summit of petiole, remotely serrulate, 3-nerved, glabrous; flowers white, in loose pyramidal terminal panicles; sepals 4 or 5, tomentulose, about 4 mm. long; petals 4 or 5, resembling the sepals and of the same length; fruit subglobose, 5 to 6 mm. long, indehiscent, tomentulose, usually 1-seeded.

5. **LUNANIA** Hook. Lond. Journ. Bot. 3: 317. 1844.

The other species are West Indian and South American.

1. **Lunania mexicana** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 56. 1914.

Veracruz and Chiapas; type from Finca Irlanda, Chiapas.

Branches slender; flexuous, puberulent at first; leaves short-petiolate, oblong-lanceolate, 7 to 12 cm. long, cuspidate-acuminate, entire or nearly so, rounded or obtuse at base and 3-nerved, thin, barbate beneath at base, otherwise glabrous; flowers small, in terminal racemes, these 5 to 10 cm. long; calyx separating into 2 reflexed segments; petals none; stamens 7 to 9; ovary 1-celled, puberulent.

6. **PROCKIA** L. Syst. Nat. ed. 10. 1074, 1759.

1. **Prockia crucis** L. Syst. Nat. ed. 10. 1074. 1759.

Sinaloa and Jalisco to Veracruz and Chiapas. West Indies, Central America, and South America.

Shrub or tree, 3 to 10 meters high; sepals large and foliaceous; leaves alternate, slender-petiolate, broadly ovate, elliptic, or rounded-ovate, 3 to 12 cm. long or larger, acute or acuminate, serrate, thin, pilosulous or glabrate; pedicels slender, terminal, fasciculate or short-racemose; sepals 3 or 4, valvate, persistent, reflexed, tomentose within; petals usually abortive or absent; stamens very numerous, yellow; fruit baccate, 3 to 5-celled, subglobose, about 6 mm. in diameter, black at maturity, sparsely pilose. "Huesito" (Colombia); "guacimilla," "guácima de costa" (Cuba).

7. **MYROXYLON** Forst. Char. Gen. Pl. 125. 1776.

Trees or shrubs, armed with long spines, the spines of the trunk commonly branched; leaves short-petiolate, crenate or serrate, with reticulate venation; flowers usually dioecious, minute, fasciculate in the axils or short-racemose; sepals 4 or 5, imbricate; petals none; stamens numerous; fruit baccate, indehiscent, 2 to 8-seeded.

It is difficult to find characters by which to separate the species, and it is evident that altogether too many species have been described from Mexico. The

flowers, in particular, seem to be remarkably uniform in their structure. The leaves, however, are unusually variable in form.

Leaves velutinous-pilosulous beneath.....1. *M. velutinum*.

Leaves glabrous beneath.

Pedicels glabrous.

Sepals glabrous on the outer surface, ciliate.....2. *M. celastrinum*.

Sepals minutely pubescent on the outer surface or, if glabrous, not ciliate.

3. *M. flexuosum*.

Pedicels puberulent or pilosulous.

Pedicels fasciculate.....4. *M. ellipticum*.

Pedicels short-racemose.....5. *M. horridum*.

1. *Myroxylon velutinum* (Tulasne) Warb. in Engl. & Prantl. Pflanzenfam. 3^{ea}: 41. 1893.

Flacourtia velutina Tulasne, Ann. Sci. Nat. III. 7: 295. 1847.

Xylosma velutinum Triana & Karst.; Karst. Fl. Columb. 1: 123. pl. 97. 1858.

Sinaloa to Jalisco and Veracruz. Central America and Colombia; type from Colombia.

Shrub about 3.5 meters high, armed with slender spines; leaves mostly elliptic, 3.5 to 6 cm. long, 2 to 4 cm. wide, obtuse or rounded at apex, acute or obtuse at base, pilosulous on both surfaces but often glabrate above, crenate-serrate; pedicels fasciculate, pilosulous; fruit glabrous, black, 7 mm. long.

2. *Myroxylon celastrinum* (H. B. K.) Kuntze, Rev. Gen. Pl. 1: 44. 1891.

Flacourtia celastrina H. B. K. Nov. Gen. & Sp. 7: 239. 1825.

Prockia obovata Presl, Rel. Haenk. 2: 94. 1836.

Xylosma palmeri Rose, Contr. U. S. Nat. Herb. 1: 303. pl. 26. 1895.

Colima and Guerrero; type from Acapulco, Guerrero.

Very spiny shrub or tree; leaves elliptic, rhombic-ovate, or cuneate-obovate, 3 to 5 cm. long, 1.5 to 2.5 cm. wide, obtuse to short-acuminate, coarsely crenate or crenate-serrate, lustrous, coriaceous, turning dark when dry; flowers fasciculate, short-pedicellate; fruit subglobose, 5 to 6 mm. in diameter, red or black, containing 2 to 4 seeds, glabrous.

This species was referred by Hemsley incorrectly to *Xylosma nitidum* (Hellen.) A. Gray.

3. *Myroxylon flexuosum* (H. B. K.) Kuntze, Rev. Gen. Pl. 1: 44. 1891.

Flacourtia flexuosa H. B. K. Nov. Gen. & Sp. 7: 239. 1825.

Hisingera cinerea Clos, Ann. Sci. Nat. IV. 8: 223. 1857.

Hisingera paliurus Clos, Ann. Sci. Nat. IV. 8: 227. 1857.

Xylosma lanceolatum Turcz. Bull. Soc. Mat. Moscou 36¹: 553. 1863.

Xylosma cinereum Hemsl. Biol. Centr. Amer. Bot. 1: 57. 1879.

Xylosma flexuosum Hemsl. Biol. Centr. Amer. Bot. 1: 57. 1879.

Xylosma pringlei Robinson, Proc. Amer. Acad. 26: 164. 1891.

Tepic to Nuevo León, Veracruz, and Chiapas; type from Jalapa, Veracruz. Guatemala.

Spiny shrub or small tree, 1 to 6 meters high, nearly glabrous throughout; leaves elliptic-oblong to elliptic-ovate or obovate, 2.5 to 6 cm. long, 1.5 to 3 cm. wide, obtuse to acuminate, acute to rounded at base, coriaceous, serrate or subentire; flowers fasciculate, the pedicels 1.5 to 5 mm. long; fruit red, subglobose, 5 to 6 mm. in diameter. "Manzanillo" (Veracruz); "coronilla" (Oaxaca); "huichichiltemel" (San Luis Potosí, Seler).

Seler reports that in San Luis Potosí the plant is employed as a remedy for tuberculosis.

The specimens referred here by the writer are variable in shape of leaves and length of pedicels, but no reliable characters have been found by which any of the several proposed segregates can be recognized.

4. *Myroxylon ellipticum* (Clos) Kuntze, Rev. Gen. Pl. 1: 44. 1891.

Hisingera elliptica Clos, Ann. Sci. Nat. IV. 8: 226. 1857.

Xylosma ellipticum Hemsl. Biol. Centr. Amer. Bot. 1: 57. 1879.

Guerrero to Veracruz and Oaxaca; type from Jalapa, Veracruz. Central America.

Shrub or tree, 4.5 to 6 meters high; leaves elliptic, rounded-elliptic, or elliptic-obovate, 3 to 7 cm. long, 2 to 4.5 cm. wide, rounded to subacute at apex, acute to very obtuse at base, crenate-serrate, coriaceous, usually lustrous; flowers yellow or reddish, on short or elongate pedicels; fruit red, glabrous, 5 to 6 mm. in diameter.

5. *Myroxylon horridum* (Rose) Standl.

Xylosma horridum Rose, Contr. U. S. Nat. Herb. 1: 303. 1895.

Michoacán and Colima to Oaxaca; type from Manzanillo, Colima.

Tree, 5 to 9 meters high, the trunk sometimes 20 cm. in diameter; spines of the trunk often 8 to 15 cm. long, branched; leaves oval, elliptic, or rounded, 4.5 to 8 cm. long, 3 to 5 cm. wide, obtuse or rounded at apex and base, coriaceous, lustrous, crenate; flowers greenish white; fruit globose. "Corona santa," "malacate" (Oaxaca).

8. **SAMYDA** L. Sp. Pl. 443. 1753.

Shrubs or small trees; leaves deciduous, short-petiolate, entire or serrulate, pellucid-punctulate; flowers axillary, solitary or fasciculate; calyx tube tubular-campanulate, the lobes 4 to 6, unequal, imbricate; petals none; stamens 8 to 13, inserted in the upper part of the calyx tube, the filaments connate into a tube; fruit globose, fleshy-coriaceous, 3 to 5-valvate at apex, many-seeded.

Flowers long-pedicellate; leaves rounded or obtuse at base----1. **S. mexicana**.

Flowers sessile or subsessile; leaves acute or attenuate at base.

2. **S. yucatanensis**.

1. *Samyda mexicana* Rose, Contr. U. S. Nat. Herb. 5: 199. 1899.

Colima and Guerrero; type from Acapulco.

Shrub, 1.5 to 2.5 meters high; leaves oval or oblong-oval, 3 to 7 cm. long, obtuse or acute, serrulate, when young densely pilosulous above and tomentose beneath; calyx white, densely pilosulous, about 12 mm. long, the lobes 4 or 5, shorter than the tube, rounded at apex.

2. *Samyda yucatanensis* Standl., sp. nov.

Yucatán (type collected by Schott, no. 603; U. S. Nat. Herb. no. 1,073,356).

Tree, 7.5 to 12 meters high; leaves (immature) short-petiolate, obovate, cuneate-obovate, or oval, rounded at apex or obtuse, attenuate at base or rarely obtuse, thin, entire or obscurely and remotely serrulate, densely pilosulous or beneath tomentose; flowers sessile, pilosulous; calyx tube 7 mm. long, the 4 or 5 lobes 1 cm. long, oval-oblong, rounded at apex; stamen tube 3 to 4 mm. long; fruit subglobose, 12 mm. in diameter, on a very short thick pedicel. "Puus mucuy," "aguja de tórtola."

The Yucatán specimens have been referred to *S. serrulata* L. (= *S. dodecandra* Jacq.) and to *S. rosea* Sims, both of which are West Indian species. The Mexican specimens are imperfect, but in leaf characters they are so unlike the specimens of those species examined that it seems safe to describe them as new.

DOUBTFUL SPECIES.

SAMYDA MACROCARPA DC. Prodr. 2: 48. 1825. Described from Mexico, the description based upon one of Sessé and Mociño's plates.¹

SAMYDA RUBRA DC. Prodr. 2: 48. 1825. This also was based upon one of Sessé and Mociño's plates.² The generic position of both plants is doubtful.

¹ DC. Calq. Dess. Fl. Mex. pl. 183.

² DC. Calq. Dess. Fl. Mex. pl. 182.

9. **ZUELANIA** A. Rich. in Sagra, Hist. Cuba 10: 33. 1845.

The two other species of the genus are West Indian.

1. **Zuelania roussoviae** Pittier, Contr. U. S. Nat. Herb. 18: 163. *pl.* 79. 1916.

Tamaulipas, San Luis Potosí, Veracruz and Yucatán. Panama, the type collected between Río Grande and Pedro Vidal, Canal Zone.

Tree, 10 to 25 meters high, the trunk 30 to 50 cm. in diameter, the crown rounded, or sometimes only a shrub; bark gray and rough; leaves deciduous, short-petiolate, oblong to oblong-oval, 7 to 12 cm. long, acute or obtuse, rounded at base, pellucid-punctate, becoming glabrate above, beneath densely pilosulous or tomentose; pedicels in dense lateral clusters, 10 to 14 mm. long; sepals 5, 5 to 7 mm. long, thin, greenish white; stamens about 32; disk with as many staminodia-like appendages as stamens; fruit a baccate capsule, subglobose, shallowly 3-sulcate, about 3.5 cm. in diameter, yellowish green, opening at the apex by 3 valves; seeds numerous. "Volatín" (San Luis Potosí).

The wood is said to contain an abundant transparent odorless resin. This species is closely related to *Z. laetioides* A. Rich., of the West Indies, but is distinct in the dense pubescence of the leaves. Pittier states that it is distinguished "by the obtuse and versatile anthers and the hairy, clavate pseudo-staminodes." The anthers, however, are exactly alike in both species, and in *Z. roussoviae* the disk appendages are either hairy or glabrous.

10. **CASEARIA** Jacq. Enum. Pl. Carib. 4. 1760.

Shrubs or trees; leaves alternate, usually distichous, entire or serrate, commonly pellucid-punctate, persistent or deciduous; flowers perfect, fasciculate, umbellate, or corymbose-paniculate, lateral, small, the pedicels articulate; calyx 4 to 7-lobate, the tube short; petals none; stamens 6 to 25; disk with staminodia-like appendages, these as numerous as the stamens; fruit a dry or fleshy capsule, 3 or 4-valvate; seeds covered by a fleshy aril.

The aril surrounding the seeds is edible; and the fruit is said to have laxative properties. The name "capulincillo" is reported for a Mexican species which has not been identified.

Stamens 20 to 22; sepals 5 to 7, glabrous-----13. *C. spiralis*.
Stamens 6 to 15; sepals 5.

Inflorescence sessile, the pedicels fasciculate.

Leaves entire or practically so-----1. *C. sylvestris*.

Leaves serrate or crenate.

Leaves sharply, closely, and rather finely serrate-----2. *C. arguta*.

Leaves sinuately and remotely serrate.

Leaves lustrous on the lower surface, oblong or narrowly elliptic-oblong, mostly 10 to 15 cm. long, glabrous, acuminate----3. *C. javitensis*.

Leaves dull beneath, mostly obovate-elliptic, 5 to 10 cm. long, usually pilosulous, obtuse, or very obtusely short-acuminate.

Leaves rounded or truncate-rounded at base-----4. *C. platyphylla*.

Leaves mostly cuneate at base.

Pubescence of the stems and leaves sparse, appressed, the leaves nearly glabrous-----5. *C. guianensis*.

Pubescence of the stems and leaves dense, spreading, the leaves densely velutinous-pilosulous beneath-----6. *C. obovata*.

Inflorescence pedunculate, corymbose-paniculate.

Pedicels glabrous or with a few scattered inconspicuous hairs; outer sepals ciliate, glabrous on the outer surface-----7. *C. laevis*.

Pedicels and sepals densely puberulent or pilosulous.

Leaves glabrous beneath at maturity but often barbate along the costa, when young often pilosulous beneath.

Leaves obovate-oblong, broadest above the middle.

12. *C. dolichophylla*.

Leaves lanceolate to elliptic, broadest at or below the middle.

Leaves mostly elliptic, oblong-elliptic, or ovate-elliptic, usually 2.5 to 3.5 cm. wide-----8. *C. nitida*.

Leaves lanceolate or linear-lanceolate, 1 to 2.5 cm. wide.

Leaves lanceolate, 6 to 8 cm. long, 1.5 to 2.5 cm. wide.

9. *C. orizabana*.

Leaves narrowly lanceolate, 6 to 7 cm. long, 1 to 1.4 cm. wide.

10. *C. lindeniana*.

Leaves densely pilosulous beneath even at maturity.

Leaves oblong, of nearly equal width throughout, rounded at apex.

11. *C. pringlei*.

Leaves obovate-oblong or elliptic-obovate, broadest above the middle, acute to rounded at apex-----12. *C. dolichophylla*.

1. *Casearia sylvestris* Swartz, Fl. Ind. Occ. 2: 752. 1800.

Samyda parviflora L. Syst. Nat. ed. 10. 1025. 1759. Not *S. parviflora* Loefl. 1758.

Casearia parviflora Willd. Sp. Pl. 2: 627. 1799.

Tepic to Veracruz and Oaxaca. West Indies, Central America, and South America.

Shrub or tree, 3 to 20 meters high, with slender branches; leaves short-petiolate, lanceolate or lance-oblong, 6 to 10 cm. long, 2 to 3 cm. wide, acuminate, glabrous or nearly so, usually quite entire, thin, densely pellucid-punctate; flowers greenish white, numerous in each umbel, the pedicels 2 to 4 mm. long; sepals 1.5 to 2 mm. long; stigma 3-lobate; stamens 10; fruit globose-obovoid, 3 to 4 mm. long, 2 to 6-seeded. "Guayabillo" (Oaxaca); "comida de culebra" (Nicaragua); "cafeillo cimarrón," "laurel espada" (Porto Rico); "sarna de perro" (Cuba, Porto Rico); "rompe-hueso," "sarnilla" (Cuba).

The wood is said to be hard, compact, heavy, and pale yellow, and to be used in Cuba for carpenter work.

2. *Casearia arguta* H. B. K. Nov. Gen. & Sp. 5: 364. 1821.

Tepic and Jalisco to Oaxaca; type from La Venta del Exido. Central America and Colombia.

Shrub or tree, 4 to 5 meters high or larger; leaves short-petiolate, oblong, lance-oblong, or oblong-elliptic, 7 to 15 cm. long, acuminate, sharply serrate, pilosulous beneath or glabrate, sparsely punctate; flowers greenish white, densely fasciculate, the pedicels 2 to 4 mm. long; sepals narrow, sometimes 5 mm. long; stamens usually 8; stigma entire; fruit globose, nearly 2 cm. in diameter at maturity. "Palo María," "raspa-lengua" (Costa Rica); "guayabillo" (Guatemala).

3. *Casearia javitensis* H. B. K. Nov. Gen. & Sp. 5: 366. pl. 479. 1825.

Tabasco and Oaxaca. Costa Rica and northern South America.

Shrub or tree, sometimes 20 meters high; leaves short-petiolate, oblong or elliptic-oblong, 8 to 20 cm. long, acuminate, coriaceous, glabrous, opaque, very lustrous on both surfaces; flowers densely fasciculate, the pedicels 3 to 7 mm. long; calyx lobes oblong, 3 to 4 mm. long; stamens 10 to 15; stigma trifid; capsule ovoid, about 1 cm. long, thin-walled. "Pochitoquillo" (Tabasco).

4. *Casearia platyphylla* Briq. Ann. Cons. Jard. Genève 2: 68. 1898.

Described from Mexico, the exact locality not known.

Leaves very broadly ovate, 4 to 5 cm. long and 4 to 4.5 cm. wide, obtuse or acute, undulate or subentire, coriaceous, lustrous above, glabrous or nearly so; pedicels 2 to 3 mm. long; calyx 4 to 6 mm. long; stamens 10; stigma entire.

5. *Casearia guianensis* (Aubl.) Urban, Symb. Antill. 3: 322. 1902.

Iroucana guianensis Aubl. Pl. Guian. 1: 329. pl. 127. 1775.

Casearia ramiflora Vahl, Symb. Bot. 2: 50. 1791.

Veracruz. West Indies, Panama, and South America.

Shrub or tree, 2 to 10 meters high; leaves broadly obovate or oblong-obovate, 6 to 10 cm. long, 3 to 5 cm. wide, obtuse, shallowly and remotely crenate-serrate, thick, in age nearly glabrous; flowers 10 or fewer in each fascicle, the pedicels 3 to 6 mm. long; sepals about 4 mm. long; stamens usually 8; stigma entire; capsule 6 to 12 mm. long. "Cafeillo," "cafetillo," "palo blanco" (Porto Rico).

6. *Casearia obovata* Schlecht, Linnaea 13: 434. 1839.

Casearia dentata DC. Prodr. 2: 51. 1825.

Sinaloa, Tepic, and Veracruz; type from Hacienda de la Orduña, Veracruz.

Shrub or small tree; leaves short-petiolate, obovate-elliptic, 5 to 9.5 cm. long, obtuse or abruptly short-pointed, sinuate-serrulate, coriaceous, densely pilosulous beneath, pilosulous above along the nerves; fascicles few or many-flowered; calyx 3 mm. long; stamens usually 8; stigma entire; fruit globose, 8 mm. in diameter.

Closely related to *C. guianensis* and perhaps not distinct. Another closely related species is *C. aculeata* Jacq. (*C. spinosa* Willd.; *C. hirta* Swartz), which has been reported from southern Mexico. It is a thorny shrub, of which the writer has seen no Mexican specimens.

7. *Casearia laevis* Standl., sp. nov.

Sinaloa to Oaxaca; type from Mazatlán, Sinaloa (*Rose, Standley & Russell* 14154; U. S. Nat. Herb. no. 637012). Guatemala.

Shrub or small tree, 2 to 4 meters high; leaves short-petiolate, mostly elliptic or obovate-elliptic, usually broadest above the middle, 4 to 6.5 cm. long, 2 to 3.5 cm. wide, obtuse or rounded at apex, rarely acute, rounded or obtuse at base and very unequal, crenate-serrulate, thin, densely punctate, sparsely barbate beneath along the costa, otherwise glabrous; inflorescence corymbose, few-flowered, slender-pedunculate, the flowers on slender glabrous pedicels; sepals 4 mm. long, oblong-obovate, obtuse, the outer ones glabrous and ciliate, the inner ones very minutely tomentulose; stamens usually 8, the filaments sparsely pubescent or glabrous; disk appendages ligulate, half as long as the filaments, placed between the stamens, hairy; stigma entire; fruit globose-obovoid, 12 mm. long, glabrous; seeds usually 2. "Palo de piedra corteño" (Oaxaca).

Besides the type, the following collections are to be referred here: *Nelson* 4308, *Langlassé* 949, *Rose* 1418, and *Palmer* 417, from Mexico; *J. D. Smith* 2818 and 2007, from Guatemala.

8. *Casearia nitida* (L.) Jacq. Enum. Pl. Carib. 21. 1760.

Samyda nitida L. Syst. Nat. ed. 10. 1025. 1759.

Casearia corymbosa H. B. K. Nov. Gen. & Sp. 5: 366. 1821.

? *Casearia dubia* DC. Prodr. 2: 51. 1825.

Tepic to Tamaulipas, Veracruz, Yucatán, and Oaxaca. West Indies, Central America, and northern South America; type from Cartagena, Colombia.

Shrub or small tree, 1 to 4.5 meters high or larger, with whitish branches; leaves short-petiolate, 4 to 7.5 cm. long, acute or short-acuminate, rarely obtuse, rounded to acute at base, serrulate or subentire, thin, densely punctate, barbate beneath along the costa but otherwise glabrous at maturity, when young often pilosulous beneath; corymbs few or many-flowered, the flowers on short or elongate pedicels, greenish white; sepals 3 to 4 mm. long, stamens usually 8; stigma entire; fruit obovoid or ellipsoid, 8 mm. long or larger. "Cafetillo" (Veracruz, Tabasco); "vara blanca" (Guatemala, Honduras); "cerillo" (Costa Rica); "comida de culebra," "cerillos" (Nicaragua).

9. *Casearia orizabana* Briq. Ann. Cons. Jard. Genève 2: 67. 1898.

Type from Orizaba, Veracruz.

Shrub; leaves lanceolate, long-acuminate, densely punctate, serrulate, barbate beneath along the costa but otherwise glabrous or nearly so; inflorescence densely pubescent; calyx 2.3 mm. long; stamens 8, the filaments glabrous; stigma entire; capsule ellipsoid, 7 to 8 mm. long, glabrate.

10. *Casearia lindeniana* Briq. Ann. Cons. Jard. Genève 2: 67. 1898.

Known only from the type locality, Río Teapa, Tabasco.

Small shrub; leaves narrowly lanceolate, long-acuminate, densely pellucid-punctate, serrulate, puberulent on the nerves near the base but otherwise glabrous; inflorescence minutely puberulent; calyx 3 mm. long; stamens 8; stigma entire.

11. *Casearia pringlei* Briq. Ann. Cons. Jard. Genève 2: 65. 1898.

Sinaloa and Jalisco to Guerrero; type from barranca near Guadalajara, Jalisco.

Shrub, 1.5 to 3 meters high or larger; leaves 4.5 to 9 cm. long, short-petiolate, rounded or subcordate at base, minutely serrulate, densely pilosulous beneath, the venation reticulate and very prominent, densely punctate; corymbs few or many-flowered, densely pubescent; flowers greenish yellow; calyx about 4 mm. long; stamens 8; stigma entire; fruit ovoid, 1 to 1.5 cm. long, glabrate; seeds usually 2, with a red aril. "Crementinillo" (Michoacán, Guerrero, *Langlassé*); "ciruela" (Jalisco).

The aril surrounding the seeds is edible and is said to be of excellent flavor.

12. *Casearia dolichophylla* Standl., sp. nov.

Sinaloa to Chiapas; type from Picacho, Oaxaca (*Purpus* 7447; U. S. Nat. Herb. no. 877536). Nicaragua.

Shrub or small tree, 1 to 5 meters high; leaves short-petiolate, usually obovate-oblong or elliptic-obovate, 5.5 to 10.5 cm. long, 2.5 to 4 cm. wide, obtuse or rounded at apex, rarely acute, narrowed to the base, this acute to subcordate, serrulate or subentire, thin, densely pellucid-punctate, densely pilosulous beneath (and sometimes also above), rarely glabrate; inflorescences few-flowered, short-pedunculate, 1.5 to 2.5 cm. long, minutely pilosulous; calyx 4 mm. long, the lobes tomentulose outside; stamens 8, the filaments pilose; appendages of the disk ligulate, placed between the stamens, less than half as long as the filaments, pilose; stigma entire; fruit ellipsoid, 1 to 1.5 cm. long, glabrate, subterete, yellow or reddish; seeds about 4, surrounded by a red aril. "Chilillo" (Sinaloa).

The writer has referred here a large number of specimens, all of which may not be conspecific. On the other hand, he is not altogether confident of the segregates of *C. nitida* here proposed, or of those described by Briquet. Some of the specimens referred to *C. dolichophylla* have glabrous leaves, but they do not appear to differ otherwise from the typical form.

In Sinaloa the young branches are much used for making bird cages.

13. *Casearia spiralis* Johnston, Proc. Amer. Acad. 40: 691. 1905.

Casearia bonairensis Boldingh, Fl. Dutch W. Ind. 2: 68. 1914.

Laetia glabra T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 369. 1917.

Oaxaca. Curaçao, Venezuela, and Colombia; type from Margarita Island, Venezuela.

Shrub or small tree; leaves slender-petiolate, oblong-elliptic to elliptic or oval, 5 to 14 cm. long, acute or acuminate, crenate or subentire, thin, densely pellucid-punctate, glabrous; flowers few or numerous, glabrous, fasciculate, on long slender pedicels; sepals 5 to 6 mm. long, reflexed, very thin; stamens usually 20; stigma entire; fruit globose, 1 to 1.5 cm. in diameter, glabrous.

It seems remarkable that there should be no earlier name for a plant of so wide distribution, but the writer has been unable to find one. This species differs in several respects from the other American representatives of the genus and may belong to a distinct genus.

DOUBTFUL GENERA.

AZARA UMBELLATA Presl, Rel. Haenk. 2: 92. 1836. Type from the west coast of Mexico. The plant is probably not of this genus, but the writer has been unable to place it among any of the Flacourtiaceae represented in recent Mexican collections.

112. TURNERACEAE. Turnera Family.

REFERENCE: Urban, Jahrb. Bot. Gart. Berlin 2: 1-152. 1883.

Herbs, shrubs, or trees; leaves alternate, petiolate, simple, toothed, often biglandular at base; stipules small or none; flowers axillary, solitary or fasciculate, often bibracteolate, perfect; calyx 5-lobate, deciduous, the lobes imbricate; petals 5, inserted in the throat of the calyx tube; stamens 5, inserted on the calyx tube, the filaments free; styles 3; fruit a 1-celled 3-valvate capsule, many-seeded.

The genus *Piriqueta* is represented in Mexico by one herbaceous species.

Calyx lobes nearly free; flowers about 8 cm. long; petals appendaged.

1. ERBLICHIA.

Calyx lobes united for about half their length; flowers less than 3 cm. long; petals not appendaged-----2. TURNERA.

1. ERBLICHIA Seem. Bot. Voy. Herald 130. 1854.

1. *Erblichia odorata* Seem. Bot. Voy. Herald 130. 1854.

Piriqueta odorata Urban, Jahrb. Bot. Gart. Berlin 2: 80. 1883.

Oaxaca and Chiapas; reported from Tabasco. Also in Panama, the type locality.

Tree, 7 to 15 meters high; leaves lanceolate, oblong-lanceolate, or oblong-elliptic, 6 to 13 cm. long, acute or acuminate, crenate, glabrous above, fulvous-pilosulous or glabrate beneath; flowers long-pedicellate; sepals linear-lanceolate, subulate-tipped, pilosulous, with thin petaloid margins; petals yellow, about 8 cm. long and 4 cm. wide; capsule 4 cm. long, oblong-ellipsoid, densely fulvous-pilose, the valves very thick (2.5 to 3 cm.) and woody. "Sanjuanero" (Tabasco, *Ramírez*); "jarro de oro" (Oaxaca); "azucho" (Oaxaca; from the Nahuatl *a-xochitl*, "water-flower," or "flower like a water-jar," *Reko*).

When in flower this must be a remarkably showy and handsome tree.

2. TURNERA L. Sp. Pl. 271. 1753.

Herbs or small shrubs; leaves serrate, often biglandular at base; flowers axillary, usually solitary, yellow, white, or pink, the peduncle often adnate to the petiole; calyx tubular or campanulate, with 5 narrow lobes; petals obovate or spatulate, short-clawed, thin; fruit, a thin-walled capsule; seeds with a sub-membranaceous aril.

Besides the species listed below, two or three herbaceous ones occur in Mexico.

Flowers pedicellate, the pedicel adnate to the petiole; petiole with 2 large glands-----1. *T. ulmifolia*.

Flowers sessile; petiole without glands-----2. *T. diffusa*.

1. *Turnera ulmifolia* L. Sp. Pl. 271. 1753.

Turnera angustifolia Mill. Gard. Dict. ed. 8. *Turnera* no. 2. 1768.

Turnera trioniflora Sims in Curtis's Bot. Mag. pl. 2106. 1820.

Turnera mollis H. B. K. Nov. Gen. & Sp. 6: 126. 1823.

Turnera caerulea DC. Prodr. 3: 346. 1828.

Turnera velutina Presl, Rel. Haenk. 2: 44. 1836.

Turnera alba Liebm. Ann. Sci. Nat. III. 9: 318. 1848.

Sinaloa to Tamaulipas, Yucatán, and Chiapas. Widely distributed in tropical America and naturalized in the Old World.

Plants herbaceous or fruticose, usually 30 to 60 cm. high, sometimes as much as 3.5 meters high; leaves petiolate, extremely variable, linear to broadly rhombic-ovate, serrate or dentate or subentire, densely or sparsely pilose or glabrous; flowers 2 to 3 cm. long, white, yellow, or pink, sweet scented; capsule about 6 mm. long. "Clavel de oro" (Yucatán); "caléndula," "amaranto" (Yucatán, *Dondé*); "Marilópez" (Oaxaca); "María López" (Cuba, Nicaragua); "San Juan," "margarita de los campos," "oreja de coyote" (Nicaragua); "malva" (Colombia).

The plant is employed locally as a remedy for indigestion, for bronchitis and other chest affections, and as a tonic.

The species, as treated here and by other authors, is a remarkably variable one, but the variations are chiefly in leaf shape and pubescence. A form with linear or almost linear, glabrous or glabrate leaves is *T. ulmifolia angustifolia* (Mill.) Willd. A form with broad leaves and white flowers is *T. ulmifolia alba* (Liebm.) Rose.¹ *Turnera velutina*, described from Acapulco, is a form characterized by very dense and short pubescence.

2. *Turnera diffusa* Willd.; Schult. Syst. Veg. 6: 679. 1820.

Turnera microphylla Desv. in Hamilt. Prodr. Pl. Ind. Occ. 33. 1825.

Bohadschia humifusa Presl, Rel. Haenk. 2: 98. pl. 68. 1836.

Turnera humifusa Endl. in Walp. Repert. Bot. 2: 230. 1843.

Turnera aphrodisiaca Ward, Virginia Med. Monthl. 49. 1876.

Turnera diffusa aphrodisiaca Urban, Jahrb. Bot. Gart. Berlin 2: 127. 1883.

Turnera pringlei Rose, Contr. U. S. Nat. Herb. 5: 166. 1899.

Nearly throughout Mexico, chiefly on dry hillsides. Texas, West Indies, Central America, and South America.

Shrub, 0.3 to 2 meters high; leaves petiolate, oblong to rhombic-ovate, mostly 1 to 2 cm. long, obtuse or acute, commonly cuneate at base, coarsely crenate-dentate or serrate, tomentose beneath or merely pilose, often glabrate on the upper surface; flowers 8 to 12 mm. long, the calyx tomentose; petals yellow; capsule 4 to 5 mm. long. "Damiana" (Sinaloa, Tepic, Baja California, Tamaulipas); "pastorcita," "hierba de la pastora" (Querétaro); "hierba del venado" (San Luis Potosí, Tamaulipas); "xmisisibcoc" (Yucatán, Maya); "oreganillo" (Santo Domingo).

The damiana plant has an aromatic odor and pleasant taste. It contains a volatile oil with a warm, bitter, camphor-like taste, also tannin. The dried twigs and leaves are imported into the United States and used in the preparation of medicine, although they do not constitute an official drug. They probably have only feeble tonic properties, and the aphrodisiac properties ascribed to them are doubtful. In Mexico the plant is often used as a substitute for Chinese tea and for flavoring liquors. It has a wide reputation as an aphrodisiac and is administered also for dysentery, malaria, syphilitic diseases, pains in the stomach and intestines, dyspepsia, and even paralysis. Diuretic, astringent, tonic, expectorant, and laxative properties are ascribed to it. The plant was introduced into Europe about 1874 under the name damiana, and was for some time recommended for all kinds of renal and vesical diseases. It should be stated here that the name damiana is sometimes applied to other plants, especially to species of *Isocoma* and related genera of the family Asteraceae.

¹ Contr. U. S. Nat. Herb. 5: 166. 1899.

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[Synonyms in italic.]

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SMITHSONIAN INSTITUTION
UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23, PART 4

TREES AND SHRUBS OF MEXICO (PASSIFLORACEAE-SCROPHULARIACEAE)

By PAUL C. STANDLEY



WASHINGTON
GOVERNMENT PRINTING OFFICE
1924

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM.

II

PREFACE.

The fourth installment of the Trees and Shrubs of Mexico, by Mr. Paul C. Standley, Associate Curator of the United States National Herbarium, treats the families Passifloraceae to Scrophulariaceae. Several large families are included, notably the Cactaceae, of which Mexico possesses a far greater number of species than does any other part of the earth. Other important groups covered are the Myrtaceae, Melastomaceae, Asclepiadaceae, and Verbenaceae, families whose Mexican representatives have received little systematic attention during the last 30 years or more.

The account of the family Passifloraceae has been furnished by Mr. Ellsworth P. Killip, and that of the Cactaceae by Dr. N. L. Britton and Dr. J. N. Rose.

FREDERICK V. COVILLE,
Curator of the United States National Herbarium.

TREES AND SHRUBS OF MEXICO¹

By PAUL C. STANDLEY.

113. PASSIFLORACEAE. Passionflower Family.

(Contributed by Mr. Ellsworth P. Killip.)

REFERENCE: Masters in Mart. Fl. Bras. 13¹: 530-627. 1872.

1. PASSIFLORA L. Sp. Pl. 955. 1753.

Usually scandent herbs, frequently woody at base, rarely shrubs; leaves alternate, stipulate, petiolate, entire, lobed, or divided; inflorescence axillary, the peduncles usually in pairs and 1-flowered; flowers perfect, often showy; sepals 5; petals 5 or wanting; fruit variable, indehiscent, pulpy within.

About 40 species of this genus occur in Mexico, but only two can properly be considered shrubs.

Flowers less than 4 cm. wide; petals obovate, less than twice as long as filaments of corona.....1. *P. fruticosa*.

Flowers more than 6 cm. wide; petals linear, more than twice as long as filaments of corona.....2. *P. palmeri*.

1. *Passiflora fruticosa* Killip, Journ. Washington Acad. Sci. 12: 256. 1922. Baja California.

Low shrub with an erect caudex, 20 to 40 cm. high, and a few short sprawling branches, densely lanate throughout; leaves 1.5 to 2 cm. long, 3-lobed; peduncles 1 to 2.5 cm. long.

2. *Passiflora palmeri* Rose, Contr. U. S. Nat. Herb. 1: 131. 1892.

Baja California; type from Carmen Island.

Low flat-topped shrub, 50 cm. high, 80 to 120 cm. wide; leaves 1.5 to 4 cm. long, 2 to 5 cm. broad; peduncles 4 to 5 cm. long; sepals and petals white; corona filaments blue and white. "Sandía de la Pasión."

114. CARICACEAE. Papaw Family.

REFERENCE: Solms-Laubach in Mart. Fl. Bras. 13³: 175-196. 1889.

Trees or shrubs, rarely herbs, with milky juice; leaves alternate, long-petiolate, digitately compound, or simple and usually deeply lobate, without stipules; flowers perfect or more commonly unisexual and dioecious, the pistillate solitary and axillary or in few-flowered panicles; calyx small, rotate or campanulate, 5-lobate; staminate corolla with an elongate tube, the limb 5-lobate; pis-

¹The first installment of the Trees and Shrubs of Mexico, comprising the families Gleicheniaceae to Betulaceae, was published as Part 1 of Volume 23, Contributions from the U. S. National Herbarium, pp. 1-170, October 11, 1920; the second, including the families Fagaceae, to Fabaceae, as Part 2, pp. 171-515, July 14, 1922; the third, including the families Oxalidaceae to Turneraceae, as Part 3, pp. 517-848, July, 1923.

tillate corolla of 5 nearly distinct, narrow segments; stamens 10, inserted in the corolla throat in 2 series; fruit baccate, large, 1 or 5-celled.

Leaves digitately compound. Corolla lobes opposite the calyx lobes; stamens distinct ----- 1. **LEUCOPREMNA**.

Leaves simple, often deeply lobate.

Plants trees, with simple trunks; stamens distinct; calyx lobes alternating with the corolla lobes; fruit not appendaged ----- 2. **CARICA**.

Plants herbaceous, with tuberous roots; stamens united at base; calyx lobes opposite the corolla lobes; fruit with an appendage at the base of each angle ----- 3. **JARILLA**.

1. **LEUCOPREMNA** Standl., gen. nov.

Only the following species is known. By most authors it has been referred to the genus *Jacaratia*, but it seems necessary to place it in a separate genus.

1. *Leucopremna mexicana* (A. DC.) Standl.

Jacaratia mexicana A. DC. in DC. Prodr. 15¹: 420. 1864.

Jacaratia conica Kerber, Jahrb. Bot. Gart. Berlin 2: 282. 1883.

Carica heptaphylla Sessé & Moc. Pl. Nov. Hisp. 172. 1887. Not *C. heptaphylla* Vell. 1825.

Pileus heptaphyllus Ramírez, Naturaleza II. 3: 711. 1903.

Colima, Guerrero, Morelos, Campeche, and Yucatán; said to occur in Oaxaca, and probably to be found elsewhere. El Salvador; reported from Nicaragua, and apparently also in Costa Rica.

Tree, 4.5 to 12 meters high, the trunk very thick at base, tapering upward and dividing into few heavy branches, the twigs thick and soft, the wood very soft, the trunk consisting largely of pith; bark smooth, gray; leaves deciduous, clustered at the ends of the branchlets, the leaflets 5 to 7, obovate, acuminate, 10 cm. long and 6 cm. wide or smaller; flowers dioecious, the staminate in terminal or axillary panicles, pale yellow, the corolla about 2 cm. long; stamens 10, free; pistillate flowers terminal, long-pedunculate, the petals greenish, 4 cm. long; fruit 15 cm. long or more, 8 to 10 cm. thick, 5-celled, pendent, conic or ovoid-oblong, 5-angled, the angles often produced below into conelike protuberances or wings, the skin green or yellow; seeds rough, black. "Bonete" (Yucatán, Campeche, Morelos); "kunché" or "kumché" (Yucatán, Maya); "cuaguayote" or "coahuayote" (Colima); "coalsuayote" (Guerrero); "orejona," "papaya orejona," "papayo montés" (Oaxaca); "cuayote" (El Salvador).

In outward appearance the fruit is not unlike a large green pepper of the bullnose type, but it varies greatly in shape, being sometimes long, narrow, and twisted. The flesh is sweet and reddish yellow; it is eaten cooked or as a salad, and is made into sweetmeats. The juice is said to have the same properties as that of *Carica papaya*. Kerber reports that in Colima a kind of tortilla is made from the starch of the trunk. The tree has been described at length by Ramírez,¹ and illustrated with several excellent plates. It is treated by Hernández under the name "quaiuhayoth."

Leucopremna mexicana is abundant in extreme western Salvador, occurring as a characteristic tree on the arid hills near the Río Paz, close to the Guatemalan frontier.

¹ José Ramírez, *El Pileus heptaphyllus*, Naturaleza II. 3: 707-711. pl. 41-45. 1903.

2. *CARICA* L. Sp. Pl. 1036. 1753.

Trees with simple trunks; leaves simple, deeply incised-lobate; flowers usually dioecious, axillary; fruit 1 or 5-celled.

The genus consists of about 25 species, all natives of tropical America.

Fruit 5-celled; stigmas lobed only at apex----- 1. *C. cauliflora*.
Fruit 1-celled; stigmas irregularly divided or dichotomous almost or quite
to the base----- 2. *C. papaya*.

1. *Carica cauliflora* Jacq. Pl. Hort. Schönbr. 3: 33. pl. 311. 1776.

Vasconcellea boissieri A. DC. in DC. Prodr. 15¹: 415. 1864.

Carica boissieri Hemsl. Biol. Centr. Amer. Bot. 1²: 481. 1880.

Veracruz and Chiapas, and probably elsewhere; cultivated and perhaps also native. Central America, Colombia, and Venezuela.

Trunk about 3.5 meters high, leafy at the top; leaves large, cordate at base, lobed halfway to base or less, the lobes acuminate and with remote acuminate teeth, glabrous; flowers inodorous, the staminate 3 to 3.5 cm. long, the pistillate flowers of about the same size; fruit ovoid, pointed, narrowed at base, yellow, 8 cm. long or larger. "Papayo de montaña" (El Salvador).

2. *Carica papaya* L. Sp. Pl. 1036. 1753.

Papaya vulgaris DC. in Lam. Encycl. 5: 2. 1804.

Carica quinqueloba Sessé & Moc. Fl. Mex. 255. 1896.

Commonly cultivated in all the warmer parts of Mexico and wild in many places. Southern Florida, West Indies, and Central and South America; cultivated in the tropics of the Old World.

Trunk sometimes 9 meters high and 25 cm. in diameter, pale green, the woody tissue thin and porous, the pith large, the trunk with a large central cavity; leaves borne at the top of the trunk, 20 to 60 cm. wide, deeply lobed, the lobes pinnately lobed, glaucous beneath; flowers yellow, the staminate in slender panicles 10 to 30 cm. long, fragrant, the corolla 2 to 3 cm. long; pistillate flowers solitary or in 2 or 3-flowered cymes, the petals linear-lanceolate, 2 to 2.5 cm. long; fruit oblong or obvoid, 5 to 10 cm. long or often much larger, pointed, yellow or orange, with thick skin, the flesh firm, sweet and insipid; seeds numerous, black, rough.

Known generally in Spanish-speaking countries as "papaya,"¹ which is believed to be a corruption of the Carib "ababal;" the English names "papaw" or "pawpaw"² are used, also "tree-melon," but "papaya" is the preferable name. The following additional names are reported. "Chick put," "put" (Yucatán, Maya; the former a wild form); "papaya de los pájaros" (Yucatán, a wild form); "papayero" (the plant); "melón zapote" (various parts of Mexico; sometimes corrupted into "melón chapote"); "manón" (Argentina); "papaya montés" (a wild form); "fruta bomba" (Cuba); "dzoosadzahuidium" (Oaxaca, Mixtec, *Reko*); "lechosa" (Porto Rico). It is remarkable that no Nahuatl name is known for the plant.

The papaya is one of the best-known of tropical American fruits. The fruits vary greatly in shape, size, and quality; they sometimes attain a length of 50 cm. and a weight of 20 pounds. They resemble some forms of muskmelons, especially on the inside. The flesh is 2 to 5 cm. thick and orange-yellow or deep orange. The fruit is eaten like a muskmelon or sliced and served with sugar and cream, made into salads, or candied; made into

¹ This is the name for the fruit; that of the plant is "papayo."

² Not to be confused with the "pawpaw" of the Southern United States, which is *Asimina triloba* (L.) Dunal, a plant of the family Annonaceae.

preserves, pickles, jellies, pies, or sherbets; or sometimes cooked and eaten like a vegetable. The plants grow easily and rapidly from seeds, and they bear fruit almost throughout the year.¹ A confection is sometimes made by boiling the flowers in syrup.

The fruit and other parts of the plant contain an abundant milky juice from which an enzyme, papain, resembling animal pepsin in its digestive action, has been separated. This product has become an article of commerce, being used for the treatment of dyspepsia and related affections, and also for clarifying beer. The digestive properties of the juice were well known to the original inhabitants of tropical America, like those of to-day, who often wrap meat in the leaves and leave it thus over night, to make it tender. Sometimes leaves are boiled with meat for this purpose, but if too much papaya juice comes in contact with the meat, or for too long a time, the meat will fall apart in shreds. Indeed, it is even popularly believed that the plant is even more efficient, for it is said that if old hogs and poultry are fed on the leaves and fruit, their flesh will become tender, and if a piece of tough meat is hung among the leaves of the tree for a few hours it also will be made tender. This last property is attested by so eminent an authority as Heber Drury, who states that he proved it by experiment. The leaves are sometimes used in Mexico as a substitute for soap in washing clothes.

Various medicinal properties are attributed to the papaya plant. The seeds and the milk from the roots are often employed as a vermicide, and the milk is applied to the skin to assist in the removal of chiggers. The infusion of the flowers is reported to have emmenagogue, febrifuge, and pectoral properties; a decoction of the leaves is employed as a remedy for asthma; and the juice is administered for indigestion. Grosourdy states that the juice of the ripe fruit was used as a cosmetic, to remove freckles.

The papaya is treated at length by Oviedo (Lib. VIII, Cap. XXXIII), who states that in Hispaniola it was known as "papaya," but among the Spaniards of the mainland it was called "higos de mastuerzo," the latter name being given because the seeds had a pungent flavor like cress (*mastuerzo*). In Nicaragua, he states, the plant or fruit was called "olocotón." He claims also that the plants were not native in the West Indies, but were brought there by the Spaniards from the mainland, which may or may not be true. The plant is mentioned by all the early writers, and is described by Hernández.²

Ramírez has described and illustrated³ a fruit known as "papaya voladora," which is presumably a form of this species. It is noteworthy in having peduncles as much as 34 cm. long. The flowers of *Carica papaya* are usually dioecious, but occasionally both kinds of flowers are found upon the same plant.

DOUBTFUL SPECIES.

CARICA BOURGAEI Solms in Mart. Fl. Bras. 13³: 178. 1889. This name is used by Solms in his key to the species of the genus, but, so far as the writer can learn, no description has ever been published. The species was probably based upon a specimen from the Valley of Córdoba, Veracruz, and the plant is closely related to *C. papaya*.

¹ For a general account of the papaya and methods of cultivation see F. W. Popenoe in Bailey, Stand. Cycl. Hort. 2460-2462. 1916.

² Thesaurus 99, 365. 1651.

³ Naturaleza II. 3: 548-549. pl. 32. 1901.

3. **JARILLA** Rusby, *Torreyia* 21: 47. 1921.

Plants herbaceous, glabrous, branched, from tuberous rhizomes; leaves simple, entire, toothed, or lobed; flowers dioecious, axillary, the staminate in long-pedunculate paniced cymes, the calyx minute, the corolla funnelform, with a slender tube; stamens 10, the filaments united at base, hairy, the alternate ones longer; pistillate flowers usually solitary, slender-pedicellate; fruit pendent, 1-celled, 5-angulate, each angle produced at base into a long recurved fleshy appendage, the style persistent and elongate; stigmas entire.

The genus, so far as known, is confined to Mexico. It was discussed at length by Ramírez,¹ who gives excellent illustrations of both the species.

Leaves hastate, the basal lobes narrow, elongate, acute; fruit only slightly contracted above the appendages-----1. *J. heterophylla*.

Leaves various but not hastate, the basal lobes, if any, obtuse or rounded; fruit strongly contracted above the appendages-----2. *J. caudata*.

1. *Jarilla heterophylla* (Llave) Rusby, *Torreyia* 21: 50. 1921.

Mocinna heterophylla Llave, *Registro Trimestre*, June 12, 1832.

Carica nana Benth. *Pl. Hartw.* 288. 1848.

Jalisco and Guanajuato; type from Guanajuato.

Plants said to be sometimes scandent, slender; leaves hastate, 2.5 to 10 cm. long, acute or attenuate, entire or with a few large remote teeth, pale beneath; staminate corolla 5 mm. long, the lobes as long as the tube; fruit subglobose, 2.5 cm. in diameter, with short thick appendages. "Jarrilla," "granadilla."

The writer has seen only a single specimen of this species, consisting of staminate plants from La Palma, Jalisco.

2. *Jarilla caudata* (T. S. Brandeg.) Standl.

Mocinna heterophylla sesseana Ramírez, *Anal. Inst. Med. Nac. Mex.* 1: 207. pl. 2-4. 1894.

Carica caudata T. S. Brandeg. *Zoe* 4: 401. 1894.

Jarilla sesseana Rusby, *Torreyia* 21: 47. 1921.

Baja California, Sinaloa, Jalisco, and Guanajuato; type from mountains of Baja California.

Plants slender, 1 meter long or less, erect or decumbent, the root large; leaves long-petiolate, very variable, rounded-ovate to deltoid or deltoid-oblong, 2 to 12 cm. long, acute to rounded at apex, cuneate to cordate at base, entire, undulate, dentate, or lobate, pale beneath; staminate inflorescence long-pedunculate, the corolla purplish white, about 1 cm. long, the lobes much shorter than the tube; pistillate flowers usually solitary, long-pedicellate; body of the fruit ellipsoid or subglobose, sometimes 9 cm. long, the elongate fleshy style 1 to 2 cm. long, the appendages 3 to 5 cm. long; seeds surrounded by a white aril. "Jarrilla" (Guanajuato, Jalisco); said to be known as "bonete" in Jalisco.

The fruit has an odor resembling that of lemon or citron. It is usually employed for making preserves or sweetmeats, and is well known in the markets of Jalisco and Guanajuato.

The specimens which have been referred here by Ramírez and by the present writer are remarkably variable, and it is not improbable that they represent more than a single species. The writer has seen only six collections, and they are quite inadequate for critical study. It is desirable that a large series of specimens be collected of these plants, which are practically unknown outside the limited area within which they grow.

¹ *Anal. Inst. Méd. Nac. Mex.* 1: 205-212. pl. 2-5. 1894.

115. LOASACEAE. Loasa Family.

Usually herbs but sometimes shrubs; leaves opposite or alternate, entire or toothed, estipulate; flowers perfect, racemose or cymose-paniculate, the pedicels bibracteolate; calyx tube adnate to the ovary, the limb 4 or 5-lobate; petals 4 or 5, inserted in the calyx throat; stamens few or numerous; style subulate, entire or bifid or trifid; fruit a 1-celled capsule, containing 1 to many seeds.

Several other genera are represented in Mexico by herbaceous species. Some of them are plants with stinging hairs. *Cevallia sinuata* Lag. is a common plant of the desert regions of northern Mexico, with hairs which sting as painfully as those of a nettle.

Leaves mostly opposite; stamens numerous; capsule many-seeded.

1. MENTZELIA.

Leaves alternate; stamens 4 or 5; capsule 1-seeded.....2. PETALONYX.

1. MENTZELIA L. Syst. Nat. ed. 10. 1076. 1759.

Several other representatives of the genus occur in Mexico, but they are herbs. The leaves in most species of this genus are extremely scabrous and cling tenaciously to clothing. Some of the species are known in the United States by the name of "stickleaf."

1. *Mentzelia konzattii* Greenm. Proc. Amer. Acad. 32: 298. 1897.

Oaxaca.

Tall shrub, sometimes 7 meters high, with brittle woody stems; leaves mostly opposite, short-petiolate, lanceolate, 4 to 12 cm. long, acuminate, finely dentate, scabrous above, tomentose beneath; flowers pedicellate, cymose-paniculate, about 5 cm. broad, bright yellow; calyx lobes 5, 12 to 15 mm. long; petals oblong-obovate, acute; stamens numerous; capsule about 1 cm. long and nearly as thick. "Arnica."

The leaves and roots, Professor Konzatti states, are employed as a remedy for itch and other cutaneous diseases.

2. PETALONYX A. Gray, Mem. Amer. Acad. n. ser. 5: 319. 1855.

Low shrubs or herbs; leaves alternate, entire or toothed, sessile, very scabrous; flowers very small, in dense terminal bracted spikes or racemes; calyx tube short, the lobes 4 or 5, narrow, deciduous; petals 4 or 5, clawed; stamens 4 or 5; staminodia none; fruit small, fragile, rupturing irregularly, 1-seeded.

Leaves strongly revolute, crenate.....1. *P. crenatus*.

Leaves not revolute, entire or dentate.

Leaves lanceolate or ovate, broad at base, often dentate.....2. *P. thurberi*.

Leaves linear or linear-oblong, attenuate at base, entire.....3. *P. linearis*.

1. *Petalonyx crenatus* A. Gray; S. Wats. Proc. Amer. Acad. 17: 358. 1882.

Coahuila; type from San Lorenzo de Laguna.

Plants woody at base, the stems retrorse-hispidulous; leaves oblong, 4 to 8 mm. long, obtuse, retrorse-scabrous; flowers white, racemose; petals 3 to 4 mm. long.

2. *Petalonyx thurberi* A. Gray, Mem. Amer. Acad. n. ser. 5: 319. 1855.

Baja California and northern Sonora. Arizona, Nevada, and southern California; type from the Gila River, Arizona.

Plants 1 meter high or less, chiefly or wholly herbaceous, very scabrous; leaves 1 to 4 cm. long, thick and stiff, spreading or appressed, the upper ones entire; racemes 4 cm. long or shorter; petals about 4 mm. long.

3. *Petalonyx linearis* Greene, Bull. Calif. Acad. 4: 188. 1885.

Baja California and adjacent islands.

Low shrub, very scabrous throughout; leaves 1 to 3 cm. long, obtuse, very thick; racemes sometimes 12 cm. long, the bracts rounded-cordate, entire; petals yellowish white, 4 to 5 mm. long.

Some of the Mexican species of *Begonia* are perhaps to be classed as shrubs, but there is no satisfactory evidence to this effect.

116. CACTACEAE. Cactus Family.

(Contributed by Dr. N. L. Britton and Dr. J. N. Rose.)

REFERENCES: Britton & Rose, The Cactaceae, vols. 1-4. 1919-23; Safford, Cactaceae of northeastern and central Mexico, Ann. Rep. Smiths. Inst. 1908: 525-563. pl. 1-15. 1909.

Plants perennial, succulent, usually shrublike or treelike; leaves usually none or much reduced, sometimes large and flat; spines present, variable in form and arrangement, borne upon areoles in the leaf axils; flowers usually perfect, regular or irregular, solitary or clustered, sometimes borne in a terminal specialized inflorescence known as cephalium; perianth tube none or large and elongate, with few or numerous lobes, these sometimes differentiated into sepals and petals; stamens commonly numerous, the filaments usually borne upon the throat of the perianth, the anthers small, 2-celled; style one, terminal, the stigma with 2 to many lobes; ovary 1-celled; fruit baccate, fleshy or dry, usually containing numerous seeds.

The Cactaceae constitute one of the largest and most interesting groups of Mexican plants, and they are more profusely developed in Mexico than in any other part of the earth. They are often conspicuous features of the landscape, particularly in the desert regions, and they are of great economic importance. Many of the more showy ones are commonly grown in gardens for ornament.

Leaves broad, flat; flowers stalked (stalk sometimes very short). Areoles without glochids. (PERESKIEAE)-----1. **PERESKIA.**

Leaves (except in *Pereskiopsis*) terete or subterete, often wanting; flowers sessile.

Areoles with glochids; vegetative parts bearing leaves, these usually small and fugacious; flowers without a definite tube. (OPUNTIEAE.)

Leaves broad and flat-----2. **PERESKIOPSIS.**

Leaves subulate or cylindric.

Stamens much longer than the petals-----3. **NOPALEA.**

Stamens shorter than the petals.

Joints of the stems flat to terete, not ribbed-----4. **OPUNTIA.**

Joints terete, longitudinally ribbed-----5. **GRUSONIA.**

Areoles without glochids; vegetative parts usually without leaves; flowers with a definite tube (except in *Rhipsalis*). (CEREEAE.)

Perianth rotate or nearly so, without a tube. Plants slender, spineless, epiphytic, many-jointed-----54. **RHIPSALIS.**

Perianth not rotate, with a definite tube.

Areoles mostly spineless; plants with numerous joints, these flat; epiphytes.

Tube of flower definitely longer than the limb---51. **EPIPHYLLUM.**

Tube of flower not longer than the limb.

Perianth campanulate, with few segments-----52. **CHIAPASIA.**

Perianth short-funnelform, with many segments.

53. **NOPALXOCHIA.**

Areoles mostly spine-bearing; plants often not jointed, the joints not flat; plants terrestrial.

A. Flowers and spines borne at the same areoles.

B. Plants several-jointed or many-jointed, the joints elongate.

Plants vinelike, with aerial roots.

Ovary and fruit covered with large foliaceous scales, the axils neither spiny, hairy, nor bristly. Stems and branches 3-angled or 3-winged-----21. **HYLOCEREUS**.

Ovary and fruit not bearing large foliaceous scales, the axils spiny, hairy, or bristly.

Flowers elongate-funnelform.

Stems ribbed, fluted, or angled-----22. **SELENICEREUS**.

Stems winged-----23. **DEAMIA**.

Flowers short-funnelform-----24. **APOROCATUS**.

Plants erect, treelike, bushy, arching, or diffuse.

Flowers 2 to several at an areole, small.

Flowering areoles bearing many long bristles.

19. **LOPHOCEREUS**.

Flowering areoles without bristles--20. **MYRTILLOCACTUS**.

Flowers solitary at the areoles, mostly large.

Ovary naked or rarely bearing a few short scales, these sometimes subtending tufts of short hairs.

6. **CEPHALOCEREUS**.

Ovary with scales, often bearing also wool, bristles, or spines.

Ovary with scales only-----7. **ESCONTRIA**.

Ovary with scales and also with wool, felt, or spines.

Perianth short-campanulate or short-funnelform, its tube short and thick.

Plants mostly stout, columnar, and erect, ribbed or angled; roots without tubers.

Corolla short-campanulate; fruit dry.

8. **PACHYCEREUS**.

Corolla short-funnelform; fruit fleshy.

Plants columnar, with stout stems; flowers white to pink, not widely expanded.

9. **LEMAIREOCEREUS**.

Plants low; flowers pale yellow.

10. **BERGEROCACTUS**.

Plants very slender, nearly terete or with many low ribs; roots with tubers-----11. **WILCOXIA**.

Perianth funnelform, funnelform-campanulate, or salverform.

Areoles of the ovary with spines or bristles.

Plants slender, with a large fleshy root; flowers salverform-----12. **PENIOCEREUS**.

Plants stout or slender, without large fleshy roots; flowers funnelform.

Plants stout, bushy or prostrate, the spines flat, dagger-like-----13. **MACHAEROCEREUS**.

Plants slender or weak, the spines acicular or subulate.

- Tube of the perianth as long as the limb or longer; plants elongate, with white flowers.
 Joints ribbed-----14. **NYCTOCEREUS**.
 Joints angled-----15. **ACANTHOCEREUS**.
 Tube of the perianth mostly shorter than the limb; plants bushy, usually with scarlet flowers-----16. **HELIOCEREUS**.
 Areoles of the ovary with wool or felt.
 Perianth limb regular; flowers white.
 17. **CARNEGIEA**.
 Perianth limb oblique; flowers scarlet
 18. **RATHBUNIA**.
 BB. Plants with one or few joints, the joints usually short, sometimes clustered, ribbed or rarely tubercled.
 Flowers at lateral areoles-----25. **ECHINOCEREUS**.
 Flowers at central areoles.
 Ovary and fruit naked.
 Plants without spines.
 Tubercles prominent, cartilaginous, flattened, more or less imbricate-----26. **ARIOCARPUS**.
 Tubercles low, rounded above-----27. **LOPHOPHORA**.
 Plants very spiny-----28. **EPITHELANTHA**.
 Ovary and fruit with scales.
 Flowers funnelform-----29. **HAMATOCACTUS**.
 Flowers mostly campanulate, at least not long and slender.
 Areoles not arranged on ribs.
 Tubercles short, imbricate-----30. **STROMBOCACTUS**.
 Tubercles much elongate, slender, finger-like.
 31. **LEUCHTENBERGIA**.
 Areoles arranged on definite ribs.
 Axils of scales on ovary and fruit naked.
 Ribs usually continuous, rarely if ever tubercled; flowers with scarcely any tube.
 Ribs usually numerous, much compressed, th'n.
 32. **ECHINOFOSSULOCACTUS**.
 Ribs not so numerous, usually thick.
 33. **FEROCACTUS**.
 Ribs usually broad, tubercled; flowers with a short but definite tube-----34. **ECHINOMASTUS**.
 Axils of scales on ovary hairy, woolly, or bristly
 Ribs several to many; plants very spiny.
 Fruit permanently woolly, nearly dry, dehiscent by a terminal pore-----35. **ECHINOCACTUS**.
 Fruit not so woolly, somewhat fleshy, bursting irregularly-----36. **HOMALOCEPHALA**.
 Ribs few, broad; plants mostly spineless.
 37. **ASTROPHYTUM**.
 AA. Flowers and spines borne at different areoles. Plants consisting of a single joint.
 Flowering areoles forming a central terminal cephalium.
 38. **CACTUS**.

Flowering areoles at the base or on the side of the tubercles.

Ovary more or less scaly (not known in *Mamillopsis*).

Flowers with a short tube.

Spines partly hooked-----39. **ANCISTROCACTUS**.

Spines not hooked.

Tubercles not deeply grooved; fruit scaly.

40. **THELOCACTUS**.

Tubercles deeply grooved; fruit nearly naked.

41. **NEOLLOYDIA**.

Flowers with an elongate tube-----42. **MAMILLOPSIS**.

Ovary naked or nearly so.

Flowers irregular-----43. **COCHEMIEA**.

Flowers regular.

Flowers central, borne in axils of young, usually nascent tubercles.

Tubercles grooved on upper side.

Seeds mostly light brown; fruit greenish or yellowish, ripening slowly-----44. **CORYPHANTHA**.

Seeds black or dark brown; fruit red, maturing rapidly.

45. **ESCOBARIA**.

Tubercles not grooved on upper side.

Fruit circumscissile; tubercles fleshy; spines acicular.

46. **BARTSCHELLA**.

Fruit not circumscissile; tubercles woody; spines pectinate-----47. **PELECYPHORA**.

Flowers lateral, borne in axils of old and mature tubercles, these never grooved above.

Flowers large, with an elongate tube; tubercles elongate, flabby-----48. **DOLICOTHELE**.

Flowers small, campanulate; tubercles not flabby.

Hilum of seed large; spines pectinate----49. **SOLISIA**.

Hilum of seed minute; spines not pectinate.

50. **NEOMAMMILLARIA**.

1. **PERESKIA** Mill. Gard. Dict. Abr. ed. 4. 1754.

Leafy trees or shrubs, or sometimes clambering vines, branching and resembling other woody plants; spines in pairs or in clusters in the axils of the leaves, neither sheathed nor barbed; leaves alternate, broad, flat, deciduous, somewhat fleshy; flowers solitary, corymbose, or in panicles, terminal or axillary, wheel-shaped; stamens numerous; style one; stigma lobes linear; seeds black, glossy, with a brittle shell, the embryo strongly curved, the cotyledons leafy; seedlings without spines.

Pereskia portulacifolia (L.) Haw. has often been reported incorrectly from Mexico. The following vernacular names have been given for it: "Pitahayita de agua" (Jalisco); "pata de león," "patilón" (Oaxaca). The name "palo de puerco espino" is reported from Oaxaca for a *Pereskia* whose specific identity is doubtful.

Plants climbing vines; branches with a pair of reflexed spines at each areole-----1. **P. aculeata**.

Plants erect shrubs or trees; branches with straight spines at the areoles.

Petals fimbriate-----2. **P. lychnidiflora**.

Petals entire.

Branches with few or no spines-----3. *P. tampicana*.

Branches very spiny.

Leaves acuminate, cuneate at base-----4. *P. zinniaeflora*.

Leaves merely acute, not cuneate at base-----5. *P. konzattii*.

1. *Pereskia aculeata* Mill. Gard. Dict. ed. 8. 1768.

Cactus pereskia L. Sp. Pl. 469. 1753.

Pereskia pereskia Karst. Deutsch. Fl. 888. 1882.

Pereskia godseffiana Sander, Gard. Chron. III. 43: 257. 1908.

Cultivated throughout tropical America; perhaps an escape in Mexico.

Shrub, at first erect, but the branches often clambering and forming vines 3 to 10 meters long; spines on lower part of stem solitary or 2 or 3 together, slender and straight; spines in the axils of the leaves paired, rarely in threes, short, recurved; leaves short-petioled, lanceolate to oblong or ovate, short-acuminate, tapering or rounded at base, 7 cm. long or less; flowers in panicles or corymbs, white, pale yellow, or pinkish, 2.5 to 4.5 cm. broad; ovary leafy and often spiny; fruit light yellow, 1.5 to 2 cm. in diameter, when mature quite smooth; seeds black, somewhat flattened, 4 to 5 mm. in diameter. "Gro-sellero" (Cuba).

This species is often cultivated, the flowers being handsome, although they have an offensive odor. The fruit is edible, and is sometimes used for making preserves. The leaves are said to be employed in Brazil as a pot herb. In the British West Indies the plant is sometimes known as Barbados gooseberry or Spanish gooseberry.

2. *Pereskia lychnidiflora* DC. Prodr. 3: 475. 1828.

Mexico; known only from a drawing by Mocino and Sessé.

Evidently a tree or shrub; branches cylindric, woody; leaves 4 to 7 cm. long, oval to oblong, pointed, rounded at base, sessile; axils of leaves each bearing a stout spine 2 to 5 cm. long and several long hairs; flowers 6 cm. broad, solitary, borne at the ends of short stout branches; petals broadly cuneate, lacinate at the apex; ovary turbinate, bearing small leaves.

3. *Pereskia tampicana* Weber, Dict. Hort. Bois 939. 1898.

Reported only from Tampico, Tamaulipas.

Shrub; branches often without spines, or the spines several, needle-like, black, 2 to 3 cm. long; areoles globular, appearing as knobs along the stem; leaves about 5 cm. long, petioled; flowers 2.5 cm. long; petals entire, rose-colored.

4. *Pereskia zinniaeflora* DC. Prodr. 3: 475. 1828.

Based upon a drawing by Mocino and Sessé, and not otherwise known.

Shrub; leaves oval to oblong, 2 to 4 cm. long, acuminate, cuneate at base; spines on young branches 1 or 2 at an areole, on old branches 4 or 5, all less than 1 cm. long; flowers 5 cm. wide, rose-red; petals entire, obtuse or retuse; style and stamens very short; ovary truncate, bearing small stalked leaves.

5. *Pereskia konzattii* Britt. & Rose, Cactaceae 1: 24. 1919.

Southern Oaxaca, the type from Salina Cruz.

Tree, 8 to 10 meters high; bark of stems and branches brown and smooth; leaves orbicular to obovate, acute, 1 to 2.5 cm. long; areoles small, with short white wool and a few long hairs; spines 2 to 6 on young branches, 10 to 20 on main stem, acicular, 2 to 2.5 cm. long, at first yellowish brown, dark brown in age; ovary bearing small scales; fruit naked, pear-shaped, more or less stalked, 3 to 4 cm. long; seeds black, glossy, 3 mm. long, with a small white hilum.

2. **PERESKIOPSIS** Britt. & Rose, Smiths. Misc. Coll. 50: 331. 1907.

Trees and shrubs, in habit and foliage similar to *Pereskia*; old trunk forming a solid woody cylinder covered with bark and resembling the ordinary dicotyledonous stem; areoles circular, spine-bearing or sometimes spineless, also bearing hairs, wool, and usually glochids; flowers similar to those of *Opuntia*; ovary sessile (one species described as pedunculate), with leaves at the areoles (except in one species); fruit red; seeds bony, few, covered with matted hairs.

Stems, ovary, and often the leaves more or less pubescent.

Normal leaves long-acuminate, narrow, with narrow cuneate base.

1. *P. velutina*.

Normal leaves abruptly pointed, somewhat cuneate at base—2. *P. diguetii*.
Stems, ovary, and leaves glabrous.

Leaves, at least some of them, not much longer than broad.

Fruit without leaves-----3. *P. opuntiaeflora*.

Fruit with leaves subtending the areoles.

Areoles white, with few or no glochids.

Leaves orbicular or nearly so, rounded or apiculate at apex.

4. *P. rotundifolia*.

Leaves, at least the upper ones, obovate or elliptic, acute at both ends.

5. *P. chapistle*.

Areoles dark, filled with numerous brown glochids-----6. *P. porteri*.
Leaves, at least some of them, twice as long as broad or longer.

Leaves spatulate-----7. *P. spathulata*.

Leaves elliptic to oblong or obovate.

Leaves pale green, glaucous-----8. *P. pititache*.

Leaves bright green, shining-----9. *P. aquosa*.

1. *Pereskiopsis velutina* Rose, Smiths. Misc. Coll. 50: 333. 1907.

Central Mexico, the type from Querétaro.

Stems weak and spreading, forming compact bushes 1 meter high or more; old stems with cherry-brown bark; young branches green, borne nearly at right angles to the old stem, velvety-pubescent; areoles bearing long white hairs, several short spines, and some glochids; leaves elliptic to ovate-elliptic, 2 to 6 cm. long by 1.5 to 2.5 cm. broad, acuminate, or acute at both ends, dull green, more or less velvety-puberulent on both surfaces; flowers sessile on the second-year branches; ovary obovoid to oblong, pubescent, bearing large leaves and areoles similar to those of the stem; leaves on ovary spreading or ascending and persisting after the flower falls; sepals green or deep and tinged with yellow; petals bright yellow. "Nopaleta," "cola de diablo."

The plant is grown in hedges about Querétaro.

2. *Pereskiopsis diguetii* (Weber) Britt. & Rose, Smiths. Misc. Coll. 50: 332. 1907.

Opuntia diguetii Weber, Bull. Mus. Hist. Nat. 4: 166. 1898.

Jalisco to Oaxaca; type collected near Guadalajara, Jalisco.

Tall shrub, larger than the preceding species; old stems reddish; branches pubescent; areoles when young filled with long cobwebby hairs, when old large and filled with short black wool; leaves elliptic to obovate, 3 to 5 cm. long, usually abruptly pointed, more or less cuneate at base; spines usually 1, rarely as many as 4, at first nearly black, in time becoming lighter, sometimes nearly 7 cm. long; glochids brownish, not very abundant; flowers yellow; fruit 3 cm. long, red, pubescent, its areoles often bearing spines as well as glochids; seeds white, 5 mm. broad, covered with matted hairs. "Tasajillo," "alfilerillo" (Jalisco).

3. *Pereskia opuntiaeflora* (DC.) Britt. & Rose, Smiths. Misc. Coll. 50: 332. 1907.

Pereskia opuntiaeflora DC. Prodr. 3: 475. 1828.

Opuntia golziana Schum. Gesamtb. Kakt. 654. 1898.

Based upon a drawing of a Mexican plant by Sessé and Mocino, and not otherwise known.

Shrubby, glabrous; leaves obovate, mucronate, often in pairs; spines, when present, solitary, elongate, 2 to 3 times as long as the leaves; flowers subterminal, short-pedunculate; petals numerous, ovate, subacute, reddish yellow, arranged in two series; ovary leafless, bearing areoles filled with glochids.

4. *Pereskia rotundifolia* (DC.) Britt. & Rose, Smiths. Misc. Coll. 50: 333. 1907.

Pereskia rotundifolia DC. Prodr. 3: 475. 1828.

Opuntia rotundifolia Schum. Gesamtb. Kakt. 652. 1898.

Based upon an illustration by Mocino and Sessé of a Mexican plant; perhaps occurring in Oaxaca.

Stem thick, more or less woody; branches slender, glabrous; leaves nearly orbicular, mucronate; spines elongate, solitary; flowers 3 cm. broad, borne on the second-year branches; petals reddish yellow, broad, with mucronate tips; ovary leafy; fruit obovoid, red, leafy.

5. *Pereskia chapistle* (Weber) Britt. & Rose, Smiths. Misc. Coll. 50: 331. 1907.

Opuntia chapistle Weber; Goss. Bull. Mus. Hist. Nat. 10: 388. 1904.

Oaxaca and probably Morelos; type from Oaxaca.

A large branching shrub, sometimes 3 to 4 meters high, the branches widely spreading, glabrous; spines single, white, long (6 cm.), very stout; leaves fleshy, somewhat persistent, obovate to elliptic, sometimes nearly orbicular, 3 to 4 cm. long, glabrous; flowers yellow; fruit red. "Chapiztli."

6. *Pereskia porteri* (T. S. Brandeg.) Britt. & Rose, Smiths. Misc. Coll. 50: 332. 1907.

Opuntia porteri T. S. Brandeg.; Weber, Dict. Hort. Bois 899. 1898.

Opuntia brandegeei Schum. Gesamtb. Kakt. 653. 1898.

Pereskia brandegeei Britt. & Rose, Smiths. Misc. Coll. 50: 331. 1907.

Sinaloa and southern Baja California; type from Sinaloa.

Stems stout, woody, branching, 60 to 120 cm. high, 3 cm. in diameter, the old areoles bearing 3 to 8 stout spines 3 to 5 cm. long, but on the trunk often 15 to 20 spines from an areole; first and second-year branches usually short, spineless or with 1 or 2 brown spines, those of the first year green, of the second year brownish; areoles bearing numerous small brown glochids; leaves sessile, 2 to 3 cm. long, obovate, acute, fleshy; flowers about 4 cm. in diameter; sepals few, spatulate, short; petals few, yellow, broad, entire; fruit joint-like, oblong, 4 to 5 cm. long, orange-colored, with large areoles bearing brown glochids; seeds 1 or few, covered with white deciduous hairs. "Alcajer" (Baja California).

The fruit is said to be edible but very sour.

7. *Pereskia spathulata* (Otto) Britt. & Rose, Smiths. Misc. Coll. 50: 333. 1907.

Pereskia spathulata Otto; Pfeiff. Enum. Cact. 176. 1837.

Opuntia spathulata Weber, Bull. Mus. Hist. Nat. 4: 165. 1898.

Collected many years ago in Mexico, but without definite locality.

Branching shrub, 1 to 2 meters high; branches few, glaucescent, deflexed; leaves spatulate, thick, green, 2.5 to 5 cm. long; areoles distant, woolly, hairy when young; spines 1 or 2, rigid, white below, 2.5 cm. long; glochids brown, borne in the upper part of the areoles; flowers red; seeds white.

The vernacular name "pititache" has been reported, perhaps erroneously, for this species.

8. *Peresklopsis pititache* (Karw.) Britt. & Rose, Smiths. Misc. Coll. 50: 332. 1907.

Pereskia pititache Karw.; Pfeiff. Enum. Cact. 176. 1837.

Pereskia calandriniaefolia Link & Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 252. 1850.

Opuntia pititache Weber, Bull. Mus. Hist. Nat. 4: 166. 1898.

Reported from southern Mexico.

Stems rather low and somewhat branching; bark light brownish and flaking off; areoles on main trunk each bearing 1 to 4 slender acicular spines and a small cluster of yellowish glochids; branches, even when several years old, bearing a single long acicular spine from an areole and no glochids; young branches rather slender and green, their areoles small, black in the center, with long white hairs from their margins and no spines; leaves obovate or oblong-obovate, 4 cm. long or less, pale green, thin, acute or bluntish at apex, narrowed at base.

The names "patilón" and "pititache" are reported for this species.

9. *Peresklopsis aquosa* (Weber) Britt. & Rose, Smiths. Misc. Coll. 50: 331. 1907.

Opuntia aquosa Weber, Bull. Mus. Hist. Nat. 4: 165. 1898.

Vicinity of Guadalajara, Jalisco.

Shrub, with glabrous glaucous green branches, the young shoots with long white hairs at the areoles; leaves bright green, nearly elliptic, acute, about twice as long as wide, narrowed at base, glabrous; spines usually solitary, standing at right angles to the stem, white; glochids few, yellow; flowers yellow; outer petals blotched with red; fruit pear-shaped, 4 to 5 cm. long, 2 to 2.5 cm. in diameter, yellowish green. "Tuna de agua," "pitaya de agua," "chirrioncillo," "tasajillo," "alfilerillo."

3. **NOPALEA** Salm-Dyck, Cact. Hort. Dyck. 1849. 63. 1850.

Much branched plants with definite cylindric trunks; roots, so far as known, fibrous; branches or joints flattened, fleshy, often narrow; glochids usually less abundant than in *Opuntia*; spines solitary or in clusters at the areoles, sheathless; leaves small, subterete, soon deciduous; areoles bearing white wool, glochids, and often spines; flowers originating in the areoles usually at or near the edges of the joints; sepals ovate, erect; petals red or pinkish, erect, closely appressed against the numerous stamens and the style; filaments and style slender, much longer than the petals; ovary more or less tuberculate, naked or spiny, with a very deep umbilicus; fruit a juicy berry, red, edible, usually spineless; seeds numerous, flat, covered by a hard bony aril.

Joints without spines-----1. *N. cochenillifera*.

Joints more or less spiny.

Spines acicular-----2. *N. gaumeri*.

Spines subulate.

Areoles usually with 1 or 2 spines, but sometimes without spines; joints glaucous-----3. *N. auberi*.

Areoles with 2 to 12 spines; joints green.

Joints narrow, 4 to 7 times as long as wide-----4. *N. dejecta*.

Joints oblong or oblong-obovate, 2 to 4 times as long as wide.

Spines 2 to 4; joints not tuberculate-----5. *N. karwinskiana*.

Spines 4 to 12; joints strongly tuberculate-----6. *N. inaperta*.

1. *Nopalea cochenillifera* (L.) Salm-Dyck, Cact. Hort. Dyck. 1849. 64. 1850.

Cactus cochenillifer L. Sp Pl. 468. 1753.

Opuntia cochinelifera Mill. Gard. Dict. ed. 8. *Opuntia* No. 6. 1768.

Cultivated throughout tropical America.

Often tall plants, 3 to 4 meters high, with trunks up to 20 cm. thick; branches of ascending or spreading oblong joints, sometimes 50 cm. long, green, bright green at first; spines none or rarely minute ones developing on the older joints; glochids numerous, caducous; flowers appearing from the tops of the joints, usually in great abundance; flower, from base of ovary to tip of style, 5.5 cm. long; ovary nearly globular, 2 cm. long, with low diamond-shaped tubercles, its areoles bearing many glochids; sepals broadly ovate, acute, scarlet; petals a little longer than the sepals, otherwise similar, persistent; stamens pinkish, exserted 1 to 1.5 cm. beyond the petals; stigma lobes 6 or 7, exserted beyond the stamens; style swollen just above its base into a broad disk; fruit red, about 5 cm. long; seeds about 5 mm. long and 3 mm. wide. "Nocheznopalli" (Nahuatl); "nopal de San Gabriel" (Oaxaca); "tuna mansa" (Porto Rico); "tuna," "nopál" (El Salvador).

Nopalea cochenillifera is one of the best known of Mexican plants, particularly because of the fact, as indicated by the specific name, that it was upon this cactus that there were propagated the cochineal insects from which was obtained the famous dye of the same name. The source of the dye was well known to the precolumbian inhabitants of Mexico, who used it for coloring various articles. Immediately after the Conquest the export of cochineal was begun, and it was long one of the chief articles of tribute to the crown. The industry was later established in Spain, India, Jamaica, the Canary Islands, and elsewhere. The principal producer of the dye was probably the Canaries, and from those islands in 1868 more than 6,000,000 pounds, valued at \$4,000,000 was exported. With the development of coal-tar dyes this industry quickly decayed.

The cochineal insects were "planted" upon the branches of the plants, where they quickly multiplied, and were later brushed off into bags. After having been dried, they became the cochineal of commerce. Large plantations of *Nopalea* plants were made in Mexico for this purpose, the chief centers of production being in Guerrero and Oaxaca. It should be noted that the cochineal insect lives upon *Opuntias*, and extends as far north as the State of Colorado.

The fruit is edible. The joints are sometimes applied as poultices to relieve articular rheumatism, erysipelas, ophthalmia, earache, and toothache.

2. *Nopalea gaumeri* Britt. & Rose, Cactaceae 1: 216. 1919.

Yucatán; type locality, near Silam.

About 3 meters high, much branched; joints small, linear-oblong or oblong-oblong, 6 to 12 cm. long, 2 to 3 cm. broad, rather thin; areoles small, 1 to 2 cm. apart; spines very unequal, 5 to 20 mm. long, acicular, 4 to 12, yellowish when young; flower small, including ovary and stamens about 4 cm. long; sepals ovate, acute; petals oblong, 12 mm. long; stamens long-exserted; style longer than the stamens; fruit red, darker within, obovoid, 3 cm. long, its numerous areoles bearing spines and yellow glochids; umbilicus prominent, 1 cm. deep; seeds about 4 mm. broad, with very narrow margin and very thin testa.

3. *Nopalea auberi* (Pfeiff.) Salm-Dyck, Cact. Hort. Dyck. 1849. 64. 1850.
Opuntia auberi Pfeiff. Allg. Gartenz. 8: 282. 1840.

Central to southern Mexico; type locality unknown.

Often 8 to 10 meters high, with a cylindric jointed trunk, never very spiny but the areoles bearing tufts of brown glochids; branches often at right angles to the stem; joints narrow, thick, 30 cm. long, bluish green and glaucous; areoles circular, about 2 mm. broad, bearing short white wool and later a tuft of brown glochids; spines when present 1 or 2, subulate, the upper one about twice as long as the other, white or nearly so, with brownish tips, the longest one 2 to 3 cm. long; flowers from base of ovary to tip of style about 9 cm. long; petals erect, closely embracing the stamens, rose-pink, ovate-lanceolate, acuminate, 2 to 3.5 cm. long; filaments 12 to 15 mm. longer than the petals, white below, but the exposed parts pinkish; ovary 4 cm. long, with low but very distinct tubercles and a deep umbilicus, its areoles bearing many brown glochids, these sometimes 10 mm. long.

4. *Nopalea dejecta* Salm-Dyck, Cact. Hort. Dyck. 1849. 64. 1850.
Opuntia dejecta Salm-Dyck, Hort. Dyck. 361. 1834.

Cultivated in tropical Mexico; type locality unknown.

Plants 1 to 2 meters high, with definite trunk, very spiny, the old areoles often bearing 6 or 8 spines; joints narrow, 10 to 15 cm. long, only moderately thick, often drooping, bright green even in age, bearing usually two somewhat spreading spines at an areole; spines at first pale yellow or pinkish, in age gray, the longest 4 cm. long; flower, including ovary and style, 5 cm. long; sepals obtuse; petals erect, dark red; stamens long-exserted, dark red. "Nopal chacuero" (Tamaulipas).

The fruit is edible. The joints are sometimes cut into strips and boiled as a vegetable.

5. *Nopalea karwinskiana* (Salm-Dyck) Schum. Gesamtb. Kakt. 752. 1898.
Opuntia karwinskiana Salm-Dyck, Cact. Hort. Dyck. 1849. 239. 1850.

Widely distributed in Mexico.

A tree, 2 meters high or more, with a definite jointed terete spiny trunk; joints oblong, 15 to 30 cm. long, light dull green, only slightly glaucous; leaves elongate, acute; areoles distant; spines 3 to 7 from an areole, porrect, 1 to 2 cm. long, pale yellow to nearly white; glochids yellow, numerous, caducous; flowers red, 11 to 12 cm. long; ovary deeply umbilicate, 3 cm. long. "Nopalillo de flor" (Jalisco); "nopalillo."

The root is said to be employed as a remedy for dysentery.

6. *Nopalea inaperta* Schott; Griffiths, Monatsschr. Kakteenk. 23: 139. 1913.
 Yucatán.

Described as 5 to 7 meters high but in cultivation much smaller, diffusely branched, often bushlike; trunk very spiny; terminal joints rather small, obovate, 6 to 17 cm. long, strongly tuberculate, bright green; spines usually 3 to 6 at areoles of young joints, more at old ones, yellowish brown, 2 cm. long or less; flowers including ovary and stamens 4 cm. long; filaments numerous, long-exserted; style much longer than the stamens; fruit red, 1.5 cm. long.

4. *OPUNTIA* Mill. Gard. Dict. Abr. ed. 4. 1754.

Plants sometimes with definite trunks or more often much branched from the base, the branches often spreading, reclining, or prostrate, sometimes clambering, but never climbing (one species known with annual stems); roots fibrous or rarely tuberous and large and fleshy; ultimate branches (joints or pads) cylindric to globose or flattened, usually very fleshy, sometimes woody;

areoles axillary, bearing spines, barbed bristles (glochids), hairs, flowers, and sometimes glands; leaves usually small, terete, mostly early deciduous; spines solitary or in clusters, terete or flattened, naked or sheathed; glochids usually numerous, borne above the spines; flowers usually one at an areole; ovary many-ovuled, bearing leaves, the areoles often with spines and glochids; sepals usually grading into the petals; petals usually of various shades and combinations of green, yellow, and red (rarely white), widely spreading; stamens much shorter than the petals, sensitive; fruit a berry, dry or juicy, often edible, spiny or naked, globular, ovoid, or ellipsoid; seed covered by a hard bony aril, white, flattened.

The species of *Opuntia* are common in nearly all parts of Mexico, particularly in the arid regions. Those of the subgenus *Platyopuntia* are of great economic importance because of their edible fruits. Not all species produce edible fruits, but in certain ones the fruits are large and of excellent quality. During their season the tunas are the principal food of the people in certain parts of Mexico, and enormous quantities of them are consumed. Usually they are eaten raw, but they are also cooked in various ways, and sweetmeats are made from them. *Queso de tuna* consists of the dried fruit pressed into large cakes; this is widely sold in the markets. *Miel de tuna* is a syrup prepared from the fruit. *Melcocha* is a thick paste made by boiling down the juice. *Colonche* is the boiled and fermented juice. *Nochote* or *nochole* is a fermented beverage prepared from tuna juice, pulque, and water.¹ *Tejuino* also is a beverage prepared from the juice of the fruit.

The tender young joints are often cooked as a vegetable. They are also applied as poultices to reduce inflammation. The juice of the joints is sometimes boiled with tallow in making candles, in order to make the candles hard.

Among some of the Californian Indians the seeds were an important food. These were stored until winter, when they were ground and used to prepare a kind of atole.

Many of the *Opuntias* are of importance as food for stock in the arid regions. In order to make them more easily edible, the spines are sometimes burned off with torches.²

The usual name for a plant of the subgenus *Platyopuntia* is "nopal"; for the fruit "tuna" (a name said to be of West Indian origin). The English name is prickly pear. An infinite number of names is employed in Mexico to designate the numerous varieties of the fruit that are recognized. The following are some of the names that are reported for the plants and their fruits: "Nochtli" (fruit; Nahuatl); "culhua"; "pacac", "potzotz" (Huastec); "taat" (Mixe); "pare" (Tarascan); "câhâ" (fruit), "xâthâ" (plant) (Otomí).

The nopal occupies a prominent place in Mexican legend and history, and upon the national banner there appears an eagle perched upon a nopal plant.

The tunas are mentioned by all the early writers, as, for instance, Oviedo, who devotes a long chapter to them. Bernal Díaz del Castillo mentions them as one of the fruits depended upon for food during the siege of Mexico

¹ For an account of the economic properties of the genus see Hare and Griffiths, The tuna as food for man, N. Mex. Agr. Expt. Sta. Bull. 64. 1907.

² See Griffiths and Hare, Prickly pear and other cacti as food for stock, N. Mex. Agr. Expt. Sta. Bull. 60. 1906.

in 1521. Clavigero states that improved varieties of tunas were carried to Baja California by the early missionaries. He reports also that the Cochimi name for the fruit "is the single vowel *a*."

Joints of the stems all terete, elongate or short, cylindric to globose. (Subgenus CYLINDROPUNTIA.)

Spines without sheaths.....VII. CLAVATAE.

Spines with papery sheaths.

Spines, at least some of them, solitary, sometimes several; ultimate branches slender, rarely more than 1 cm. thick....I. LEPTOCAULES.

Spines always more than one; ultimate branches stouter.

Ultimate branches not over 2 cm. thick.....II. THURBERIANAE.

Ultimate branches 2 cm. thick or more.

Fruit dry.....III. ECHINOCARPAE.

Fruit fleshy.

Tubercles of young joints scarcely longer than broad.

IV. BIGELOVIANAE.

Tubercles distinctly longer than broad.

Tubercles narrow, high, laterally flattened....V. IMBRICATAE.

Tubercles broad, low.....VI. FULGIDAE.

Joints, at least some of them, flat or compressed. (Subgenus PLATYOPUNTIA.)

Stems annual, very slender.....XXIV. CHAFFEYANAE.

Stems perennial, stout or slender.

Flowers dioecious; petals very narrow.....XXIII. STENOPETALAE.

Flowers perfect; petals obovate to oblong.

Joints easily detached from the plants.

Joints very easily detached, little flattened; plants mostly low and with small joints.....VIII. PUMILAE.

Joints not so easily detached, flattened; plants mostly taller and with larger joints.....IX. TUNAE.

Joints not easily detached, persistent.

Areoles small, 1 to 2 mm. in diameter, mostly close together, not elevatedX. BASILARES.

Areoles larger, mostly distant.

Spines, when present, brown or yellow (white in *O. setispina*).

Spines brown, at least at base or tip.

Plants bushy or depressed.

Spines acicular.....XI. SETISPINAE.

Spines subulate.....XII. PHAEACANTHAE.

Plants tall, sometimes with a definite trunk.

XIII. ELATIORES.

Spines yellow, at least partially so.

Epidermis glabrous.

Areoles close together, bearing long brown wool.

XIV. SCHEERIANAE.

Areoles distant, without long wool....XV. DILLENIANAE.

Epidermis, at least that of the ovary, pubescent.

XVI. MACDOUGALIANAE.

Spines, when present, white (or faintly yellow).

Epidermis pubescent.

Spines acicular.....XVII. TOMENTOSAE.

Spines setaceous, flexible.....XVIII. LEUCOTRICHAE.

Epidermis glabrous.

Areoles bearing long soft hairs.....XIX. ORBICULATAE.

Areoles without long hairs.

Joints green or bluish green.

Plants spineless, or with a few, usually short spines.

XX. FICUS-INDICAE.

Plants spiny, at least on old joints.

XXI. STREPTACANTHAE.

Joints blue.....XXII. ROBUSTAE.

I. LEPTOCAULES.

Ultimate joints short, usually at right angles to the branches, 4 to 7 mm. thick.

Leaves ovoid to ovoid-subulate; young areoles long-hairy...1. *O. mortolensis*.

Leaves linear; areoles not long-hairy.....2. *O. leptocaulis*.

Ultimate joints longer, usually at an acute angle with the branches, 8 to 15 mm. thick.

Joints only slightly tuberculate.....3. *O. arbuscula*.

Joints manifestly tuberculate.....4. *O. kleiniae*.

II. THURBERIANAE.

Tubercles narrowly oblong, 1 cm. long or more.

Spines, at least the larger ones, 2.5 cm. long or more.....5. *O. recondita*.

Spines 2 cm. long or less.....6. *O. thurberi*.

Tubercles low, oblong, 6 to 8 mm. long.....7. *O. clavellina*.

III. ECHINOCARPAE.

Sheaths of the spines white or straw-colored.....8. *O. echinocarpa*.

Sheaths yellow-brown.....9. *O. serpentina*.

IV. BIGELOVIANAE.

Larger spines numerous; upper tubercles on fruit larger than the lower ones.

10. *O. bigelovii*.

Larger spines 4 to 6; tubercles on fruit all alike.....11. *O. ciribe*.

V. IMBRICATAE.

Joints clavate; tubercles not much flattened laterally.....19. *O. molesta*.

Joints cylindric; tubercles much flattened laterally.

Fruit smooth or but slightly tuberculate.

Branches very stout, 5 cm. thick or more.....12. *O. cholla*.

Branches relatively slender, 2 cm. thick or less.

Plants glaucous; spines 4 at an areole.....13. *O. calmalliana*.

Plants not glaucous; spines more than 4 at an areole...14. *O. versicolor*.

Fruit manifestly tuberculate.

Plants tall, up to 2 to 4 meters high.

Flowers small, the petals 1.5 cm. long.....15. *O. lloydii*.

Flowers large, the petals 2 to 3 cm. long.....16. *O. imbricata*.

Plants low, 60 cm. high or less.

Flowers yellow.....17. *O. tunicata*.

Flowers rose-colored.....18. *O. pallida*.

VI. FULGIDAE.

Joints very readily detached, freely falling-----20. *O. fulgida*.
 Joints not readily detached, persistent.

Spines brown or reddish, at least at base.

Branches slender; fruit not proliferous-----21. *O. spinosior*.

Branches stout; fruit proliferous-----22. *O. prolifera*.

Spines white or yellow.

Spines white; petals greenish yellow, 1 cm. long or less--23. *O. alcahes*.

Spines yellow; petals red, 2 cm. long-----24. *O. burrageana*.

VII. CLAVATAE.

Spines flattened.

Stems very stout.

Stems hardly clavate; ovary very prickly-----25. *O. invicta*.

Stems strictly clavate; ovary only slightly prickly-----26. *O. stanlyi*.

Stems more slender and weak-----27. *O. schottii*.

Spines terete, elongate, and flexible, or the central ones somewhat flattened.

Flowers pinkish or purple-----28. *O. vilis*.

Flowers yellow.

Spines comparatively short, swollen at base-----29. *O. bulbispina*.

Spines long and flexible, not swollen at base-----30. *O. grahamii*.

VIII. PUMILAE.

Areoles (young ones) with only 1 to 3 spines-----31. *O. pumila*.

Areoles with 3 to 7 spines-----32. *O. pubescens*.

IX. TUNAE.

Areoles surrounded by purplish spots-----33. *O. decumbens*.

Areoles not surrounded by purplish spots-----34. *O. depressa*.

X. BASILARES.

Joints not pubescent-----35. *O. lubrica*.

Joints usually manifestly pubescent

Spines none or few.

Flowers red-----36. *O. basilaris*.

Flowers yellow to orange.

Joints bright green.

Glochids long-----37. *O. microdasys*.

Glochids short-----38. *O. macrocalyx*.

Joints grayish green-----39. *O. rufida*.

Spines very numerous.

Areoles close together-----40. *O. pycnantha*.

Areoles distant-----41. *O. comonduensis*.

XI. SETISPINAE.

Joints elongate-----42. *O. megarhiza*.

Joints obovate to orbicular.

Flowers red or purple-----43. *O. pottsil*.

Flowers yellow.

Areoles large; joints glaucous, purplish about areoles----44. *O. setispina*.

Areoles small; joints green throughout-----45. *O. tenuispina*.

XII. PHAEACANTHAE.

- Plants small and creeping-----53. *O. rastrera*.
 Plants more or less bushy.
 Joints thin; spines, when present, very long and confined to the upper and middle areoles.
 Spines dark brown, stout, rigid-----46. *O. macrocentra*.
 Spines pale brown, flexible or subulate-----47. *O. gosseliniana*.
 Joints thick; spines not confined to the upper and middle areoles.
 Joints relatively small, seldom over 15 cm. broad; plants relatively low.
 Plants erect, 2 meters high or less-----48. *O. azurea*.
 Plants bushy, rarely over 1 meter high-----49. *O. phaeacantha*.
 Joints relatively large, mostly over 15 cm. broad; plants relatively tall.
 Spines clear brown nearly throughout-----50. *O. occidentalis*.
 Spines nearly white above or throughout.
 Spines with dark brown bases-----51. *O. engelmannii*.
 Spines whitish throughout-----52. *O. discata*.

XIII. ELATIORES.

- A single species in Mexico-----54. *O. fuliginosa*.

XIV. SCHEERIANAE.

- A single species-----55. *O. scheeri*.

XV. DILLENIANAE.

- Spines nearly setaceous, most of them reflexed-----56. *O. chlorotica*.
 Spines, when present, acicular to subulate.
 Spines mostly stout, commonly flattened-----57. *O. dillenii*.
 Spines acicular to subulate, terete or slightly flattened at base.
 Spines long.
 Areoles mostly 1.5 to 2 cm. apart-----58. *O. taponia*.
 Areoles mostly 2.5 to 4 cm. apart.
 Spines yellow or yellowish brown-----59. *O. lindheimeri*.
 Spines pale yellow or whitish-----60. *O. cantabrigiensis*.
 Spines 1.5 cm. long or less, or becoming longer on old joints.
 61. *O. pyriformis*.

XVI. MACDOUGALIANAE.

- Joints merely finely puberulent or glabrous; spines 1.5 cm. long or less.
 62. *O. durangensis*.
 Joints distinctly pubescent; spines 2 to 3 cm. long.
 Petals red.
 Style shorter than the petals-----63. *O. atropes*.
 Style as long as the petals-----64. *O. affinis*.
 Petals yellow,
 Spines acicular, at first yellow, soon white-----65. *O. macdougaliana*.
 Spines subulate.
 Petals retuse; areoles of ovary many, approximate-----66. *O. velutina*.
 Petals mucronate; areoles of ovary few, distant-----67. *O. wilcoxii*.

XVII. TOMENTOSAE.

- Joints narrowly obovate-----68. *O. tomentosa*.
 Joints broadly obovate-----69. *O. guilanchi*.

XVIII. LEUCOTRICHAE.

A single species-----70. *O. leucotricha*.

XIX. ORBICULATAE.

Hairs from the areoles of young plants long and white, long-persistent; plants low-----71. *O. orbiculata*.

Hairs from the areoles of young joints early deciduous; plants tall.
72. *O. pilifera*.

XX. FICUS-INDICAE.

Joints dull.

Joints thin, up to 50 cm. long-----73. *O. ficus-indica*.

Joints thick, 15 cm. long or less-----74. *O. crassa*.

Joints glossy-----75. *O. undulata*.

XXI. STREPTACANTHAE.

Areoles close together, sunken-----76. *O. spinulifera*.

Areoles not close together, not sunken.

Spines acicular-----77. *O. lasiacantha*.

Spines subulate.

Areoles with 2 or more short reflexed hairs or bristles at the lower part of the areole.

Spines strongly depressed; areoles with several hairs.

78. *O. hyptiacantha*.

Spines not strongly depressed; areoles with 1 or 2 hairs.

Joints obovate-----79. *O. streptacantha*.

Joints oblong-----80. *O. amyclaea*.

Areoles without reflexed hairs or bristles-----81. *O. megacantha*.

XXII. ROBUSTAE.

Fruit deep red, 7 to 9 cm. in diameter-----82. *O. robusta*.

Fruit greenish white, 4 to 5 cm. in diameter-----83. *O. guerrana*.

XXIII. STENOPETALAE.

Spines dark; plants low, prostrate-----84. *O. stenopetala*.

Spines white; plants erect.

Joints narrow; spines acicular-----85. *O. glaucescens*.

Joints broader; spines stouter-----86. *O. grandis*.

XXIV. CHAFFEYANAE.

A single species-----87. *O. chaffeyi*.

1. *Opuntia mortolensis* Britt. & Rose, Cactaceae 1: 47. 1919.

Sonora; described from cultivated plants.

Slender, 60 cm. high or less, dull green, the ultimate twigs short, sometimes only 2 cm. long, 4 to 5 mm. thick, scarcely tuberculate; young areoles with numerous early deciduous weak white hairs and several brown glochids; areoles of old branches with solitary acicular spines 3 to 5 cm. long, these with tightly fitting brown sheaths.

2. *Opuntia leptocaulis* DC. Mém. Mus. Hist. Nat. 17: 118. 1828.

Opuntia ramulifera Salm-Dyck, Hort. Dyck. 360. 1834.

Opuntia gracilis Pfeiff. Enum. Cact. 172. 1837.

Opuntia virgata Link & Otto; Först. Handb. Cact. 506. 1846.

Opuntia vaginata Engelm. in Wislitz. Mem. North. Mex. 100. 1848.

Opuntia frutescens Engelm. Bost. Journ. Nat. Hist. 6: 208. 1850.

Widely distributed in Mexico, extending southward to Puebla. Also in the southwestern United States.

Usually bushy, often compact, 2 meters high or less, but sometimes with a short definite trunk 5 to 8 cm. in diameter, dull green with darker blotches below the areoles, with slender, cylindric, ascending, hardly tuberculate branches; branches, especially the fruiting ones, thickly set with short, usually spineless joints spreading nearly at right angles to the main branches, very easily detached; spines usually solitary at young areoles, very slender, white, at areoles of old branches 2 or 3 together, 2 to 5 cm. long or less; areoles with very short white wool; flowers greenish or yellowish, 1.5 to 2 cm. long (including the ovary); ovary obconic, bearing numerous small woolly brown areoles subtended by small leaves, its glochids brown; fruit globular to obovate or even clavate, often proliferous, red or rarely yellow, 10 to 18 mm. long, slightly fleshy. "Tasajillo" (Durango, Nuevo León, Tamaulipas, Chihuahua, Texas, New Mexico).

The plant is abundant in many parts of northern Mexico and often forms dense thickets. The long spines are very offensive, and often cause bad sores when they penetrate the flesh.

Opuntia ramosissima Engelm.,¹ a closely related species, common in southwestern Arizona, should be looked for in Sonora and Baja California.

Opuntia tesajo Engelm.² was based on a Baja California specimen, but the type has been lost, and the plant should perhaps be referred to *O. leptocaulis*.

3. *Opuntia arbuscula* Engelm. Proc. Amer. Acad. 3: 309. 1856.

Sonora. Southwestern United States; type from the lower Gila, near Maricopa Village.

Forming a bush 2 to 3 meters high, often with a rounded, very compact top with numerous short branches; trunk short, 10 to 12 cm. in diameter, with several woody branches; ultimate joints 5 to 7.5 cm. long, 8 mm. in diameter, with low indistinct tubercles; spines usually 1, but sometimes several, especially on old joints, porrect, up to 4 cm. long, covered with loose straw-colored sheaths; flowers greenish yellow tinged with red, 3.5 cm. long; fruit often proliferous, sometimes only one-seeded.

4. *Opuntia kleiniae* DC. Mém. Mus. Hist. Nat. 17: 118. 1828.

Opuntia wrightii Engelm. Proc. Amer. Acad. 3: 308. 1856.

Opuntia caerulescens Griffiths. Rep. Mo. Bot. Gard. 20: 86. 1909.

Central and northern Mexico. Southwestern United States.

Stems pale, glaucous, sometimes 2.5 meters tall, woody at base; tubercles long; areoles large, a little longer than wide, filled with white wool from the very first; spines usually 1, but sometimes more, from the base of the areole, covered with yellow sheaths, on old joints accompanied by several bristle-like spines from the lower margin of the areole; glochids yellow to brown; flowers 3 cm. long, purplish; petals broad, rounded at apex; fruit red, 2 to 2.5 long, long persisting; seeds 4 to 5 mm. broad. "Tasajillo" (Durango, Patoni).

¹ Amer. Journ. Sci. II. 14: 339. 1852.

² Coulter, Contr. U. S. Nat. Herb. 3: 448. 1896.

5. *Opuntia recondita* Griffiths, Monatsschr. Kakteenk. 23: 131. 1913.

Type from La Perla, Mexico.

Shrub 1 to 1.5 meters high; joints 20 to 30 cm. long, very spiny, about 2 cm. in diameter, tuberculate; areoles broadly obovate, 5 to 6 mm. long, in age larger and more prominent, forming new wool for several years; glochids yellow; spines at first 2 to 4, later 6 to 10, 2.5 to 5 cm. long, gray at base, deep reddish brown at tip, with a loose sheath; flowers bright purple, 2.5 cm. broad; fruit persistent, 3 to 3.5 cm. long, greenish yellow, weakly tuberculate.

6. *Opuntia thurberi* Engelm. Proc. Amer. Acad. 3: 308. 1856.

Sonora and Sinaloa; type from Bacuachi, Sonora. Arizona.

Large bushy plants, 2 to 4 meters high; joints slender, elongate, 15 to 25 cm. long, 10 to 12 mm. in diameter; tubercles 1.5 to 2 cm. long, flattened laterally; spines 3 to 5, short (10 to 12 mm. long), spreading, covered with thin brown papery sheaths, the lowest one stoutest; flowers 3.5 cm. broad, brownish; fruit 2 to 3 cm. long, spineless; seeds nearly globular, 4 mm. in diameter. "Cholla" (Sinaloa).

7. *Opuntia clavellina* Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 444. 1896.

Central Baja California; type collected near Misión Purísima.

Plants 1 meter high, rather openly branched; ultimate joints slender, spreading or ascending, somewhat clavate, 5 to 10 cm. long, a little over 1 cm. in diameter; tubercles prominent, elongate; spines 3 to 6 in a cluster, very long, covered with loose, straw-colored or brown sheaths, the central one much longer and porrect; flowers yellow; fruit clavate, short, tuberculate.

For an illustration of this species see Contr. U. S. Nat. Herb. 16: pl. 129, A.

8. *Opuntia echinocarpa* Engelm. & Bigel. Proc. Amer. Acad. 3: 305. 1856.

Baja California. Southwestern United States; type from the Colorado Valley near the mouth of the Bill Williams River.

Plants usually low, but sometimes 1.5 meters high, much branched and widely spreading, with a short woody trunk 2 to 3 cm. in diameter, in age with nearly smooth bark; joints short, turgid, strongly tuberculate; spines numerous, when young bright yellow, when older brownish or in age grayish, unequally covered with thin papery sheaths; flowers yellowish, but the sepals often tipped with red; ovary short, turbinate, densely spiny, especially in the upper part; fruit dry, very spiny; seeds somewhat angular, 4 mm. broad.

Opuntia acanthocarpa Engelm. & Bigel.,¹ a somewhat smaller species, has been reported from Mexico, but we have seen no specimens.

9. *Opuntia serpentina* Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Northern Baja California. Southern California, the type from San Diego.

Ascending, erect, or prostrate; branches slender, 2 to 2.5 cm. in diameter, bluish green, strongly tuberculate; tubercles elevated, 1 to 1.5 cm. long, longer than broad, flattened; spines 7 to 20, brown, covered with yellowish brown, papery sheaths about 1 cm. long; glochids light brown; flowers close together at the top of short branches, about 4 cm. broad, greenish yellow, the outer petals tinged with red; ovary strongly tuberculate, spiny, with a depressed umbilicus; fruit dry, very spiny.

10. *Opuntia bigelovii* Engelm. Proc. Amer. Acad. 3: 307. 1856.

Northern Sonora and northern Baja California. Southwestern United States; type from the region of Bill Williams River.

Usually with a central erect trunk, 1 meter high or less, with short lateral branches, the upper ones erect; joints usually 5 to 15 cm. long, very turgid,

¹ Proc. Amer. Acad. 3: 308. 1856.

with closely set areoles and almost impenetrable armament; tubercles slightly elevated, pale green, somewhat 4-sided, about as long as broad, 1 cm. broad or less; spines, as well as their papery sheaths, pale yellow; flowers several, borne at the tips of the branches, 4 cm. long (including the ovary); sepals orbicular, about 1 cm. in diameter, tinged with red; petals 1.5 cm. long, pale magenta to crimson; ovary 2 cm. long, its large areoles bearing brown wool and several acicular spines; fruit usually naked, strongly tuberculate, the upper tubercles larger than the lower.

For an illustration of this species see Contr. U. S. Nat. Herb. 16: *pl.* 128, *B.*

11. *Opuntia ciribe* Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 445. 1896.

Central Baja California.

One meter high or less, with numerous stout branches, densely armed; ultimate joints 4 to 5 cm. in diameter, strongly and regularly tuberculate, 3 cm. in diameter; tubercles about as long as broad (5 to 7 cm. broad); larger spines 4 to 6, stout, 2 to 3 cm. long, covered with loose yellow sheaths, accompanied by several bristle-like spines or hairs; glochids numerous; flowers yellow; ovary somewhat bristly; fruit strongly tuberculate, 3 to 4 cm. long, spineless.

12. *Opuntia cholla* Weber, Bull. Mus. Hist. Nat. 1: 320. 1895.

Widely distributed in Baja California.

Usually treelike, 1 to 3 meters high, with a definite trunk 7 to 15 cm. in diameter; trunk very spiny at first and becoming more spiny each year for some time, but in age spineless and developing a smooth, brownish yellow bark; top of plant often dense and broad; joints often in whorls, horizontal, pale, with large compressed tubercles; spines usually numerous, more or less porrect, covered with loose brownish sheaths; glochids numerous, yellow; flowers rather small, 3 cm. broad, deep purple; fruit often 4 to 5 cm. long, usually proliferous, often in long chains of 8 to 12 individuals or forming compound clusters; seeds numerous, very small, often abortive. "Cholla."

In this as in some other species the fruits are proliferous, hanging on for a few years and usually remaining green. They are, however, easily detached, and on falling to the ground take root and form new colonies. For an illustration of *O. cholla* see Contr. U. S. Nat. Herb. 16: *pl.* 128, *A.*

13. *Opuntia calmalliana* Coulter, Contr. U. S. Nat. Herb. 3: 453. 1896.

Baja California, the type from Calmalli.

Habit and height unknown; joints cylindric, 1 to 2 cm. in diameter, glaucous, with linear-oblong crested (mostly distinct) tubercles 20 to 25 mm. long; pulvini densely covered with yellowish wool, and with a penicillate tuft of whitish bristles at upper edge; spines usually 4, the upper one stout and porrect, reddish with yellowish tip, 2 to 2.5 cm. long (occasionally 1 to 2 short upper ones added), the usually 3 (sometimes 4) lower ones more slender and sharply deflexed, 1 to 1.5 cm. long (occasionally one of them longer); flowers apparently purple; ovary covered with very prominent woolly pulvini, ripening into a smooth juicy obovate fruit; seeds discoid and beaked, irregularly angular, with broad commissure, about 4 mm. broad.

14. *Opuntia versicolor* Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 452. 1896.

Sonora, Arizona, the type from Tucson.

Bushy or treelike, 2 to 4 meters high, with a large open top sometimes 5 meters broad; trunk and larger stems woody throughout; terminal joints 10 to 20 cm. long, 2.5 cm. in diameter, variously colored, not strongly tuberculate when living; tubercles 1.5 cm. long; spines 5 to 11, 5 to 25 mm. long, dark-colored, with close-fitting sheaths; glochids reddish brown; flowers variously

colored, yellow, greenish, reddish, or brown, 3 to 5.5 cm. broad; ovary tuberculate, with large areoles bearing wool, glochids, and long deciduous bristles; fruit persisting for months, sometimes for a year, 2.5 to 4 cm. long, at first somewhat tuberculate, becoming pear-shaped or globose, sometimes proliferous; seeds white, 5 mm. broad.

The fruit of this species was eaten by the Pima Indians of Arizona, either raw or prepared like that of *O. imbricata*.

15. *Opuntia lloydii* Rose, Contr. U. S. Nat. Herb. 12: 292. 1909.

Central Mexico; type from Hacienda de Cedros, Zacatecas.

Much branched, 2 to 3 meters high and nearly as broad; joints terete, 2 cm. in diameter; tubercles prominent, oblong; spines few, on last year's joints 3, reddish, 1.5 cm. long; flowers 3 cm. long, opening after midday; petals 15 mm. long, dull purple; filaments olive-green below, purplish above; style rose-colored; ovary yellowish, strongly tuberculate, naked; fruit 3 cm. long, yellow to orange, slightly tuberculate.

16. *Opuntia imbricata* (Haw.) DC. Prodr. 3: 471. 1828.

Cereus imbricatus Haw. Rev. Pl. Succ. 70. 1828.

Opuntia rosea DC. Prodr. 3: 471. 1828.

Opuntia decipiens DC. Mém. Mus. Hist. Nat. 17: 118. 1828.

Opuntia exuviata DC. Mém. Mus. Hist. Nat. 17: 118. 1828.

Opuntia arborescens Engelm. in Wislitz. Mem. North. Mex. 90. 1848.

Opuntia magna Griffiths, Proc. Biol. Soc. Washington 27: 23. 1914.

Opuntia spinotecta Griffiths, Proc. Biol. Soc. Washington 27: 24. 1914.

Central and northern Mexico. Southwestern United States.

Treelike, often 3 meters high or larger, with a more or less definite woody trunk 25 cm. in diameter; ultimate joints 2 to 3 cm. in diameter, strongly tuberculate; tubercles 2 to 2.5 cm. long, flattened laterally; spines 8 to 30, 2 to 3 cm. long, brown, covered with papery sheaths; flowers borne at ends of branches, 4 to 6 cm. long, sometimes 8 to 9 cm. broad, purple; ovary tuberculate, bearing a few bristles from some of the upper areoles; fruit naked, yellow, 2.5 to 3 cm. long, strongly tuberculate or, when long persistent, smooth; seeds 2.5 to 3.5 mm. in diameter. "Xoconochtli" (*Hernández*); "xoconostle," "joconoxtle" (Jalisco); "joconostle" (Zacatecas); "cardenche" (Durango, Zacatecas); "tasafo" (Chihuahua); "coyonostle" (Nuevo León, Coahuila); "coyonoxtle" (*Ochoterena*); "coyonostli" (Nuevo León); "tuna joconoxtle" (Jalisco); "tuna huell" (*Griffiths*); "velas de coyote," "entraña" (New Mexico).

In many parts of its range this is an abundant and characteristic plant, often forming extensive thickets. In early times a decoction of the fruit was used to set cochineal dye, and it is said to be so employed even at the present time. The stems contain a hard woody framework resembling a network after the soft tissue has been removed, and they are often made into canes. Among the Penitentes, a religious organization of the Southwest, it was formerly the custom, among other similar practices, during Holy Week to march in processions with large bundles of the very spiny stems bound upon their naked backs.

The Pimas of Arizona formerly consumed quantities of the hard fruits of a related species. These were cooked over night in pits filled with heated stones, then dried in the sun, after which the spines were removed, and the fruit stored for later use. Thus prepared, the fruit was boiled and salted and eaten with pinole, or it was cooked with meat or various herbs.

Opuntia cardenche Griffiths¹ is perhaps a synonym of this species, or possibly referable to *O. kleiniae*.

¹ Rep. Mo. Bot. Gard. 19: 259. pl. 21. 1908.

17. *Opuntia tunicata* (Lehm.) Link & Otto; Pfeiff. Enum. Cact. 170. 1837.

Cactus tunicatus Lehm. Ind. Sem. Hort. Hamb. 6. 1827.

Opuntia stapeliae DC. Mém. Mus. Hist. Nat. 17: 117. 1828.

Opuntia perrita Griffiths, Rep. Mo. Bot. Gard. 22: 33. 1912.

Widely distributed in Central Mexico. Ecuador, Peru, and Chile.

Very variable, sometimes low and spreading from the base and forming broad clumps, at other times 50 to 60 cm. high, with a more or less definite woody stem and numerous lateral branches; joints easily detached, sometimes short and nearly globular to narrowly oblong, 10 to 15 cm. long; spines reddish, normally 6 to 10, 4 to 5 cm. long, covered with thin white papery sheaths; flowers 3 cm. long, yellow; petals obtuse; ovary often bearing long spines at the areoles, but usually naked. "Abrojo" (Mexico); "clavellina" (Durango); "tencholote" (*Ochoterena*).

18. *Opuntia pallida* Rose, Smiths. Misc. Coll. 50: 507. 1908.

Hildalgo; type from Tula.

Stems 5 cm. in diameter, about 1 meter high, with widely spreading branches, the whole plant often broader than high; old areoles very spiny, often bearing 20 spines or more, often 3 to 4 cm. long, with white papery sheaths; young areoles bearing few spines; ovary tuberculate, the areoles either naked or bearing a few bristly spines; flowers pale rose-colored; petals 15 mm. long.

19. *Opuntia molesta* T. S. Brandeg. Proc. Calif. Acad. II. 2: 164. 1889.

Baja California, the type from San Ignacio.

Stems 1 to 2 meters high, with few long spreading branches; joints clavate to subcylindric, 10 to 40 cm. long, sometimes as much as 4 cm. in diameter at the top, pale green, with low broad tubercles, these elongate and often 4 cm. long or more; spines 6 to 10, unequal, the longest 2.5 to 5 cm. long, straw-colored, with loose papery sheaths; flowers purple, 5 cm. in diameter; fruit ovoid, 2.5 cm. long, somewhat spiny or naked; seeds 6 mm. in diameter, irregular in shape.

20. *Opuntia fulgida* Engelm. Proc. Amer. Acad. 3: 306. 1856.

Opuntia mamillata Schott; Engelm. Proc. Amer. Acad. 3: 308. 1856.

Sinaloa and Sonora; type from western Sonora. Arizona.

Plants sometimes 3 meters high or even larger, with a rather definite woody trunk 10 to 20 cm. in diameter, much branched, sometimes almost from the base and forming a compact flattened crown; terminal joints 10 to 20 cm. long, 3 to 5 cm. in diameter, very succulent, strongly tuberculate, easily breaking off; spines 2 to 12, yellowish to brown, 2.5 to 3.5 cm. long, acicular, covered with loose papery sheaths; glochids small, whitish to light yellow; flowers light rose, 2.5 to 3 cm. broad; fruit at first tuberculate, in age smooth, somewhat pear-shaped, 2 to 5 cm. long, green, usually very proliferous; seeds rather small, 4 mm. broad, often wanting. "Velas de coyote" (*Coulter*).

21. *Opuntia spinosior* (Engelm.) Toumey, Bot. Gaz. 25: 119. 1898.

Opuntia whipplei spinosior Engelm. Proc. Amer. Acad. 3: 307. 1856.

Sonora. New Mexico and Arizona.

Plants 2 to 4 meters high, treelike, with a more or less definite woody trunk, openly branched; ultimate joints 10 to 30 cm. long, 1.5 to 2.5 cm. in diameter, often bright purple, strongly tuberculate; tubercles about 6 to 12 mm. long, longer than broad, more or less flattened laterally; spines 6 to 12, but on old branches sometimes as many as 25, 10 to 15 mm. long, divergent, gray to brownish, covered with thin sheaths; glochids yellowish white; flowers 5 to 6 cm.

broad, purple to pink, yellow, or even white; petals about 10, broad at apex, narrowed at base; ovary tuberculate, bearing small purple leaves and long, white, easily detached bristles; fruit strongly tuberculate, spineless, yellow, globose to broadly oblong, 2.5 to 4 cm. long, with a depressed umbilicus; seeds white, 4 mm. broad, smooth, with a very indistinct marginal band.

22. *Opuntia prolifera* Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Widely distributed in Baja California. Southern California, the type from San Diego.

Stems 1 to 2 meters high, the trunk and old branches terete and woody; terminal joints 3 to 12 cm. long, easily breaking off, fleshy, covered with short, more or less turgid tubercles; spines 6 to 12, brown, 10 to 12 mm. long; glochids pale; flowers small; sepals orbicular, obtuse, dark red; petals red; ovary 1 cm. long, strongly tuberculate, the upper areoles bearing 2 to 6 reddish spines, or the joints naked throughout; fruit proliferous, 3 to 3.5 cm. long, often without seeds.

23. *Opuntia alcahes* Weber, Bull. Mus. Hist. Nat. 1: 321. 1895.

Baja California.

Plants about 1 meter high, much branched, very spiny, especially when old; branches terete; spines on young joints about 12, short, covered with white or very pale sheaths; tubercles prominent, diamond-shaped; sepals small, brownish, closely imbricate, hardly spreading at tips; petals sometimes wanting, if present about 1 cm. long, greenish yellow, obtuse; fruit globular, small, becoming turgid in age, yellowish, more or less proliferous, the umbilicus truncate or slightly depressed.

24. *Opuntia burrageana* Britt. & Rose, Cactaceae 1: 70. 1919.

Baja California, the type from Pichilingue Island.

Usually low and bushy, rarely 1 meter high; stems slender, 1 to 2 cm. in diameter, densely spiny; young joints cylindric to narrow-clavate, 15 cm. long or less; areoles closely set; tubercles rather low, not much broader than long; spines numerous, similar, spreading, rarely 2 cm. long, all covered with thin, bright yellow sheaths; wool in areoles short, brown; glochids, when present, short, light yellow; flower 3 to 4 cm. broad; petals few, brownish red with green base; ovary very spiny; fruit not proliferous, globular, 2 cm. in diameter, somewhat tuberculate, probably dry; seeds pale, 4 mm. in diameter.

25. *Opuntia invicta* T. S. Brandeg. Proc. Calif. Acad. II. 2: 163. 1889.

Central Baja California; type from San Juanico.

Plants usually growing in large clusters 2 meters in diameter and 20 to 50 cm. high, with many ascending or spreading branches; joints obovoid to clavate, dark green, 8 to 10 cm. long, strongly tuberculate; tubercles large, flattened laterally, 3 to 4 cm. long; areoles large, 1 to 1.5 cm. in diameter; spines very formidable, when young reddish or purple with carmine-red bases, chestnut-brown at tips and grayish between, in age dull; radial spines 6 to 10; central spines 10 to 12, much stouter than the radials, strongly flattened, the wool white; glochids few, white, 2 to 4 mm. long; flowers yellow, 5 cm. in diameter; sepals ovate, acuminate; ovary 2 cm. in diameter, almost hidden by the numerous reddish acicular spines; seeds yellowish, 2 mm. broad.

26. *Opuntia stanlyi* Engelm. in Emory, Mil. Recon. 158. 1848.

Opuntia emoryi Engelm. Proc. Amer. Acad. 3: 303. 1856.

Opuntia kunzei Rose, Smiths. Misc. Coll. 50: 505. 1908.

Northern Sonora. Arizona and New Mexico.

Stems low, usually less than 30 cm. high, much branched, creeping, forming broad impenetrable masses 2 to 3 meters in diameter; joints 10 to 15 cm. long, clavate, more or less curved, strongly tuberculate; tubercles 3 to 4 cm. long, flattened laterally, 4 to 6 cm. apart; spines numerous, stout, elongate, somewhat roughened, reddish brown, the larger ones strongly flattened, 3.5 to 6 cm. long; flowers yellow, 5 to 6 cm. broad; fruit ovate, clavate at base, yellow, 5 to 6 cm. long, very spiny, with a depressed umbilicus; seeds flattened, 4.5 to 6.5 mm. in diameter.

27. *Opuntia schottii* Engelm. Proc. Amer. Acad. 3: 304. 1856.

Northern Mexico. Texas.

Prostrate, rooting from the areoles, forming dense clusters sometimes 2 or 3 meters in diameter; joints clavate, curved, ascending, easily breaking off, 6 to 7 cm. long, 2 cm. in diameter at thickest part, strongly tuberculate; areoles 1 to 1.5 cm. apart; spines white and sheathed when young, soon brown, the larger ones sometimes as many as 12, very slender, sometimes 6 cm. long, somewhat flattened; wool white when young, turning brown; glochids white when young, turning brown, 4 mm. long or less; flowers yellow, 4 cm. long (including ovary); sepals narrow, acuminate; petals acuminate; fruit yellow, narrowly oblong, a little narrowed at base, 4 cm. long, closely set with areoles bearing numerous short spines, bristles, and white wool, the umbilicus depressed; seeds yellow, flattened, 4 mm. in diameter, notched at base.

28. *Opuntia vilis* Rose, Contr. U. S. Nat. Herb. 12: 293. 1909.

Zacatecas.

Low, creeping, often forming mats several meters in diameter and only 10 to 15 cm. high; joints prostrate, becoming erect or ascending, the ultimate vertical ones clavate, 5 cm. long, the others 2 to 4 cm. long, very turgid, pale green, with low tubercles; young areoles bearing white wool; radial spines upward of 12, the number increasing with age by the addition of very small whitish ones; central spines on prostrate joints 4, reddish, white-tipped, 1 to 4 cm. long, terete, slightly scabrous, with a sheath 5 mm. long, those of clavate joints white, reddish on the upper surface at base; flower 4 cm. long; petals brilliant purplish, 2 cm. long; fruit pale green, 2 to 2.5 cm. in diameter, 2.5 to 3 cm. long, tuberculate, especially about the margin of the umbilicus, spiny, somewhat dry, with large white seeds.

29. *Opuntia bulbispina* Engelm. Proc. Amer. Acad. 3: 304. 1856.

Coahuila and Durango; type from Perros Bravos, north of Saltillo.

Stems low, forming wide-spreading clumps 0.6 to 1.2 meters broad; joints ovoid, 2 to 2.5 cm. long, 10 to 12 mm. in diameter; tubercles prominent, 6 to 8 mm. long; radial spines 8 to 12, acicular, 3 to 6 mm. long; central spines 4, much stouter than the radials, 8 to 12 mm. long, bulbous at base; flower and fruit unknown.

30. *Opuntia grahamii* Engelm. Proc. Amer. Acad. 3: 304. 1856.

Chihuahua. Texas and New Mexico; type from El Paso.

Roots at first thick and fleshy, becoming woody, 2 cm. thick or more; plants low, much branched, spreading, forming low mounds often half buried in sand, sometimes giving off roots at the areoles; terminal joints erect, clavate, bright green, 3 to 5 cm. long, with large oblong tubercles; areoles about 3 mm. broad; wool white; spines 8 to 15, slender, slightly scabrous, terete or some of the larger ones slightly compressed, white when young, soon reddish, the longest 3.5

to 6 cm. long; glochids numerous, slender, 4 mm. long or less, white, turning brown, persistent on the old stems; flowers yellow, 5 cm. broad; fruit oblong to ovoid, 3 to 4.5 cm. long, its numerous areoles bearing white glochids and some slender spines; seeds beakless, 5 to 5.5 mm. in diameter.

31. *Opuntia pumila* Rose, Smiths. Misc. Coll. 50: 521. 1908.

Central and southern Mexico; type from Oaxaca.

Stems low, very much branched, the joints readily falling off when touched, 6 to 20 cm. long, velvety-pubescent, terete or sometimes slightly flattened, turgid, bearing more or less prominent tubercles; areoles small, those of old stems bearing several slender spines, the longer ones 3 cm. long; areoles of young joints usually bearing 2 yellowish spines; ovary pubescent, with few spines or none; petals yellow, tinged with red, 15 mm. long; fruit globular, red, 15 mm. long. "Cardo," "nopal cardoso" (Oaxaca, *Reko*); "vixivixio" (Zapotec, *Reko*).

32. *Opuntia pubescens* Wendl.; Pfeiff. Enum. Cact. 149. 1837.

Opuntia angusta Meinsh. Wochenschr. Gärt. Pflanz. 1: 30. 1858.

Opuntia leptarthra Weber; Goss. Bull. Mus. Hist. Nat. 10: 393. 1904.

Widely distributed in Mexico. Guatemala.

Plants small, usually low, sometimes 40 cm. high, much branched; joints easily becoming detached, nearly terete, glabrous or pubescent, 3 to 7 cm. long; spines numerous, short, brownish; flowers lemon-yellow but drying red; fruit 2 to 2.5 cm. long, red, a little spiny, with depressed umbilicus; seeds 3 mm. in diameter.

33. *Opuntia decumbens* Salm-Dyck, Hort. Dyck. 361. 1834.

Opuntia puberula Pfeiff. Enum. Cact. 156. 1837.

Southern Mexico. Guatemala.

Stems low, often creeping or trailing, rarely over 40 cm. high; joints 10 to 20 cm. long, oval to oblong, covered with a short soft pubescence; areoles usually small, surrounded by a purple blotch, bearing yellow glochids and wool, the wool cobweb-like on very young joints; spines often wanting, usually solitary but sometimes numerous, slender or rather stout, 4 cm. long, yellow; flowers numerous, small, including the ovary about 4 cm. long; petals dark yellow; fruit deep purple, very juicy; seeds about 4 mm. broad.

34. *Opuntia depressa* Rose, Smiths. Misc. Coll. 50: 517. 1908.

Southern Mexico; type from Tehuacán.

Low, creeping or spreading plant, sometimes 60 cm. high and forming a patch 3 to 4 meters in diameter; joints dark glossy yellowish green, pubescent when young, obovate, 20 cm. long, usually with 1 long, somewhat curved spine at each areole, sometimes with 1 to 3 shorter ones, all yellowish; old joints oblong, 30 cm. long, bearing 4 to 6 spines at each areole; flowers red; fruit small, globular, with large clusters of brown glochids, when immature with a broad deep umbilicus.

35. *Opuntia lubrica* Griffiths, Rep. Mo. Bot. Gard. 21: 169. 1910.

Type from Alonzo.

Plants low, ascending-spreading, frequently 45 cm. high; joints subcircular to obovate, 15 to 20 cm. long, glossy, bright green, papillate but scarcely pubescent; areoles 15 to 22 mm. apart, 4 to 6 mm. in diameter; spines very variable, nearly absent or abundant, usually 1 to 3, mostly about 12 mm. long but sometimes 2.5 cm., yellowish, sometimes darker at base; fruit light red, acid; seeds thin-shelled, about 3 mm. in diameter.

36. *Opuntia basilaris* Engelm. & Bigel. Proc. Amer. Acad. 3: 298. 1856.

Northern Sonora. Southwestern United States.

Stems low, growing in clumps, either prostrate or erect, sometimes 1.2 meters high; joints broadly obovate, 8 to 20 cm. long, slightly pubescent or glabrous, usually highly colored; areoles numerous, filled with white to brown wool and brownish glochids; spines none or rarely a few at upper areoles; flowers 6 to 8 cm. long, deep purple or sometimes white; fruit dry, globular to obovoid; seeds thick, 6 to 10 mm. broad.

The young fruit was eaten by the Coahuilla Indians of California after having been cooked for about 12 hours in a pit lined with hot stones. The Panamint Indians gathered the young joints in May and June, brushed off the spines with bunches of grass, and dried them in the sun. The dried joints were later boiled with salt and eaten. The tender joints were also cooked in pits lined with stones, and were eaten immediately or dried and stored for use in winter.

37. *Opuntia microdasys* (Lehm.) Pfeiff. Enum. Cact. 154. 1837.

Cactus microdasys Lehm. Ind. Sem. Hamb. 16. 1827.

Opuntia pulvinata DC. Mém. Mus. Hist. Nat. 17: 119. 1828.

Northern Mexico.

Often low and creeping but sometimes nearly erect and 40 to 60 cm. high; joints oblong to orbicular, 10 to 15 cm. long, soft-velvety, usually pale green, spineless; areoles conspicuous, closely set, filled with numerous yellow or brown glochids; flowers usually produced in abundance, 4 to 5 cm. long, pure yellow, or tinged with red; petals broad, retuse; fruit dark red, juicy, nearly globular; seeds 2 to 3 mm. broad. "Cegador" (Zacatecas); "nopal cegador" (Durango); "nopalillo cegador" (Nuevo León).

The name "cegador" ("blinding") is given because of the fact that the very numerous glochids get into the eyes of pasturing animals and sometimes cause blindness.

38. *Opuntia macrocalyx* Griffiths, Rep. Mo. Bot. Gard. 19: 268. 1908.

Described from cultivated plants; perhaps in Coahuila.

Plants ascending or erect, about 1 meter high; joints long-obovate, commonly about 22 cm. long, gray-green, pubescent; areoles 2 to 3 mm. in diameter, 1 cm. apart; wool tawny; glochids reddish brown, 1 mm. long; spines none; flowers yellow; fruit red, the pulp greenish, long-obovoid to cylindric, about 7 cm. long; seeds few, 3 mm. in diameter.

39. *Opuntia rufida* Engelm. Proc. Amer. Acad. 3: 298. 1856.

Northern Mexico. Texas.

More or less erect, 20 to 150 cm. high, with a somewhat definite trunk; joints nearly orbicular, 6 to 25 cm. in diameter, thickish, velvety-tomentose, dull grayish green; areoles large, filled with numerous brown glochids; flowers yellow to orange, 4 to 5 cm. long (including the ovary); petals obovate, 2 to 2.5 cm. long; ovary globular, 1.5 cm. in diameter, umbilicate, with large areoles; fruit bright red. "Nopal cegador" (*Ochoterena*).

40. *Opuntia pycnantha* Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 423. 1896.

Baja California; type from Magdalena Bay.

Often low and creeping but sometimes forming a clump 20 cm. high; joints oblong to orbicular, often 20 cm. long, puberulent or papillose, usually nearly hidden by the thick mass of spines; areoles large and closely set, the upper part filled with yellow or brown glochids and the lower part with 8 to 12 yellow or brown, reflexed spines 2 to 3 cm. long; fruit 4 cm. long, very spiny; seeds 2 cm. broad, very thick.

41. *Opuntia comonduensis* (Coulter) Britt. & Rose, Smiths. Misc. Coll. 50: 519. 1908.

Opuntia angustata comonduensis Coulter, Contr. U. S. Nat. Herb. 3: 425. 1896. Baja California; type from Comondú.

Low spreading plants, sometimes 20 cm. high and forming broad clumps; joints obovate to orbicular, 12 to 15 cm. long, softly pubescent; areoles large, filled with brown wool and yellow glochids; lower areoles spineless, the upper ones bearing 1 or 2, rarely 3, or on old stems as many as 10, slender spines, 3 to 5 cm. long or longer, yellow; flowers (including ovary) 6 cm. long, yellow; fruit purple, 4 cm. long, spineless; seeds 4 to 4.5 mm. broad, thick.

42. *Opuntia megarhiza* Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.

San Luis Potosí; type from Álvarez.

Roots long and thickened, sometimes 30 to 60 cm. long and 5 to 6 cm. in diameter; stems 20 to 30 cm. high, much branched; lower joints elongate, 20 to 30 cm. long, cuneate below, thin, 3 cm. broad; lateral joints appearing along the margins of the older joints and often, if not always, in the same plane; spines 2 to 4, acicular, 1 to 2.5 cm. long, brown; flowers lemon-yellow, often tinged with rose, 5 cm. broad; petals about 13, obovate, mucronately tipped; ovary clavate, 3 cm. long.

Palmer reports that the fleshy roots are applied as poultices for the reduction of fractures and inflammation.

43. *Opuntia pottsii* Salm-Dyck, Cact. Hort. Dyck. 1849. 236. 1850.

Chihuahua. Texas and New Mexico.

Low spreading plant, 30 cm. high or less, from thickened tuberous roots 2 to 3 cm. in diameter, these sometimes moniliform; joints broadly obovate, 3.5 to 12 cm. long, pale green to bluish; areoles few, either small or large; spines confined to the upper and marginal areoles, 1 or 2, slender, 2 to 4 cm. long, usually white but sometimes purplish; glochids yellow, usually few but sometimes abundant; flowers 6 to 7 cm. broad, deep purple; ovary slender, 3 to 3.5 cm. long, with only a few scattered areoles; fruit spineless.

44. *Opuntia setispina* Engelm.; Salm-Dyck, Cact. Hort. Dyck. 1849. 239. 1850.

Chihuahua; type from mountains west of Chihuahua.

Stems branching and spreading, sometimes forming clumps a meter broad, erect and 60 cm. high; joints deep bluish green, somewhat glaucous, often purplish at the areoles, obovate to orbicular, 5 to 15 cm. in diameter; spines 1 to 6 from an areole, white, 2 to 3 cm. long; glochids yellow, very conspicuous on old joints; flowers yellow; fruit purplish, about 4 cm. long.

45. *Opuntia tenuispina* Engelm. Proc. Amer. 3: 294. 1856.

Opuntia minor C. Muell. Ann. Bot. Syst. Walp. 5: 50. 1858.

Northern Mexico. Western Texas to Arizona; type from El Paso.

Low and spreading but becoming 30 cm. high; joints obovate, attenuate at base, 7 to 15 cm. long, light green; spines 1 to 3 from an areole, slender, usually white but sometimes brownish, 3 to 5 cm. long, the upper spines erect or spreading; glochids brown; flowers yellow, 6 to 7.5 cm. broad; ovary with numerous areoles filled with brown wool and brown glochids; fruit oblong, 2.5 to 4 cm. long; seeds 4 mm. broad or less, very irregular.

46. *Opuntia macrocentra* Engelm. Proc. Amer. Acad. 3: 292. 1856.

Chihuahua. Arizona to western Texas.

Somewhat bushy, with ascending branches, 60 to 90 cm. high; joints orbicular to oblong, or sometimes broader than long, 10 to 20 cm. long, often bluish or

purplish, sometimes spineless but usually bearing spines at the uppermost areoles; spines 1 or 2, rarely 3, usually brownish or black but sometimes white above, slender, erect or porrect, 4 to 7 cm. long; flowers yellow, often drying red, 7.5 cm. broad; sepals ovate, acuminate; ovary with few areoles, these bearing brown glochids; fruit 3 to 6 cm. long, purple; seeds 4 to 4.5 mm. broad.

47. *Opuntia gosseliniana* Weber, Bull. Soc. Acclim. France 49: 83. 1902.

Sonora and Baja California.

One meter high or more, branching from the base, the old trunk often bearing numerous long acicular spines; joints mostly red or purplish, usually very thin, as broad as long or broader, sometimes 20 cm. broad; lower and sometimes all the areoles without spines; spines porrect or nearly so, generally 1, sometimes 2, rarely 3 from an areole, 4 to 5 or even 10 cm. long, brown, usually weak; glochids brown, numerous, forming on old joints very large clusters; fruit 4 cm. long, without spines but bearing numerous brown glochids at the areoles, with a depressed umbilicus.

48. *Opuntia azurea* Rose, Contr. U. S. Nat. Herb. 12: 291. 1909.

Zacatecas and probably Durango.

Compact, upright with a single trunk or branching from the base and more or less spreading; joints orbicular to obovate, 10 to 15 cm. in diameter, pale bluish green, glaucous; areoles about 2 cm. apart, the lower ones spineless, the upper ones with 1 to 3 rather stout spines; spines, at least when old, almost black, unequal, the longer ones 2 to 3 cm. long, more or less reflexed; glochids numerous, brown; petals 3 cm. long, deep yellow, with crimson claw, but in age pink throughout; fruit dull crimson, subglobose to ovoid, spineless, truncate, juicy, edible. "Coyotillo," "nopalillo," "nopal coyotillo" (*Patoni*).

49. *Opuntia phaeacantha* Engelm. in A. Gray, Mem. Amer. Acad. 4: 52. 1849.

Opuntia chihuahuensis Rose, Contr. U. S. Nat. Herb. 12: 291. 1909.

Chihuahua. Arizona to western Texas; type from Santa Fe, New Mexico.

Low, usually prostrate, with some branches ascending; joints usually longer than broad, 10 to 15 cm. long; areoles rather remote, the lower ones often spineless; spines 1 to 4, those on the sides of the joints more or less reflexed, somewhat flattened, usually rather stout, brown, sometimes darker at base, often nearly white throughout, the longer ones 5 to 6 cm. long; glochids numerous, yellow to brown; flowers 5 cm. broad, yellow; ovary short; fruit 3 to 3.5 cm. long, much contracted at base.

50. *Opuntia occidentalis* Engelm. & Bigel. Proc. Amer. Acad. 3: 291. 1856.

Northern Baja California and on the adjacent islands. Southern California.

Erect or spreading, often 1 meter high or more, forming large thickets; joints obovate to oblong, 20 to 30 cm. long; areoles remote; spines 2 to 7, stout, unequal, the longest 4 to 5 cm. long, more or less flattened, brown or nearly white, sometimes wanting; shorter spines often white; glochids often prominent, brown; flowers yellow, often 10 to 11 cm. long; fruit large, purple.

51. *Opuntia engelmannii* Salm-Dyck; Engelm. Bost. Journ. Nat. Hist. 6: 207. 1850.

Chihuahua, Durango, and Sonora; type from Chihuahua. Texas to Arizona.

Originally described as erect and up to 2 meters high but more properly a widely spreading bush, usually without a definite trunk; joints oblong to orbicular, 20 to 30 cm. long, thick, pale green; areoles distant, becoming large and bulging; spines usually more or less white, with dark red or brownish bases and sometimes with black tips, usually 3 or 4, sometimes only 1, or entirely wanting from the lower areoles, but on old joints 10 or more, usually somewhat

porrect or a little spreading, but never reflexed, the larger ones much flattened, the longest 5 cm. long; glochids numerous, brown with yellowish tips; flowers large, yellow; fruit 3.5 to 4 cm. long, red; seeds 3 to 4 mm. broad.

52. *Opuntia discata* Griffiths, Rep. Mo. Bot. Gard. 19: 266. 1908.

Northern Sonora. Arizona, the type from the Santa Rita Mountains.

Plants bushy, spreading, sometimes 1.5 meters high; joints thick, orbicular to broadly obovate, 25 cm. in diameter or less, pale bluish green, somewhat glaucous; areoles rather few, distant, in age becoming very large, filled with short brown wool; spines usually 2 to 4, sometimes 7 or more in old areoles, 2 cm. long or more, grayish with dark bases, somewhat flattened; flowers 9 to 10 cm. broad, light yellow, darker near the center; fruit magenta, pyriform, 6 to 7 cm. long.

53. *Opuntia rastrera* Weber, Dict. Hort. Bois 896. 1898.

?*Opuntia lucens* Griffiths, Rep. Mo. Bot. Gard. 19: 269. 1908.

San Luis Potosí.

Creeping plant; joints circular to obovate, the largest 20 cm. in diameter; spines white, several from an areole, the longest 4 cm. long; glochids yellow; flowers yellow; fruit purple, acid, obovoid. "Cuija."

54. *Opuntia fuliginosa* Griffiths, Rep. Mo. Bot. Gard. 19: 262. 1908.

Jalisco; type from Guadalajara.

Tall, treelike, 4 meters high or more, much branched; joints orbicular to oblong, 30 cm. long or less, shining; areoles distant; spines few, rarely as many as 6, dull brown or horn-colored, the longest 4 cm. long, slightly twisted; glochids yellow to brown; flowers at first yellow but in age red, 5 to 6 cm. long (including the ovary); fruit pyriform to short-oblong, 3 to 4 cm. long, red; seeds 5 mm. broad.

55. *Opuntia scheeri* Weber, Dict. Hort. Bois 895. 1898.

Mexico.

About 1 meter high, branching at base, the lower branches sprawling over the ground; joints oblong to orbicular, 15 to 30 cm. long, bluish green; areoles circular, elevated, filled with short brown wool; spines 10 to 12, yellow, acicular, each surrounded by a row of long, white or yellow hairs; flowers large, pale yellow, in age salmon-colored; fruit globular, red, juicy, truncate; seeds 4 mm. broad, with a broad irregular margin.

56. *Opuntia chlorotica* Engelm. & Bigel. Proc. Amer. Acad. 3: 291. 1856.

Sonora and Baja California. New Mexico to California.

Erect-bushy, sometimes 2 meters high or more, with a definite trunk; main branches nearly erect; joints ovate to orbicular, sometimes broader than long, 15 to 20 cm. long, more or less glaucous, bluish green; areoles closely set, prominent; spines yellow, several, most of them usually appressed and reflexed, setaceous, 3 to 4 cm. long; glochids yellow, numerous, elongate, persistent; flowers yellow, 6 to 7.5 cm. broad; fruit purple without, green within, 4 cm. long; seeds small.

57. *Opuntia dillenii* (Gawler) Haw. Suppl. Pl. Succ. 79. 1819.

Cactus dilleni Gawler in Edwards, Bot. Reg. 3: pl. 255. 1818.

Eastern coast of Mexico. West Indies and southeastern United States.

Low spreading bushes growing in broad clumps and often forming dense thickets, or tall and much branched, 2 to 3 meters high, sometimes with definite terete trunks; joints obovate to oblong, 7 to 40 cm. long, bluish green, somewhat glaucous, but bright green when young, the areoles somewhat elevated;

areoles often large, filled with short brown or white wool when young, usually few and remote, on old joints 10 to 12 mm. in diameter; spines often 10 from an areole on first-year joints, very variable, usually more or less flattened and curved, sometimes terete and straight, yellow, more or less brown-banded or mottled, often brownish in age, sometimes 7 cm. long but usually shorter, sometimes few or none; glochids numerous, yellow; wool in areoles short, sometimes brown, sometimes white; flowers in the typical form lemon-yellow, in some forms red from the first, 7 to 8 cm. long; fruit pear-shaped to subglobose, narrowed at base, 5 to 7.5 cm. long, purplish, spineless, juicy.

58. *Opuntia taponia* Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 423. 1896.

Baja California; type collected near Loreto.

Low spreading plants, rarely over 60 cm. high; joints glabrous, orbicular to obovate, 20 to 25 cm. in diameter, turgid, pale green; spines 2 to 4, yellow, one much longer, 5 to 7 cm. long, slender, porrect or sometimes curved downward; glochids brownish; fruit 4 to 6 cm. long, clavate, dark purple without, red within, spineless. "Tuna taponia."

59. *Opuntia lindheimeri* Engelm. Bost. Journ. Nat. Hist. 6: 207. 1850.

Opuntia squarrosa Griffiths, Bull. Torrey Club 43: 91. 1916.

Tamaulipas. Texas and Louisiana; type from New Braunfels, Texas.

Usually erect, 2 to 4 meters high, with a more or less definite trunk, but at times much lower and spreading; joints green or bluish green, somewhat glaucous, orbicular to obovate, up to 25 cm. long; areoles distant, often 6 cm. apart; spines usually 1 to 6, often only 2, one porrect and 4 cm. long or more, the others somewhat shorter and only slightly spreading, pale yellow to nearly white, sometimes brownish or blackish at base, or some plants spineless; glochids yellow or sometimes brownish; petals yellow to dark red; fruit purple, pyriform to oblong, 3.5 to 5.5 cm. long. "Nopal," "nopal azul," "cacanapa" (Texas).

60. *Opuntia cantabrigiensis* Lynch, Gard. Chron. III. 33: 98. 1903.

Opuntia engelmannii cuija Griffiths & Hare, N. Mex. Agr. Expt. Sta. Bull. 60: 44. 1906.

Opuntia cuija Britt. & Rose, Smiths. Misc. Coll. 50: 529. 1908.

San Luis Potosí, Querétaro, and Hidalgo.

Rounded bushy plant, 1 to 2 meters high; joints orbicular to obovate, 12 to 20 cm. long, rather pale bluish green, areoles remote, large, filled with brown wool; spines usually 3 to 6 but sometimes more, somewhat spreading, acicular, yellow with brown or reddish bases, 1.5 to 4 cm. long; glochids numerous, 1 cm. long or more, yellowish, not forming a brush; flowers 5 to 6 cm. long, yellowish with reddish center; upper areoles on the ovary bearing long bristles; fruit globular, about 4 cm. in diameter, purple; seeds numerous, 4 mm. in diameter. "Cuija" (San Luis Potosí).

61. *Opuntia pyriformis* Rose, Contr. U. S. Nat. Herb. 12: 292. 1909.

Zacatecas, the type from Hacienda de Cedros.

Plants 3 to 5 meters high, with widely spreading branches, the lower ones almost resting on the ground and 3 to 5 meters long; joints obovate, thick, 18 cm. long or more; areoles closely set, small; spines 1 or 2, on old joints more, usually reflexed, slender, weak, yellow, 10 to 22 mm. long; flowers yellow; fruit 4 cm. long, somewhat tuberculate, spineless, its large areoles crowded with brown hairs forming hemispheric cushions.

62. *Opuntia durangensis* Britt. & Rose, Smiths. Misc. Coll. 50: 518. 1908.
Durango.

Joints broadly obovate, about 20 cm. long, 16 cm. broad, pale green, glabrous or minutely puberulent, bearing numerous areoles, these 1 to 2 cm. apart, elevated; spines 3 to 5 at an areole, short, 1.5 cm. long or less, pungent, spreading, yellow but in age becoming darker; glochids brown, 2 to 3 mm. long; flowers yellow, 5 cm. long; petals broad, apiculate; ovary 3 to 4 cm. long, finely pubescent, bearing many areoles with numerous glochids and a few spines; fruit white or red; seeds about 3 mm. broad.

63. *Opuntia atropes* Rose, Smiths. Misc. Coll. 50: 518. 1908.
Morelos, the type from Yautepec.

Plants 1 to 3 meters high, much branched; joints oblong to obovate, 20 to 30 cm. long, deep green, softly pubescent; young joints somewhat glossy; areoles circular, filled with short tawny wool; young spines white or yellowish; old spines 3 to 6 cm. long, somewhat angled, standing almost at right angles to the joints, dark yellow or brown at the base, much lighter and often white above; glochids numerous, long, yellow; petals reddish; ovary pubescent, covered with large cushion-like areoles bearing long glochids near the top but with few spines or none, truncate at apex.

64. *Opuntia affinis* Griffiths, Proc. Biol. Soc. Washington 27: 27. 1914.
Oaxaca.

Arborescent, sometimes 2 meters high or more; joints obovate, 35 cm. long, broadly rounded above and gradually narrowed below, densely silky; areoles obovate, 3 mm. long, 3 cm. apart; glochids light straw-colored, 3 mm. long; spines 1 to 5 in the upper areoles, straw-colored, becoming white, the longest 3 cm. long, divergent, flattened, angular, twisted; flowers dull dark red in bud, about 3 cm. in diameter; petals 2 to 2.5 cm. long; ovary subglobose, deeply pitted, 15 to 17 mm. in diameter, with small brown areoles 4 mm. apart; fruit subglobose, small, red.

65. *Opuntia macdougaliana* Rose, Smiths. Misc. Coll. 50: 516. 1908.

Opuntia micrarthra Griffiths, Monatsschr. Kakteenk. 23: 130. 1913.

Southern Mexico, the type from Tehuacán, Puebla.

Plants about 4 meters high, with a distinct cylindric trunk branching from near the base; joints oblong, 30 cm. long by 8 to 10 cm. broad, softly pubescent; areoles distinct, small; spines generally 4, one much longer (2.5 to 4 cm. long), somewhat flattened, yellowish, becoming whitish in age; glochids short, numerous, yellow; fruit globular to oblong, 5 cm. long, the surface divided into diamond-shaped plates, red, with a broad deep cup at apex, the numerous small rounded areoles filled with clumps of yellow glochids, very rarely with one or two spines.

66. *Opuntia velutina* Weber; Goss. Bull. Mus. Hist. Nat. 10: 389. 1904.

Opuntia nelsonii Rose, Smiths. Misc. Coll. 50: 516. 1908.

Southern Mexico; type from Guerrero.

Stems 1 to 4 meters high; joints flattened, oblong to obovate, 15 to 20 cm. long, 10 to 15 cm. broad near the top, pubescent, pale, yellowish green in herbarium specimens; areoles 2 to 3 cm. apart; spines 2 to 6, yellow, becoming white in age, very unequal, the longer ones 3 to 4 cm. long; bristles many, yellow, becoming brownish; flowers rather small; petals yellow, 1 to 3 cm. long; ovary pubescent, bearing many yellowish brown bristles; filaments red; fruit "dark red."

67. *Opuntia wilcoxii* Britt. & Rose, Cactaceae 1: 172. 1919.

Sonora and Sinaloa; type from Fuerte, Sinaloa.

Tall, bushy, 1 to 2 meters high, very much branched; joints oblong, thinnish, 20 cm. long, dark green, more or less purplish about the large areoles, finely puberulent; glochids numerous, long, yellow; spines 1 to 3, one very long (5 to 6 cm.), porrect, white or somewhat yellowish; flowers 6 cm. long, yellow; ovary bearing a few large areoles, these filled with brown wool and yellow glochids; fruit pubescent, 4 cm. long.

68. *Opuntia tomentosa* Salm-Dyck, Obs. Bot. 3: 8. 1822.

Cactus tomentosus Link, Enum. Hort. Berol. 2: 24. 1822.

Opuntia oblongata Wendl.; Pfeiff. Enum. Cact. 161. 1837.

Opuntia icterica Griffiths, Monatsschr. Kakteenk. 23: 138. 1913.

Central Mexico; escaped from cultivation in Australia.

Becoming 3 to 6 meters high or more, with a broad top and a smooth trunk 10 to 30 cm. in diameter; joints oblong to narrowly obovate, 10 to 20 cm. long, velvety-pubescent, somewhat tuberculate when young; glochids yellow; spines usually wanting but sometimes 1 or more; flowers orange, 4 to 5 cm. long; fruit ovoid, red, sweetish; seeds 4 mm. broad.

69. *Opuntia guilanchi* Griffiths, Rep. Mo. Bot. Gard. 19: 265. 1908.

Zacatecas.

Becoming 1.5 to 2 meters high, often with a distinct trunk 1.5 to 2.5 cm. in diameter; joints broadly obovate, 14 to 16 cm. wide, 20 to 24 cm. long, minutely pubescent; spines at first white, slightly flattened, the longest 2 cm. long; glochids light yellow; fruit subglobose, 4 cm. in diameter, pubescent, variously colored, aromatic. "Nopal guilanchi."

70. *Opuntia leucotricha* DC. Mém. Mus. Hist. Nat. 17: 119. 1828.

Opuntia fulvispina Salm-Dyck; Pfeiff. Enum. Cact. 164. 1837.

Central Mexico.

Often 3 to 5 meters high, with a large top; trunk as well as the older joints covered with long white bristles; joints oblong to orbicular, 1 to 2 cm. long, pubescent; areoles closely set, the upper part filled with yellow glochids, the lower part at first with only 1 to 3 weak white spines; flowers (including ovary) 4 to 5 cm. long; petals yellow, broad; ovary with numerous areoles, the upper ones bearing long bristly glochids (1 cm. long); fruit variable, 4 to 6 cm. long, white or red, the rind not easily coming off from the pulp, aromatic, edible. "Nopal duraznillo" (Durango); "tuna duraznillo" (Zacatecas); "duraznillo," "duraznillo blanco," "duraznillo colorado."

The following are probably synonymous with this species: *Opuntia leucosticta* Wendl. (Pfeiff. Enum. Cact. 167. 1837); *O. leucacantha* Link & Otto (Salm-Dyck, Hort. Dyck. 362. 1834).

71. *Opuntia orbiculata* Salm-Dyck; Pfeiff. Enum. Cact. 156. 1837.

Opuntia crinifera Salm-Dyck; Pfeiff. Enum. Cact. 157. 1837.

Opuntia lanigera Salm-Dyck, Cact. Hort. Dyck. 1849. 65. 1850.

Northern Mexico.

Plants without a very definite trunk, about 1 meter high, often broader than high; joints green or bluish green, orbicular to obovate, sometimes spatulate, about 15 cm. long; areoles small, in seedlings and young plants producing long white hairs or long-persistent wool; spines acicular, several, yellow; flowers yellow.

72. *Opuntia pilifera* Weber, Dict. Hort. Bois 894. 1898.

Puebla.

Becoming 4 to 5 meters high, with a definite thick woody cylindric trunk and a broad rounded top; joints oblong to orbicular, 10 to 30 cm. long, obtuse at apex, pale green; areoles 2 to 3 cm. apart, scarcely elevated; spines 2 to 9, white, slightly spreading, acicular, the outer part of the areole filled with nearly white, more or less deciduous hairs 2 to 3 cm. long; flowers large, red; areoles on the ovary bearing brown glochids and deciduous hairs, the latter especially abundant toward the top of the ovary; fruit red, juicy.

73. *Opuntia ficus-indica* (L.) Mill. Gard. Dict. ed. 8. *Opuntia* No. 2. 1768.

Cactus ficus-indica L. Sp. Pl. 468. 1753.

Central Mexico, widely cultivated. Generally planted in tropical regions.

Large and bushy or sometimes erect and treelike and then with a definite woody trunk, up to 5 meters high, usually with a large top; joints oblong to spatulate-oblong, usually 30 to 50 cm. long, sometimes even larger; areoles small, usually spineless; glochids yellow, numerous, soon dropping off; flowers normally bright yellow, 7 to 10 cm. broad; ovary 5 cm. long; fruit normally red, edible, 5 to 9 cm. long, with a low depressed umbilicus. "Nopal de Castilla," "tuna de Castilla," "nochtli."

74. *Opuntia crassa* Haw. Suppl. Pl. Succ. 81. 1819.

Widely cultivated in Mexico.

Plants 1 to 2 meters high, somewhat branched; joints ovate to oblong, 8 to 12.5 cm. long, thick, bluish green, glaucous; areoles bearing brown wool and brown glochids; spines wanting or sometimes 1 or 2, acicular, 2.5 cm. long or less; flowers and fruit unknown.

75. *Opuntia undulata* Griffiths, Rep. Mo. Bot. Gard. 22: 32. 1912.

Opuntia undosa Griffiths, Monatsschr. Kakteenk. 23: 139. 1913.

Widely cultivated in Mexico; type from Aguascalientes.

Plants tall, large, open-branched, with trunk often 30 cm. or more in diameter; joints very large, obovate, about 55 cm. long, glossy light yellowish green at first; areoles subcircular to obovate, 4.5 mm. long, 5 to 6 cm. apart; glochids yellow, 1 mm. long; spines white, few, erect, flattened, straight or twisted, 1 to 1.5 cm. long; fruit 9 to 10 cm. long, dull red.

76. *Opuntia spinulifera* Salm-Dyck, Hort. Dyck. 364. 1834.

Opuntia candelabrifformis Mart.; Pfeiff. Enum. Cact. 159. 1837.

Opuntia oligacantha Salm-Dyck, Cact. Hort. Dyck. 1849. 241. 1850.

Mexico.

Tall much-branched plant; joints orbicular to oblong, sometimes obovate, 20 to 30 cm. long, glabrous, a little glaucous; leaves small, red, 4 to 6 mm. long; areoles on young joints usually small, sometimes longer than broad, the margin at first bordered with cobwebby hairs, afterwards with short white hairs, either spineless or with short white bristle-like spines; areoles on old joints more or less sunken, rather close together; spines on old joints 1 to 3, 1 to 2 cm. long, subulate, bone-colored.

77. *Opuntia lasiacantha* Pfeiff. Enum. Cact. 160. 1837.

Central Mexico.

A tall plant, with a more or less definite trunk; joints obovate to oblong, 20 to 30 cm. long; areoles small, 2 to 3 cm. apart; spines usually 1 to 3, acicular, white, 2 to 4 cm. long, slightly spreading; glochids numerous, prominent, dirty yellow to brown; flowers yellow or deep orange, 6 to 8 cm. broad;

ovary bearing long brown deciduous bristles, especially from the upper areoles.

Opuntia chaetocarpa Griffiths¹ is perhaps the same species. *O. zacuapanensis* Berger² is closely related.

78. *Opuntia hyptiacantha* Weber, Dict. Hort. Bois 894. 1898.

Opuntia nigrita Griffiths, Rep. Mo. Bot. Gard. 21: 169. 1910.

?*Opuntia cretochaeta* Griffiths, Proc. Biol. Soc. Washington 29: 11. 1916.

Oaxaca.

A tall much-branched plant; joints oblong to obovate, 20 to 30 cm. long, pale green, but when young bright green; spines on young joints single, porrect, and accompanied by 2 or 3, sometimes many, white, slightly pungent hairs; spines on old joints 4 to 6, somewhat spreading or appressed, 1 to 2 cm. long; glochids few, brownish; areoles small, 1.5 cm. apart; leaves small, brownish; flowers red; fruit globular, yellowish, its areoles filled with long weak glochids; umbilicus broad, only slightly depressed.

Opuntia chavena Griffiths³ is perhaps the same species. It is said to be known in Aguascalientes as "nopal cadillo," "nopal chaveño," and "nopal cascarón."

79. *Opuntia streptacantha* Lem. Cact. Hort. Monv. 62. 1839.

San Luis Potosí and elsewhere in central Mexico.

Much branched, up to 5 meters high, sometimes with a trunk 45 cm. in diameter; joints obovate to orbicular, 25 to 30 cm. long, dark green; areoles small, rather close together for this group; spines numerous, spreading or some of them appressed, white; glochids reddish brown, very short; flowers 7 to 9 cm. broad, yellow to orange, the sepals reddish; fruit globular, 5 cm. in diameter, dull red or sometimes yellow within and without. "Tuna cardona," "nopal cardón."

This is one of the most important economic *Opuntias* of Mexico. It has sometimes been reported as *O. cardona*, a name which has never been properly published.

Opuntia pachona Griffiths⁴ is closely related and perhaps only a form of this species.

80. *Opuntia amyclaea* Ten. Fl. Neap. Prodr. App. 5: 15. 1826.

Doubtless native of Mexico, but not known in the wild state.

Erect; joints oblong to elliptic, 30 to 40 cm. long, about twice as long as broad, thick, dull green, a little glaucous; areoles small, with 1 or 2 short bristles from the lower parts of areoles; spines 1 to 4, stiff, nearly porrect, usually less than 3 cm. long, white or horn-colored, the stoutest angled; glochids brown, soon disappearing; flowers yellow; fruit yellowish red, not very juicy.

81. *Opuntia megacantha* Salm-Dyck, Hort. Dyck. 363. 1834.

Opuntia castillae Griffiths, Rep. Mo. Bot. Gard. 19: 261. 1908.

?*Opuntia incarnadilla* Griffiths, Rep. Mo. Bot. Gard. 22: 27. 1912.

Much cultivated in Mexico.

Plants tall, 4 to 5 meters high or more, with a more or less definite woody trunk; joints of large plants obovate to oblong, often oblique, sometimes 40 to 60 cm. long or more, pale dull green, slightly glaucous; areoles rather small, on

¹ Proc. Biol. Soc. Washington 27: 25. 1914.

² Hort. Mortol. 413. 1912.

³ Rep. Mo. Bot. Gard. 19: 264. pl. 23. 1908

⁴ Rep. Mo. Bot. Gard. 21: 168. pl. 22. 1910

large joints often 4 to 5 cm. apart, when young bearing brown wool; spines white, usually 1 to 5, slightly spreading, sometimes nearly porrect, usually only 2 to 3 cm. long, sometimes few and confined to the upper areoles; glochids few, yellow, caducous, sometimes appearing again on old joints; flowers yellow to orange, about 8 cm. broad; ovary spiny or spineless, obovoid; fruit 7 to 8 cm. long. "Nopal de Castilla."

This is the species from which the best edible tunas are obtained. Many of the varieties have local names.

Opuntia tribuloides Griffiths¹ is a closely related form.

82. *Opuntia robusta* Wendl.; Pfeiff. Enum. Cact. 165. 1837.

Opuntia flavicans Lem. Hort. Monv. 61. 1839.

Opuntia larreyi Weber; Coulter, Contr. U. S. Nat. Herb. 3: 423. 1896.

Opuntia gorda Griffiths, Monatsschr. Kakteenk. 23: 134. 1913.

Central Mexico.

Often erect, sometimes 5 meters high, usually much branched; joints orbicular to oblong, 20 to 25 cm. long, 10 to 12.5 cm. broad, very thick, bluish green, glaucous; spines 8 to 12, stout, very diverse, brown or yellowish at base, white above, up to 5 cm. long; flowers 5 cm. broad, yellow; fruit globular to ellipsoid, at first more or less tuberculate, deep red, 7 to 9 cm. long. "Tuna tapona," "tuna camuesa."

Opuntia albicans Salm-Dyck² is said by Berger to be closely related to this species. *O. megalarthra* Rose,³ known in Zacatecas as "rastrero," is closely related; also *O. cochineria* Griffiths,⁴ which is called "cochineria" in the same state.

83. *Opuntia guerrana* Griffiths, Rep. Mo. Bot. Gard. 19: 266. 1908.

Hidalgo, the type from Dublán.

Plants 90 to 120 cm. high, with an open branching top; joints oblong to orbicular, 15 to 25 cm. long, thick, glaucous; areoles 5 mm. in diameter, filled with tawny wool; spines white to yellow, 1 to 6, flattened, twisted; petals yellow; fruit globose, greenish white, 4 to 5 cm. in diameter. "Nopal tapón."

84. *Opuntia stenopetala* Engelm. Proc. Amer. Acad. 3: 289. 1856.

Coahuila to Querétaro and Hidalgo; type from Buena Vista, Coahuila.

Low bushy plant, often forming thickets, the main branches procumbent and resting on the edges of the joints; joints obovate to orbicular, 10 to 20 cm. long, grayish green, but often more or less purplish, very spiny; areoles often remote, 1 to 3 cm. apart, the lower ones often without spines, bearing white wool when young; spines usually reddish brown to black, but sometimes becoming pale, usually 2 to 4, the longest 5 cm. long, the larger ones somewhat flattened; glochids very abundant on young joints, brown; flowers dioecious, including the ovary only 3 cm. long; petals orange-red, very narrow, 10 to 12 mm. long, with long acuminate tips; ovary leafy, the upper leaves similar to the sepals; fruit globular, 3 cm. in diameter, acid, naked or spiny; seeds smooth, 3 mm. in diameter, with broad rounded margins. "Nopal lasarón" (San Luis Potosí); "nopal colorado" (Zacatecas).

¹ Monatsschr. Kakteenk. 23: 137. 1913.

² Hort. Dyck. 361. 1834.

³ Smiths. Misc. Coll. 50: 529. 1908.

⁴ Rep. Mo. Bot. Gard. 19: 263. pl. 26. 1908.

85. *Opuntia glaucescens* Salm-Dyck, Hort. Dyck. 362. 1834.

Mexico.

Probably erect; joints erect, oblong-obovate, 12 to 15 cm. long, 5 cm. broad, sometimes narrowed at both ends, pale green, glaucous, usually purplish around the areoles; areoles filled with gray wool; spines 1 to 4, elongate, acicular, white, 2.5 cm. long; glochids brownish to rose-colored.

86. *Opuntia grandis* Pfeiff. Enum. Cact. 155. 1837.

Mexico, but localities not known.

More or less erect, 60 cm. high or more; joints oblong, 12 to 18 cm. long, erect, when young reddish, glaucous; spines few, white; flowers small, a little open, 2 cm. broad; petals few, narrowly lanceolate, 12 mm. long.

87. *Opuntia chaffeyi* Britt. & Rose, Contr. U. S. Nat. Herb. 16: 241. 1913.

Zacatecas, the type from Hacienda de Cedros, near Mazapil.

Perennial by a large fleshy deep-seated root or rootstock often 35 cm. long by 4 cm. in diameter; stems normally annual, 5 to 15 cm. long, much branched, often weak and prostrate; joints elongate, 3 to 5 cm. long, 6 to 7 mm. broad, slightly flattened, glabrous, pale bluish green or sometimes purplish; areoles small, circular, with white wool in the lower parts and brown wool in the upper parts; spines 1, rarely 2 or 3, acicular, 2 to 3 cm. long, whitish or pale yellow; glochids numerous, pale yellow; flower 6 cm. broad; petals 7 to 9, pale lemon-yellow, but slightly pinkish on the outside; ovary deeply umbilicate, somewhat club-shaped, 4 to 5 cm. long, bearing flattened tubercles and large areoles filled with white wool; upper areoles on ovary bearing also white bristly spines; ovules numerous, borne in the upper third of the ovary.

5. *GRUSONIA* F. Reichenb.; Schum. Monatsschr. Kakteenk. 6: 177. 1896.

A single species is known.

1. *Grusonia bradtiana* (Coulter) Britt. & Rose, Cactaceae 1: 215. 1919.

Cereus bradtianus Coulter, Contr. U. S. Nat. Herb. 3: 406. 1896.

Grusonia cereiformis F. Reichenb.; Schum. Monatsschr. Kakteenk. 6: 177. 1896.

Opuntia bradtiana K. Brandeg. Erythea 5: 121. 1897.

Coahuila.

Forming dense, often impenetrable thickets 2 meters high or less, very spiny; stems light green, 4 to 7 cm. thick, with 8 to 10 low, longitudinal, somewhat tuberculate ribs; areoles 1 to 1.5 cm. apart, 3 to 5 mm. in diameter; leaves linear, fleshy, green, 8 mm. long, early deciduous; spines 15 to 25, yellowish brown when young, soon becoming white, acicular, terete or slightly compressed, 1 to 3 cm. long, not sheathed, some of the longer ones reflexed; wool white, turning brown, early disappearing; corolla rotate, opening in bright sunlight, 3 to 4 cm. broad; sepals ovate, acute, fleshy; petals bright yellow, spatulate, fringed; filaments brownish yellow; areoles of the ovary with long weak yellow spines, white wool, and yellow glochids; berry (according to Schumann) ellipsoid, deeply umbilicate. "Organillo" (*Patoni*).

6. *CEPHALOCEREUS* Pfeiff. Allg. Gartenz. 6: 142. 1838.

Elongate cacti, various in habit, mostly columnar and erect, sometimes much branched with a short trunk or in one species with spreading and procumbent branches; in some species the flowering areoles develop an abundance of wool which confluent forms a dense mass called a pseudocephalium either at the top or on one side near the top; in others long wool or hairs grow from the

areoles but a pseudocephalium is not formed; in others the flowers are produced in a circle at the top and the bristles and fruit afterwards form a collar at the base of the new growth; in other species neither wool nor hairs are produced in the flowering areoles; flowers nocturnal, short-campanulate to short-funnelform or pyriform, straight or curved; perianth persisting on the ripening fruit, except in one species; fruit usually depressed-globose, sometimes oblong; seeds black, smooth or tuberculate.

Numerous additional species occur in tropical and subtropical America.

Flowering areoles confluent, forming a pseudocephalium.

Pseudocephalium lateral.

Plant cylindric, the top rounded; bristles of the pseudocephalium twice as long as the wool-----1. *C. senilis*.

Plant tapering to the apex; bristles of the pseudocephalium little longer than the wool-----2. *C. hoppenstedtii*.

Pseudocephalium terminal-----3. *C. macrocephalus*.

Flowering areoles not confluent, not forming a pseudocephalium.

Ribs 15 to 18; flowers red-----4. *C. polylophus*.

Ribs 4 to 13; flowers mostly whitish to purplish.

Flowering areoles without wool or wool very short-----5. *C. scoparius*.

Flowering areoles definitely long-woolly.

Ribs only 5 to 6 mm. high-----13. *C. purpusii*.

Ribs 8 mm. high or higher.

Plants light or dark green-----6. *C. gaumeri*.

Plants, at least young joints, blue or bluish green, glaucous.

Young spines yellow-----7. *C. chrysacanthus*.

Young spines brown or nearly black.

Ribs 9 to 12.

Wool short, 2 cm. long-----8. *C. cometes*.

Wool 10 cm. long-----9. *C. leucocephalus*.

Ribs 7 to 9.

Flowers rose-red-----10. *C. sartorianus*.

Flowers brown-----11. *C. palmeri*.

1. *Cephalocereus senilis* (Haw.) Pfeiff. Allg. Gartenz. 6: 142. 1838.

Cactus senilis Haw. Phil. Mag. 63: 31. 1824.

Cactus bradypus Lehm. Delect. Sem. Hort. Hamb. 17. 1826.

Cereus senilis DC. Prodr. 3: 464. 1828.

Pilocereus senilis Lem. Cact. Hort. Monv. 7. 1839.

Echinocactus staplesiae Tate; Loud. Gard. Mag. 16: 27. 1840.

Hidalgo and Guanajuato.

Plants 6 to 10 or even 15 meters high, columnar, simple or rarely branched above, sometimes branched at base; ribs numerous; pseudocephalium developing on plants when 6 meters high, broadening above, rarely confined to one side but usually encircling the top of the plant; areoles closely set, the ones at base of old plants producing weak gray bristles 20 to 30 cm. long, the ones in the pseudocephalium producing similar but shorter bristles intermixed with dense, tawny wool, 4 to 6 cm. long; flower (including ovary) 5 cm. long, rose-colored; scales few on the tube; fruit obovoid, 2.5 to 3 cm. long, rose-colored, capped by the chartaceous base of the flower, bearing a few minute scales with hairs in their axils. "Cabeza de viejo," "viejo," "viejito."

This is one of the cacti most cultivated in northern hothouses, where it is known as "old man cactus." The young plants are densely covered with long white hairs. The species is very abundant on the limestone hills of eastern Hidalgo, where it is often the most conspicuous plant.

2. *Cephalocereus hoppenstedtii* (Weber) Schum. in Engl. & Prantl, Pflanzenfam. 3^{ra}: 181. 1894.

Pilocereus hoppenstedtii Weber, Cat. Pfersdorff. 1864.

Pilocereus hagendorpi Regel, Gartenflora 18: 220. 1869.

Pilocereus lateralis Weber, Dict. Hort. Bols 966. 1898.

Cereus hoppenstedtii Berger, Rep. Mo. Bot. Gard. 16: 70. 1905.

Southern Mexico, the type from Zapotitlán, Puebla.

Slender, columnar, said sometimes to reach 10 meters in height, often bent or clambering, the apex tapering; ribs low, close together, 20 or more, the whole plant hidden under the numerous spines; areoles close together; radial spines 14 to 18, very short, white; central spines 5 to 8, the longest one sometimes 7.5 cm. long, usually reflexed, brownish; pseudocephalum at the top of the plant but to one side (said to be on the north side); flower described as 7.5 cm. long, whitish, with rosy tips, bell-shaped.

3. *Cephalocereus macrocephalus* Weber; Schum. Gesamtb. Kakt. 197. 1897.

Cereus macrocephalus Berger, Rep. Mo. Bot. Gard. 16: 62. 1905.

Puebla, the type from Tehuacán.

Plant of great size, 10 to 16 meters high, with a very solid woody trunk 30 to 60 cm. in diameter, simple or with a few ascending branches; pseudocephalum not so conspicuous as in *Cephalocereus senilis*; ribs numerous (about 24), low, obtuse, pale green; radial spines about 12, spreading; central spines several, sometimes 6 cm. long; flowering areoles spineless but bearing white stiff hairs or weak bristles; perianth about 5 cm. long, the tube bearing a few distant scales, the limb short, the outer segments rounded.

4. *Cephalocereus polylophus* (DC.) Britt. & Rose, Contr. U. S. Nat. Herl. 12: 419. 1909.

Cereus polylophus DC. Mém. Mus. Hist. Nat. 17: 115. 1828.

Eastern Mexico.

Erect, with simple stems 10 to 13 meters high, green; ribs 15 to 18; areoles small, 1 cm. apart or less, bearing white felt but no wool; spines 7 or 8, yellow, straight, spreading; central spine single, longer than the others; flowers 4 to 5 cm. long, about 3 cm. broad at top, narrowly funnelform; free part of tube 6 to 8 mm. long with ridges down the inside; stamens included, inserted on the throat; inner perianth segments probably red, broad and short, rounded at apex; ovary somewhat tuberculate; scales small, without felt, wool, or hairs in their axils; scales of flower tube small, acute, spreading, with the tip reflexed.

5. *Cephalocereus scoparius* (Poselger) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 419. 1909.

Pilocereus scoparius Poselger, Allg. Gartenz. 21: 126. 1853.

Cereus scoparius Berger, Rep. Mo. Bot. Gard. 16: 63. 1905.

Type from La Soledad, Veracruz.

Stems 6 to 7.5 meters high, 30 cm. or more in diameter; younger branches with 12 to 15 ribs, these blunt; areoles 1.5 to 2.5 cm. apart, naked; radial spines 5, somewhat bent downward, 5 to 8 mm. long; central spine 1, stout, bent upward, 2.5 cm. long; flowering branches with 20 to 25 ribs; flowers small, reddish; fruit red, small.

6. *Cephalocereus gaumeri* Britt. & Rose, Cactaceae 2: 47. 1920.

Yucatán.

Plant 6 meters high, light green, slender, often only 2 to 3 cm., but sometimes 6 cm., in diameter; ribs 8 or 9, 6 to 8 mm. high; areoles 6 to 10, bearing short felt and cobwebby hairs when young; flowering areoles bearing tufts

of white wool 1 to 2 cm. long, 1 to 2 mm. apart; spines 15 to 25, acicular, 1 to 5 cm. long, yellowish brown when young; flowers "light green," 5 to 7 cm. long; scales on the ovary and lower part of the flower tube few, minute, acute; scales on upper part of the tube and outer perianth segments broadly ovate, acute; inner perianth segments oblong, acute; stamens included; style long exserted; fruit depressed, brownish, somewhat ridged, 4.5 cm. long.

7. *Cephalocereus chrysacanthus* (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 416. 1909.

Pilocereus chrysacanthus Weber; Schum. Gesamtb. Kakt. 178. 1897.

Cereus chrysacanthus Orcutt, West Amer. Sci. 13: 63. 1902.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Plant 3 to 5 meters high, branching near the base; branches erect or ascending, glaucous; ribs about 12; areoles about 1 cm. apart; spines 12 to 15, the longer ones 3 to 4 cm. long, at first golden yellow, becoming darker in age; flowers borne in definite zones on one side of the branch, accompanied by dense masses of long white hairs, nocturnal, 7 to 8 cm. long, rose-red; fruit smooth, reddish or purplish, about 3 cm. in diameter, the flesh red; seeds black.

8. *Cephalocereus cometes* (Scheidw.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 416. 1909.

Cereus cometes Scheidw. Allg. Gartenz. 8: 339. 1840.

Pilocereus jubatus Salm-Dyck; Först. Handb. Cact. 356. 1846.

Cereus flavicomus Salm-Dyck, Cact. Hort. Dyck. 1849. 202. 1850.

San Luis Potosí.

Erect, cylindric; ribs 12 to 15, hardly tuberculate, obtuse; areoles close together, round; spines unequal, straight, spreading, 2 cm. long or less, flesh-colored or brownish, becoming gray; flowering areoles bearing masses of yellow hairs or wool, longer than the spines.

9. *Cephalocereus leucocephalus* (Poselger) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 417. 1909.

Pilocereus leucocephalus Poselger, Allg. Gartenz. 21: 126. 1853.

Pilocereus houlletii Lem. Rev. Hort. 1862: 428. 1862.

Pilocereus foersteri Lem. Illustr. Hort. Lem. 13: under pl. 472. 1866.

Sonora and Chihuahua; type from Horcasitas, Sonora.

Plants 2 to 5 meters high, branched below, the branches 3 to 15, erect or ascending; ribs usually 12, low; spines about 10 in each cluster, acicular, 12 to 20 mm. long; flowering areoles clustered on one side of the plant toward the top and producing an abundance of long white hairs (sometimes 4 to 10 cm. long).

10. *Cephalocereus sartorianus* Rose, Contr. U. S. Nat. Herb. 12: 419. 1909. Veracruz.

Plant 3 to 5 meters high or more, with nearly erect branches, these 7 to 10 cm. in diameter, bluish or bluish green; ribs 7, 2 cm. high, marked by a pair of grooves descending obliquely, one on each side, from each areole; areoles usually 1.5 cm. apart; radial spines at first 7 or 8, others apparently developing later; central normally one; all spines short, 1 cm. long or less, at first straw-colored, in age grayish; all areoles producing few or many cobwebby hairs; flowering areoles appearing on one side of the plant, producing long white hairs 4 to 6 cm. long; flowers 6 to 8 cm. long, "dirty rose-red"; fruit red.

11. *Cephalocereus palmeri* Rose, Contr. U. S. Nat. Herb. 12: 418. 1909.

Cereus victoriensis Vaupel, Monatsschr. Kakteenk. 23: 24. 1913.

Eastern Mexico; type from Victoria, Tamaulipas.

Tall, 2 to 6 meters high, with 20 branches or more (often 5 to 8 cm. in diameter), dark green or when young glaucous and bluish; ribs 7 to 9, rounded on the edge, rather closely set, clothed from top downward for 20 to 30 cm. with long white hairs (4 to 5 cm. long) usually hiding the brown spines; radial spines 8 to 12, slender, the central one much longer than the others, 2 to 3 cm. long; areoles 1 cm. apart, scarcely woolly except toward the top; flowers 6 cm. long, somewhat tubular, purplish to brownish, the ovary without spines or hairs; fruit globular, about 6 cm. in diameter, naked but the surface somewhat warty; seeds black, shining, minutely pitted, 2 mm. long, oblique at base.

12. *Cephalocereus alensis* (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.

Pilocereus alensis Weber; Goss. Bull. Mus. Hist. Nat. 11: 508. 1905.

Cereus alensis Vaupel, Monatsschr. Kakteenk. 23: 23. 1913.

Western Mexico; type from Sierra del Alo.

Erect, sometimes 5 to 6 meters high, branching from the base; branches rather slender, spreading, 12 to 14-ribbed, the ribs somewhat tuberculate; spines 10 to 14, acicular, 1 to 1.5 cm. long, brownish; flowering areoles on one side of the stem, developing white or yellowish hairs 5 cm. long; flowers light purple to purplish green; perianth segments fleshy, usually rounded at apex; ovary nearly naked.

13. *Cephalocereus purpusii* Britt. & Rose, Cactaceae 2: 56. 1920.

Sinaloa; type from Mazatlán.

Stems slender, 2 to 3 meters high, simple or more or less branched; branches green, erect, 3 to 4 cm. in diameter, usually simple; ribs 12, 5 to 6 mm. high, separated by narrow intervals; areoles closely set, 10 mm. apart or less on the lower part of the stem, but much closer toward the top, on the young growth with long silky white hairs, but on old parts without hairs; spines acicular, swollen at base, 1 to 3 cm. long, bright yellow at first, in age gray.

7. *ESCONTRIA* Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.

The genus consists of a single species.

1. *Escontria chiotilla* (Weber) Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.

Cereus chiotilla Weber; Schum. Gesamtb. Kakt. 83. 1897.

Puebla and elsewhere in southern Mexico.

Plant 4 to 7 meters high; trunk very short; branches numerous, forming a compact top, weak and easily broken, bright green, not at all glaucous; ribs 7 or 8, acute; areoles close together, often confluent, elliptic; radial spines 10 to 15, rather short, often reflexed; central spines several, one much longer than the others, somewhat flattened, sometimes 7 cm. long, all light-colored; flowers borne near the ends of the branches, including the ovary about 3 cm. long; inner perianth segments yellow, acuminate; scales on ovary and flower tube arranged in many overlapping series, ovate, 8 to 15 mm. long; fruit glabrous, about 5 cm. in diameter, scaly, edible. "Jiotilla," "chiotilla," "xiotilla."

The ripe fruit is edible and is sold in the markets. The fruit is sometimes preserved by drying.

8. **PACHYCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 420. 1909.

Usually very large plants, more or less branched, with definite trunks, the stems and branches stout, columnar, ribbed; flowers diurnal, with rather short tube; outer perianth segments short, spatulate; stamens included, numerous, inserted along the throat; style included; ovary and flower tube covered with small scales bearing felt and bristles in their axils; fruit large, burlike, dry, usually densely covered with clusters of deciduous spines and bristles; seeds large and black.

One other species is known, a native of Guatemala.

Wool of ovary areoles sparse, shorter than the coriaceous scales—8. **P. ruficeps**.

Wool of ovary areoles copious, mostly longer than the scales.

Perianth tube narrow; branches 5 to 7-angled—7. **P. marginatus**.

Perianth tube broad; branches many-ribbed.

Areoles of ovary and perianth tube bearing copious yellow-brown wool 1.5 to 2.5 cm. long—6. **P. chrysomallus**.

Areoles of ovary and perianth tube densely felted but without long wool.

Joints, at least the young ones, glaucous, the bloom persistent as whitish streaks—5. **P. grandis**.

Joints green or but slightly glaucous.

Upper areoles of the perianth tube, like the others, densely felted, the scales short.

Spines brown to gray or sometimes black—1. **P. pringlei**.

Spines of young growth yellow-brown—2. **P. orcuttii**.

Upper areoles of the perianth tube little or scarcely felted, the scales long.

Flowering areoles bearing many short weak spines.

3. **P. pecten-aboriginum**.

Flowering areoles bearing several stiff acicular spines—4. **P. gaumeri**.

1. **Pachycereus pringlei** (S. Wats.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 422. 1909.

Cereus pringlei S. Wats. Proc. Amer. Acad. 20: 368. 1885.

Cereus calvus Engelm.; Coulter, Contr. U. S. Herb. 3: 409. 1896.

Cereus titan Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 409. 1896.

Sonora and Baja California; type from the Altar River, Sonora.

Treelike, up to 11 meters high, usually with a very short thick trunk, sometimes 1 or even 2 meters long or more, often 60 cm. in diameter or more; stem sometimes nearly simple but often with numerous thick upright branches, more or less glaucous, very spiny or in some forms nearly naked; ribs usually 11 to 15 but sometimes 17, obtuse; areoles, especially the flowering ones, very large, brown-felted, usually confluent or connected by a groove; spines on young growth 20 or more at an areole, 1 to 2 cm. long, white but with black tips, or on young plants sometimes 12 cm. long and black throughout; flower-bearing region of the branches extending from near the top downward sometimes for 2 meters, the areoles becoming broad and uniting, often spineless; flowers 6 to 8 cm. long, the tube and ovary bearing small acute scales, these nearly hidden by the mass of brown hairs produced in their axils; inner perianth segments white, broad, spreading; fruit globular, covered with brown felt and bristles, dry. "Cardón", "cardón pelón"; "saguesa" (Sonora).

This is an abundant and conspicuous plant in many parts of Sonora and Baja California, often forming extensive forests. The dried wood is employed for fuel, and the stems for building huts. The Indians grind the pulp and

seeds together into a kind of flour which is used for making tamales. For illustrations of this species see Contr. U. S. Nat. Herb. 16: *pl.* 130, 131, 132.

It is probably this plant which is described by Clavigero (*Historia de la California*, 1789) under the name "cardón." Among other notes, he remarks that "the missionaries found a method of utilizing the branches, for from a piece about two palms long they extracted by crushing the juice, which they boiled down, thus obtaining a balsam which is good for wounds and bruises."

2. *Pachycereus orcuttii* (K. Brandeg.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 422. 1909.

Cereus orcuttii K. Brandeg. Zoe 5: 3. 1900.

Type from Rosario, Baja California.

Stems bright green, reaching a height of 3 meters and a diameter of 15 cm.; ribs 14 to 18, 1 cm. high; areoles 6 mm. in diameter, densely covered with light gray wool; spines all slender, yellowish brown; radials 12 to 20, 12 mm. long, the centrals about 5, porrect; flowers greenish brown, 4 cm. long, the inner perianth segments short-apiculate; ovary densely covered with short scales, almost concealed by thick tufts of yellowish wool, and furnished with dark brown bristles 4 to 6 cm. long.

3. *Pachycereus pecten-aboriginum* (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 422. 1909.

Cereus pecten-aboriginum Engelm.; S. Wats. Proc. Amer. Acad. 21: 429. 1886.

Chihuahua, Sonora, Baja California, and Colima; type from Hacienda San Miguel, Chihuahua.

Treelike, 5 to 10 meters high, with a trunk 1 to 2 meters high and 30 cm. in diameter, crowned with many erect branches; ribs 10 or 11; areoles 1 cm. in diameter or even less, extending downward in narrow grooves, in the flowering ones forming brownish cushions connecting with the areoles below, densely tomentose (grayish except in flowering ones, these brownish or reddish); spines 8 to 12, 1 to 3 central, all short, usually 1 cm. long or less, but in some cases 3 cm. long, grayish with black tips; flowering areoles not much larger than the others; flowers 5 to 7.5 cm. long; ovary covered with dense soft hairs with only a few bristles or none; outer perianth segments purple, succulent; inner ones white, fleshy; fruit 6 to 7.5 cm. in diameter, dry, covered with yellow wool and long yellow bristles. "Cardón," "cardón hecho," "cardón barbón" (Baja California); "hecho" (Chihuahua, Baja California).

The specific name was given in allusion to the fact that the Indians used the burlike fruits as combs. They also ground the seeds into meal and employed them in the preparation of cakes. For an illustration of this species see Contr. U. S. Nat. Herb. 16: *pl.* 132, B.

4. *Pachycereus gaumeri* Britt. & Rose, Cactaceae 2: 71. 1920.

Yucatán; type from Hodo.

Plant slender, 2 to 7 meters high, erect, simple or few-branched; branches 4-angled or winged; ribs thin, 3 to 4 cm. high; areoles large, 1 to 2.5 cm. apart, brown-felted; spines several, slender, 1 to 3 cm. long, brownish; flowers yellowish green, 5 cm. long; scales of ovary and flower tube more or less foliaceous, drying black and thin, with brown felt in the areoles; scales on ovary linear, puberulent.

5. *Pachycereus grandis* Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.

Cereus bergerianus Vaupel, Monatsschr. Kakteenk. 23: 24. 1913.

Morelos, the type from Cuernavaca.

Plant 6 to 10 meters high, either simple or much branched, the trunk sometimes a meter in diameter; branches, when present, columnar, generally

simple, becoming erect almost from the first, with numerous constrictions, pale green or when young glaucous, with some bloom persisting in streaks; ribs 9 to 11, acutish, high; sterile areoles circular, large, bearing white felt and subulate spines, 2 to 3 cm. apart, not running together; old spines grayish to white with black tips; radial spines 9 or 10; central spines 3, the lower one longer, sometimes 6 cm. long, somewhat flattened; flowering areoles large, elliptic, bearing acicular or bristle-like spines; flowers about 4 cm. long; ovary and flower tube bearing small, acuminate scales, their axils filled with downy hairs; fruit large, globular, dry, covered with long yellow bristles and yellow felt.

6. *Pachycereus chrysomallus* (Lem.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.

Pilocereus chrysomallus Lem. Fl. Serr. Jard. 3: under *pl.* 242. 1847.

Cereus chrysomallus Hemsl. Biol. Centr. Amer. Bot. 1: 541. 1880.

Pilocereus fulviceps Weber; Schum. Gesamtb. Kakt. 176. 1897.

Puebla and Oaxaca.

Stem columnar, massive, at first simple, but in very old plants much branched, giving off hundreds of erect branches which form an almost compact cylinder up to 5 meters in diameter, becoming 12 to 18 meters high; branches glaucous green, 11 to 14-ribbed; flowering branches capped by dense masses of brownish wool; areoles approximate or even confluent; radial spines about 12, slender; centrals 3, 1 very long, sometimes 12 to 13 cm. long; flowers borne near the tops of the stems or branches, 6 to 7 cm. long, the bud, afterward the flower, and finally the fruit, completely concealed in the long wool; ovary covered with small pale, imbricate scales; flower tube also covered with imbricate scales, but these larger and pinkish, pointed; flower tube proper 10 mm. long or less; throat funnelform, 3 cm. long; inner perianth segments numerous, 1.5 to 3 cm. long, cream-colored.

7. *Pachycereus marginatus* (DC.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.

Cereus marginatus DC. Mém. Mus. Hist. Nat. 17: 116. 1828.

Cereus gemmatus Zucc.; Pfeiff. Enum. Cact. 96. 1837.

Hidalgo, Querétaro, and Guanajuato; also planted and naturalized in other parts of Mexico.

Stems 3 to 7 meters high, erect, usually simple; ribs 5 or 6 (7 in the original specimen), somewhat acute when young, obtuse in age; areoles close together, usually confluent, their wool forming a dense white cushion along the ridge of each rib; spines at first 5 to 8 (1 central), in old areoles more numerous, 1 cm. long or less, but in flowering areoles often numerous, bristly and 2 cm. long; flowers and fruit usually closely set, one above the other, apparently only one at an areole, but recorded as often geminate, and appearing anywhere along the ribs from the top downward; flower funnelform, 3 to 4 cm. long; tube and ovary more or less scurfy and with ovate scales subtending bunches of wool and small spines; fruit globular, about 4 cm. in diameter, not very fleshy, yellowish red within, covered with spines and wool which finally drop off; seeds numerous, black, somewhat shining, 4 mm. long. "Organo" (Durango, Oaxaca, San Luis Potosí); "jarritos" (flowers; San Luis Potosí).

Palmer reports that the flowers are sold in the markets of San Luis Potosí for the honey which they contain. This species, like many other cacti of similar habit, is much planted to form living fences. The straight trunks are placed closely side by side and form impenetrable barriers, which are characteristic features of Mexican towns.

8. *Pachycereus ruficeps* (Weber) Britt. & Rose, Cactaceae 2: 75. 1920.
Pilocereus ruficeps Weber; Goss. Bull. Mus. Hist. Nat. 11. 509. 1905.

Cereus ruficeps Vaupel, Monatsschr. Kakteenk. 23: 27. 1913.

Oaxaca and Puelba; type from Tehuacán, Puebla.

Stout, columnar, 15 meters high, from a simple trunk, 30 to 40 cm. in diameter, but branched above; ribs about 26; young spines reddish; radial spines 8 to 10, about 1 cm. long, rigid, grayish; central spines 1 to 3, the longest 4 to 5 cm. long, porrect or deflexed; flowers at the top of the plant, campanulate, 5 cm. long, the ovary and tube bearing small chartaceous scales, these with small tufts of felt and a few yellow bristles in their axils; fruit small, not edible; seeds small, brownish, shining.

9. *Pachycereus columna-trajani* (Karw.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 421. 1909.

Cereus columna-trajani Karw.; Pfeiff. Enum. Cact. 76. 1837.

Pilocereus lateribarbatus Pfeiff.; Först. Handb. Cact. ed. 2. 672. 1885.

Puebla and Oaxaca; type from San Sebastián, Puebla.

Plants erect, stout, up to 15 meters high, 45 to 50 cm. in diameter, often simple; ribs many, green; areoles oblong, bearing brown felt; radial spines 8 to 10, 12 to 25 mm. long; central spines more elongate, sometimes 16 cm. long, deflexed; spines all rigid, white or horn-colored except the brown bases and tips, sometimes said to be soft and erect; flowers described as purple. "Tetetza" (Oaxaca, Conzatti).

DOUBTFUL SPECIES.

CEREUS TETAZO Coulter, Contr. U. S. Nat. Herb. 3: 409. 1896. *Pilocereus tetetzo* Weber; Schum. Gesamtb. Kakt. 175. 1897. Described from Jalisco. This species has been referred to the present group, but the ovary is glabrous, and the fruit fleshy and edible. It should be compared with *Cephalocereus macrocephalus*. The names "tetetzo," "tetazo," "cabeza de viejo," and "tetecho" are reported for it. The fruits, known as "higos de tetetzo," are edible, and are sometimes preserved by drying, and the flowers are said to be eaten in salads.

9. *LEMAIREOCEREUS* Britt. & Rose, Contr. U. S. Nat. Herb. 12: 424. 1909.

Plants usually large, tall, and branching, but rarely low, nearly prostrate, simple, forming thickets; areoles rather large, felted; spines usually stout and numerous; flowers diurnal or in some species nocturnal, one at an areole, tubular-funnelform or campanulate, the short tube tardily separating with the style from top of the ovary; stamens numerous, borne in many rows all along the inner surface of the throat; ovary more or less tubercled, bearing scales felted in the axils, the areoles at first spineless or nearly so, soon developing a cluster of spines; fruit globular to oval, often edible, irregularly bursting when old, exposing the seeds, at first very spiny, but when ripe the spines often deciduous; seeds many, black.

About 10 other species are known, widely distributed in tropical America.

Ribs 5 to 7, separated by broad shallow intervals.-----11. *L. dumortieri*.

Ribs 6 to 20, separated by deep intervals.

Areoles with white, brown, or gray felt, not glandular.

Spines very stout, at first reddish brown or nearly black----7. *L. weberi*.

Spines slender, acicular to subulate.

Ribs about 20-----6. *L. treleasei*.

Ribs 6 to 12.

Areoles borne on ribs, when these are crenate borne on elevations.

Joints green, not glaucous-----1. *L. hollianus*.

Joints glaucous when young, the bloom persistent as whitish streaks-----2. *L. pruinus*.

Areoles borne in depressions of the crenate ribs.

Plants bright green.

Ribs 9 to 12; flowers greenish yellow-----3. *L. chichipe*.

Ribs 7 to 9; flowers rose-colored-----4. *L. chende*.

Plants glaucous-----5. *L. stellatus*.

Areoles with dark brown or black felt, glandular.

Ribs 6 to 8.

Scales of the ovary 2 mm. long or less-----8. *L. queretaroensis*.

Scales of the ovary 4 to 6 mm. long-----9. *L. montanus*.

Ribs 12 to 17-----10. *L. thurberi*.

1. *Lemaireocereus hollianus* (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 425. 1909.

Cereus hollianus Weber; Coulter, Contr. U. S. Nat. Herb. 3: 411. 1896.

Cereus bamosus Weber; Schum. Gesamtb. Kakt. 84. 1897.

Puebla, the type from Tehuacán.

Stem simple or branching only at base, 4 to 5 meters high; ribs 8 to 12, acute; areoles 1 to 3 cm. apart; spines at first bright red, but soon gray; radial spines about 12, very unequal, 1 to 3 cm. long, mostly spreading; centrals 3 to 5, swollen at base, unequal, the lower much longer than the others, sometimes 10 cm. long, strongly deflexed; flowers borne at the upper areoles, 10 cm. long, white; scales on ovary and flower tube with lanate and bristly axils; fruit "as large as a goose egg," dark purple to red, covered with clusters of spines and bristles; seeds black, shining.

Cereus brachiatus Galeotti (Salm-Dyck, Cact. Hort. Dyck. 1849. 195. 1850) must be very close to *L. hollianus* if not identical.

2. *Lemaireocereus pruinus* (Otto) Britt. & Rose, Cactaceae 2: 88. 1920.

Echinocactus pruinus Otto; Pfeiff. Enum. Cact. 54. 1837.

Cereus pruinus Otto; Först. Handb. Cact. 398. 1846.

Cereus laevigatus Salm-Dyck, Cact. Hort. Dyck. 1849. 204. 1850.

Oaxaca and elsewhere in south-central Mexico.

Plant usually tall, with a more or less definite trunk; ribs 5 or 6, very high, separated by broad intervals; spines few, the radial ones 5 to 7, brownish; central spine solitary, 3 cm. long; flowering areoles large, brown-felted; flowers about 9 cm. long; upper scales and outer perianth segments 1 cm. long or less, rounded at apex; inner perianth segments longer and thinner than the outer ones; ovary with numerous brown-felted areoles; fruit ovoid, spiny, 6 to 7 cm. long.

3. *Lemaireocereus chichipe* (Goss.) Britt. & Rose, Cactaceae 2: 89. 1920.

Cereus chichipe Goss. Bull. Mus. Hist. Nat. 11: 507. 1905.

Cereus mixtecensis Purpus, Monatsschr. Kakteenk. 19: 52. 1909.

Puebla and Oaxaca; type from Cerro Colorado, near Tehuacán, Puebla.

Treelike, up to 5 meters high, with a short trunk 80 to 100 cm. in diameter and a large, much branched top; branches 9 to 12-ribbed, the ribs undulate, acutish, 2 cm. high; areoles 1 to 1.5 cm. apart; radial spines 6 or 7, 5 to 10 cm. long, grayish; central spine 1; flowers small, yellowish green; fruit spiny, globose, 2 to 2.5 cm. in diameter, red both within and without; seeds small, black. "Chichipe," "chichibe"; "chichituna" (fruit).

The fruit is edible, and is sold in the markets.

4. *Lemaireocereus chende* (Goss.) Britt. & Rose, Cactaceae 2: 90. 1920.

Cereus chende Goss. Bull. Mus. Hist. Nat. 11: 506. 1905.

Cereus delmoralii Purpus, Monatsschr. Kakteenk. 19: 89. 1909.

Puebla and Oaxaca; type from Cerro Colorado, near Tehuacán, Puebla.

Plant 5 to 7 meters high, with a short indefinite trunk, very much branched above, forming a large top; branches rather slender, ascending or erect; ribs 7 to 9, rather sharp, areoles on old branches 1.5 cm. apart, on young branches perhaps closer together, radial spines usually 5, the centrals when present a little longer than the radials, brown to bright yellow, in age grayish, acicular; flowers 3 to 4 cm. long; fruit said to be deep red, very spiny. "Chende," "chente," "chinoa."

5. *Lemaireocereus stellatus* (Pfeiff.) Britt. & Rose, Contr. U. S. Nat. Herb.

12: 426. 1909.

Cereus stellatus Pfeiff. Allg. Gartenz. 4: 258. 1836.

Cereus dyckii Mart.; Pfeiff. Enum. Cact. 87. 1837.

Cereus tonelianus Lem. Illustr. Hort. Lem. 2: Misc. 63. 1855.

Stenocereus stellatus Riccobono, Boll. Ort. Bot. Palermo 8: 253. 1909.

Oaxaca and elsewhere in southern Mexico.

Plant 2 to 3 meters high, branching at base, rarely branching above, pale bluish green; ribs 8 to 12, low, obtuse; radial spines 10 to 12; centrals several, often much longer than the others, sometimes 5 to 6 cm. long; areoles 1 to 2 cm. apart; flowers appearing at or near the top of the plant, red, narrowly campanulate, about 4 cm. long; ovary bearing small scales subtending wool and bristly spines; fruit red, spiny, globular, about 3 cm. in diameter; spines deciduous; seeds dull, pitted. "Tuna," "joconostle."

6. *Lemaireocereus treleasei* (Vaupel) Britt. & Rose, Contr. U. S. Nat. Herb.

12: 426. 1909.

Cereus treleasei Vaupel, Monatsschr. Kakteenk. 23: 37. 1913.

Oaxaca; type collected between Mitla and Oaxaca.

Plant 5 to 7 meters high, simple or with a few strict branches; ribs about 20; areoles approximate with a peculiar V-shaped depression just above each one; spines rather short, yellowish; flowers pinkish, 4 to 5 cm. long, diurnal; scales on ovary and flower tube subtending slender whitish bristles; fruit red, about 5 cm. in diameter, covered with clusters of deciduous spines; seeds black, dull, rugose. "Tunillo."

7. *Lemaireocereus weberi* (Coulter) Britt. & Rose, Contr. U. S. Nat. Herb.

12: 426. 1909.

Cereus weberi Coulter, Contr. U. S. Nat. Herb. 3: 410. 1896.

Cereus candelabrum Weber; Schum. Gesamtb. Kakt. 106. 1897.

Puebla and Oaxaca; type collected near Tehuacán, Puebla.

Plant very large, 10 meters high or more, with a trunk short but thick and often with hundreds of nearly erect branches rising from near the base, dark bluish green, slightly glaucous; ribs usually 10, rounded; areoles large; radial spines usually 6 to 12, spreading, more or less acicular, 1 to 2 cm. long; central spine usually up to 10 cm. long, solitary, flattened, often more or less deflexed, except in the upper areoles, at first brown to blackish, much longer than the laterals; areoles white-felted; flowers 8 to 10 cm. long; scales on flower tube narrow, thin, bearing long brown hairs in their axils; inner perianth segments oblong, 2 cm. long; ovary globular, covered by the dense brown felt of its areoles; fruit oblong, edible, 6 to 7 cm. long, very spiny, the spine clusters deciduous in ripening.

Alcocer reports that the seeds are sold in the markets of Tehuacán, to be ground and mixed in tortillas.

8. *Lemaireocereus queretaroensis* (Weber) Safford, Ann. Rept. Smiths. Inst. 1908: pl. 6, f. 2. 1909.

Cereus queretaroensis Weber; Mathsson, Monatsschr. Kakteenk. 1: 27. 1891. Guanajuato, Querétaro, and Jalisco; type from Querétaro.

Plant 3 to 5 meters high, with a short woody trunk, much branched above; ribs 6 to 8, prominent, obtuse; areoles about 1 cm. apart, large, brown-woolly, very glandular; spines 6 to 10, at first red, becoming grayish in age, acicular, rather unequal, sometimes only 15 mm. long, at other times 5 cm. long; flowers 7 to 8 cm. long; ovary with many woolly areoles subtended by ovate scales 2 mm. long or less; fruit spiny, edible. "Pitahaya."

9. *Lemaireocereus montanus* Britt. & Rose, Cactaceae 2: 97. 1920.

Type from Alamos, Sonora.

Treelike, 6 to 7 meters high, with a definite smooth trunk 1 meter long or more, with few branches, at first spreading, then nearly erect; ribs usually 8, prominent; areoles 1 to 1.5 cm. apart, large, filled with short brown wool; spines 6 or less, pale, rather stout, one of them longer, sometimes 3 cm. long; flowers 6 to 7 cm. long, opening during the day; outer perianth segments purplish; scales on ovary ovate, 4 to 6 mm. long, imbricate, acuminate, with erose margins.

10. *Lemaireocereus thurberi* (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 426. 1909.

Cereus thurberi Engelm. Amer. Journ. Sci. 17: 234. 1854.

Sonora and Baja California; type collected in a canyon near the mountain pass of Bachuachi, Sonora. Arizona.

Usually without a definite trunk, sending up from the base 5 to 20, or even more, erect or ascending branches 3 to 7 meters high, 15 to 20 cm. in diameter, the basal ones usually simple but occasionally with lateral branches; ribs 12 to 17, rather low, sometimes 2 cm. high, rounded, separated by narrow intervals; areoles 10 to 15 or rarely 30 mm. apart, sometimes becoming 1 cm. in diameter, circular, brown-felted, more or less glandular, the whole areole becoming a waxlike mass; spines numerous, acicular to subulate, unequal, brownish to black, becoming gray in age, the longest sometimes 5 cm. long; flowers mostly borne near the top of the stem but sometimes 30 cm. below the top, 6 to 7.5 cm. long; outer perianth segments broad, reddish, imbricate, gradually passing into the scales on the tube; inner perianth segments light purple with nearly white margins, widely spreading or even turned back at apex, broad, obtuse; ovary tuberculate, bearing small ovate acute scales, these with white and brown hairs in their axils; fruit globular, 4 to 7.5 cm. in diameter, edible, very spiny, but in age naked, olive without, crimson within; seeds black, shining, 1.8 to 2 mm. long. "Pitahaya," "pitahaya dulce."

The dried stems are often used for fuel. The agreeably flavored fruit is gathered in large quantities, and sweetmeats are sometimes made from it. For an illustration of the plant see Contr. U. S. Nat. Herb. 16: pl. 125, A.

It is doubtless this species of which Clavigero (Historia de la California, 1789) writes as follows: "Nowhere is the *pitahayo* so luxuriant as in California * * * Underneath the bark there is about a finger's breadth of green and very juicy pulp, and within that a woody tube full of whitish pith which, when dry, burns well and is used for torches for giving light. Toward the ends of the branches spring forth beautiful white flowers, spotted with bright red, but without odor, and these are followed by the fruits, called *pitahayas* by the Spaniards, and *tammia* or *dammiá* by the Cochimi of Cali-

fornia. This fruit is round, of the size of a large peach, and is also armed with spines; at first it is green, but when ripe it turns red or yellow. That with red rind has pulp of a beautiful blood-red color, and that with yellow rind has white or yellow pulp. The rind is rather thick but soft and easily separated, and the pulp is sweet, mild, refrigerant, and wholesome. After the rind is removed the pulp is eaten, along with the seeds, with which it is filled, which are somewhat like those of the fig, although smaller. The red pitahayas color the urine like blood, for which reason some strangers who have eaten them have been much alarmed, thinking that they have broken a blood vessel. In the southern part of the peninsula the harvest of the sweet pitahayas begins the first of June, and ends the last of August; in the northern part it begins later and is most abundant in August; but when there is a little more rain than usual the harvest is very scant or none at all, for there is no plant so much injured by dampness as the pitahayo. For harvesting, the Californians use a stick to one end of which is firmly attached a slender hook-shaped bone, for pulling off the fruit, and a net in which to catch it without letting it fall on the ground. After it is gathered, they take off the spines with a little stick, which is easily done if the fruit is ripe, and then they peel and eat it; and in this way they go about gathering and eating until filled, and what is left they take home. During the time of the harvest the people go all day long over the mountains and plains hunting for ripe pitahayas, and for them, as we shall see later, this is the happiest season of the year."

11. *Lemaireocereus dumortieri* (Scheidw.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 425. 1909.

Cereus dumortieri Scheidw. Hort. Belg. 4: 220. 1837.

Morelos and Hidalgo and elsewhere in central Mexico.

Often treelike, 6 to 15 meters high, the trunk proper short, 60 to 100 cm. long, 30 cm. in diameter or more, woody; branches many, erect almost from the first, with numerous constrictions, very pale bluish green or somewhat glaucous; ribs generally 6, sometimes 5 or 7, occasionally 9 on very old joints; areoles elliptic, approximate or often confluent, gray-felted; spines various in number and in length, 10 to 20 radials, 1 central or more, the longer ones often 4 cm. long, all at first straw-colored but in age blackened; flowers 5 cm. long, the tube and ovary bearing small ovate scales with bunches of felt and occasionally bristles in their axils, the limb about 2.5 cm. broad; fruit oblong, 3 to 4 cm. long, reddish within, not spiny, its areoles nearly contiguous, felted; seeds brownish, 1.5 mm. long, dull, roughened.

Cereus anisacanthus DC. (Mém. Mus. Hist. Nat. 17: 116. 1828) is doubtfully referred here by Schumann.

DOUBTFUL SPECIES.

CEREUS CONFORMIS Salm-Dyck, Cact. Hort. Dyck. 1849. 203. 1850. Type from Mexico.

CEREUS RIGIDISPINUS Monville, Hort. Univ. 1: 223. 1840. Type from Mexico. Both this and the preceding probably represent species of *Lemaireocereus*.

10. *BERGEROCACTUS* Britt. & Rose, Contr. U. S. Nat. Herb. 12: 435. 1909.

The genus consists of a single species.

1. *Bergerocactus emoryi* (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 435. 1909.

Cereus emoryi Engelm. Amer. Journ. Sci. II. 14: 338. 1852.

Northern Baja California and on the adjacent islands. California.

Branches 20 to 60 cm. long, 3 to 6 cm. in diameter, entirely covered with the dense spiny armament; ribs 20 to 25, very low, only a few millimeters high,

somewhat tuberculate; spines 10 to 30, yellow to yellowish brown, acicular, 1 to 4 cm. long; flowers about 2 cm. long and about as broad when expanded; outer perianth segments obovate, obtuse; inner perianth segments oblong, about 1 cm. long; fruit globose, densely spiny.

11. **WILCOXIA** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 434. 1909.

Plants usually low and weak, producing a cluster of dahlia-like roots; stems very slender, more or less branched, the branches often only the diameter of a lead pencil; ribs few and low; spines of all the areoles similar; flowers diurnal, funnelform-campanulate, red or purple, large for the size of the plant, only 1 from an areole, the tube rather short, its areoles bearing spines or bristles and wool; areoles of ovary and fruit bearing spines or bristles and wool; seeds black, the aril large and basal.

The following are all the known species.

Areoles on ovary and flower tube bearing long bristles.

Stems puberulent-----1. *W. viperina*.

Stems glabrous.

Corolla about 5 cm. long; tube indefinite; seeds dull; spine clusters 3 to 5 mm. apart-----2. *W. poselgeri*.

Corolla 10 to 12 cm. long; tube definite; seeds shining; spine clusters distant-----3. *W. striata*.

Areoles on ovary and lower part of flower tube without long bristles.

4. *W. papillosa*.

1. *Wilcoxia viperina* (Weber) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 242. 1913.

Cereus viperinus Weber; Goss. Bull. Mus. Hist. Nat. 10: 385. 1904.

Puebla; type from Zapotitlán.

Stems elongate, branching, the largest ones 1 cm. in diameter, becoming spineless; branches densely velvety-puberulent, 8 mm. in diameter or less; ribs about 8, inconspicuous; spines about 8, appressed, dark, about 5 mm. long; flowers red, 3 cm. long; spines of ovary and corolla tube black, bristle-like, intermixed with long white wool. "Organito de víbora."

2. *Wilcoxia poselgeri* (Lem.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 434. 1909.

Cereus tuberosus Poselger, Allg. Gartenz. 21: 135. 1853. Not *C. tuberosus* Pfeiff. 1837.

Echinocereus poselgeri Lem. Cact. 57. 1868.

Cereus poselgeri Coulter, Contr. U. S. Nat. Herb. 3: 398. 1896.

Coahuila. Southern Texas.

Roots tuberous, black, several, near the surface of the ground; stems 60 cm. high or less, 6 to 10 mm. thick, with 8 to 10 inconspicuous ribs, the lower and older parts naked, spiny above, the spines almost hiding the ribs; radial spines 9 to 12, appressed, 3 to 5 mm. long, delicate, puberulent; central one ascending, black-tipped, about 1 cm. long, stouter than the radials; flowers purple or pink, 5 cm. long; spines of ovary and flower tube intermixed with white hairs; perianth segments linear, acuminate, about 2.5 cm. long, widely spreading or strongly recurved; seeds pitted or rugose, 8 mm. long. "Sacasil."

3. *Wilcoxia striata* (T. S. Brandeg.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 434. 1909.

Cereus striatus T. S. Brandeg. Zoe 2: 19. 1891.

Cereus diguetii Weber, Bull. Mus. Hist. Nat. 1: 319. 1895.

Baja California and Sonora; type from San José del Cabo, Baja California.

Roots brown, shallow-seated; stem vinelike, very slender, usually with 9 indistinct ribs, grayish; spines about 9, 1.5 to 3 mm. long, acicular, weak, appressed, brownish, the areoles rather distant; flowers 10 to 12 cm. long, purple, the areoles bearing slender bristle-like spines and long wool; fruit pyriform, 3 to 4 cm. long, scarlet, spiny, the spines deciduous; seeds minutely pitted. "Pitahayita," "sacamatraca," "saramatraca," "jarramatraca," "racamatraca."

A cloth saturated with the juice of the crushed roots is sometimes applied to the chest to relieve inflammation of the lungs.

4. *Wilcoxia papillosa* Britt. & Rose, *Cactaceae* 2: 112. 1920.

Sinaloa, the type from Culiacán.

Tap-root spindle-shaped, fleshy, 4 to 7 cm. long, 2 cm. in diameter, giving off long fibrous roots; stems slender, with few branches, 30 to 40 cm. long, perhaps longer, 3 to 5 mm. in diameter, glabrous, but the whole surface covered with minute papillae; ribs low, indistinct, perhaps 3 to 5; areoles small, distant, 1 to 3 cm. long, white-woolly; spines in clusters of 6 to 8, minute, yellowish brown, bulbous at base, 1 to 3 mm. long; flowers scarlet, 4 to 5 cm. long; scales on ovary and flower tube small, linear-cuspidate, those at the top of the tube with long white wool and several brown bristles in their axils; perianth segments 2 cm. long. "Cardoncillo."

12. *PENIOCEREUS* Britt. & Rose, *Contr. U. S. Nat. Herb.* 12: 428. 1909.

Plants low, slender, from an enormous fleshy turnip-shaped root; stems and branches usually 4 or 5-angled; spines of all the areoles similar; flowers very large, funnelform, nocturnal, white, the outer segments tinged with red; tube of flower long, slender, with long hairs in the axils of the upper scales, but with clusters of spines on the lower part and also on the ovary; fruit spiny, ovoid, long-pointed, bright red, fleshy; seeds black, rugose.

The genus consists of two species.

Young growth pubescent; seeds dull black-----1. *P. greggii*.
Young growth glabrous; seeds shining-----2. *P. johnstonii*.

1. *Peniocereus greggii* (Engelm.) Britt. & Rose, *Contr. U. S. Nat. Herb.* 12: 428. 1909.

Cereus greggii Engelm. in Wislitz. *Mem. North. Mex.* 102. 1848.

Cereus pottsii Salm-Dyck, *Cact. Hort. Dyck.* 1849. 208. 1850.

Sonora, Chihuahua, and Zacatecas; type collected near the city of Chihuahua. Western Texas to Arizona.

Root often very large, sometimes 60 cm. in diameter, weighing 60 to 125 pounds, usually 15 to 20 cm. long by 5 to 8 cm. in diameter; stems 30 cm. to 3 meters high, 2 to 2.5 cm. in diameter, the young parts pubescent; spines small, blackish; radials 6 to 9; central usually 1, sometimes 2; flower 15 to 20 cm. long, the tube slender and terminating in a short funnelform throat, covered with stamens; inner perianth segments lanceolate, acute, 4 cm. long, spreading, or the outer ones reflexed; filaments erect, exserted; style slender, the stigma lobes about 1 cm. long; fruit tuberculate, 12 to 15 cm. long, including the elongate beak. "Huevo de venado" (*Patoni*).

2. *Peniocereus johnstonii* Britt. & Rose, *Journ. Washington Acad. Sci.* 12: 329. f. 2. 1922.

Baja California, the type from San Josef Island.

Plant climbing or clambering, up to 3 meters long; stems and branches 3 to 5-angled; spines 9 to 12, brown to black; upper radial spines short, stubby, swollen at base, nearly black, the two lower light brown, elongate, bristle-like.

reflexed; central spines 1 to 3, subulate, 4 to 8 mm. long; flower 15 cm. long, the segments about 3 cm. long, the tube slender, with prominent areoles on knobby projections; fruit 6 cm. long, bearing prominent clusters of black spines.

13. MACHAEROCEREUS Britt. & Rose, *Cactaceae* 2: 114. 1920.

Plants prostrate or low and bushy, often with long, horizontal or prostrate, stout branches, very spiny throughout; ribs low; areoles large, felted, spiny; spines numerous, the centrals flattened and dagger-like; flowers diurnal, 1 at an areole, long, slender, funnelform, the perianth persisting on the fruit; stamens numerous, borne on the narrow elongate throat; ovary and lower part of flower tube bearing many small scales, these subtending felted areoles which afterward bear clusters of spines; fruit globular, edible when young, covered with clusters of spines, but when fully mature becoming naked; seeds dull black, somewhat punctate, acute on the back.

Only two species are known.

Plants prostrate, the tips ascending; flowers yellow-----1. *M. eruca*.
Plants erect, 1 meter high or less, bushy; flowers purple----2. *M. gummosus*.

1. Machaerocereus eruca (T. S. Brandeg.) Britt. & Rose, *Cactaceae* 2: 115. 1920.

Cereus eruca T. S. Brandeg. *Proc. Calif. Acad. II.* 2: 163. 1889.

Baja California; type from Magdalena Island.

Prostrate, except the erect or ascending tips; branches 1 to 3 meters long, 4 to 8 cm. in diameter, usually simple, rooting on the under surface, dying at the older end and growing forward at the other; sometimes several plants starting as branches from a common parent as a center and first radiating out, then dying at the rear; ribs about 12; areoles large, 2 cm. apart; spines about 20, very unequal, pale gray, the outer ones terete, the inner stout and flatter, the longest about 3 cm. long; flowers 10 to 12 cm. long; tube about 10 cm. long, nearly 6 mm. in diameter; limb 4 to 6 cm. broad; ovary very spiny; fruit spiny, 4 cm. long; seeds black. "Chilenola," "chirinole."

2. Machaerocereus gummosus (Engelm.) Britt. & Rose, *Cactaceae* 2: 116. 1920.

Cereus gummosus Engelm.; T. S. Brandeg. *Proc. Calif. Acad. II.* 2: 162. 1889.

Cereus cumengei Weber, *Bull. Mus. Hist. Nat.* 1: 317. 1895.

Cereus flexuosus Engelm.; Coulter, *Contr. U. S. Nat. Herb.* 3: 411. 1896.

Baja California and on the adjacent islands.

Erect or ascending, but usually not a meter high, or with long, spreading, sometimes prostrate branches, the whole plant sometimes having a spread of 6 to 7 meters; branches 4 to 6 cm. in diameter; ribs usually 8, rarely 9, low and obtuse; areoles rather large, about 2 cm. apart; spines stout, the radials 8 to 12, somewhat unequal, about 1 cm. long; central spines 3 to 6, stout, flattened, one much longer than the others and about 4 cm. long; flowers 10 to 14 cm. long, the tube long and slender; inner perianth segments 2 to 2.5 cm. long, purple; fruit subglobose, 6 to 8 cm. in diameter, spiny; skin of fruit bright scarlet; pulp purple; seeds rugose, pitted, 2.5 mm. long. "Pitahaya," "pitahaya agria."

The fruit is agreeably acid, and is much eaten. The crushed stems are sometimes thrown in water to stupefy fish. For an illustration of the plant see *Contr. U. S. Nat. Herb.* 16: *pl.* 126A.

It is apparently of this species that Clavigero writes as follows: "After the harvest of the sweet pitahaya [*Lemaireocereus thurberi*] follows that

of the sour one, called *tajuá* by the Cochimí, and this lasts through September and October or, if the season is favorable, even into November. The branches of this plant also are ridged, spiny, and without leaves, but the ridges are more ordinary and the spines larger, denser, and stouter. The branches are straight and parallel like those of the *tammia* or sweet pitahayo; but from the trunk they take different directions, without any order or symmetry and, stretching over the ground, they throw out roots and form new plants; interlacing with each other, there result thickets which are unpleasant to look at and impenetrable by animals. The plant differs from the first kind also in the places in which it grows; for that fruits well anywhere in the mountains or on the plains, provided it is dry, while this is found only on the plains near the coast, and if plants are found occasionally in the mountains they are always sterile."

14. **NYCTOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 423. 1909.

Erect or clambering, slender, sparingly branched cacti, with cylindric ribbed stems and branches; ribs numerous, low; areoles each bearing a tuft of short white wool and small radiating acicular bristles or weak spines; flowers large, white, nocturnal; ovary bearing small scales, short or long wool, and tufts of weak spines or bristles; perianth funnelform, gradually expanding above, bearing scales and tufts of weak bristles below the middle, above the middle bearing narrowly lanceolate scales distant from each other and grading into the blunt outer perianth segments; inner perianth segments widely spreading, obtuse or acutish; stamens numerous, shorter than the perianth; style about as long as the stamens; fruit fleshy, scaly, spiny or bristly; seeds large, black.

Three other species are known, natives of Central America.

Flower tube longer than the limb-----1. *N. serpentinus*.
Flower tube not longer than the limb-----2. *N. oaxacensis*.

1. **Nyctocereus serpentinus** (Lag. & Rodr.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 423. 1909.

Cactus serpentinus Lag. & Rodr. Anal. Cienc. Nat. Madrid 4: 261. 1801.

Cactus ambiguus Bonpl. Descr. Pl. Rar. 90. 1813.

Cereus serpentinus DC. Prodr. 3: 467. 1828.

Cereus ambiguus DC. Prodr. 3: 467. 1828.

Cereus splendens Salm-Dyck, Cact. Hort. Dyck. 1849. 214. 1850.

Mexico, probably native near the eastern coast.

Stems growing in a cluster or clump, at first erect, then clambering through bushes or over walls or, when without support, creeping or hanging, often 3 meters long, 2 to 5 cm. in diameter; ribs 10 to 13, low and rounded; areoles close together, felted and with acicular or bristle-like spines; spines about 12, white to brownish, the tips usually darker, the longest about 3 cm. long; flowers borne at the upper areoles, sometimes terminal, 15 to 19 cm. long, the limb 8 cm. broad; areoles on ovary and flower tube bristly; inner perianth segments white, spatulate, obtuse; fruit red, covered with deciduous spines, 4 cm. long; seeds black, 5 mm. long. "Junco espinoso" (Jalisco, Oaxaca); "gigante" (Durango); "reina de la noche."

This species is commonly cultivated for ornament in Mexico and is often found half wild about houses and in hedges. It is supposed to be a native, but has not been found really wild in recent years.

2. *Nyctocereus oaxacensis* Britt. & Rose, Cactaceae 2: 120. 1920.

Oaxaca; type from Lagunas, at 255 meters.

Stems branching, slender, 2 to 3 cm. in diameter; ribs 7 to 10, rather low; areoles 10 mm. apart; radial spines 8 to 12, 4 to 15 mm. long, slender, brownish; centrals 3 to 5; flowers 8 to 10 cm. long, "whitish inside, dirty purplish or reddish outside"; perianth segments linear to oblong, rounded at apex; ovary densely covered with brownish bristly spines.

15. *ACANTHOCEREUS* Britt. & Rose, Contr. U. S. Nat. Herb. 12: 432. 1909.

Weak elongate many-jointed cacti, at first erect but soon clambering or trailing, the joints usually strongly 3-angled, sometimes 4 or 5-angled, in one species sometimes 7-angled, the seedlings and juvenile branches not as strongly angled, with more ribs and with different spines; areoles bearing short wool or felt and several stiff spines; flowers funnelform, nocturnal, 1 at an areole; flower tube remaining rigid after anthesis, gradually drying and remaining on the ripe fruit, green, rather slender, expanded toward the summit, bearing a few areoles similar to those of the branches subtended by small scales; limb somewhat shorter than the tube, widely expanded; outer perianth segments narrowly lanceolate to linear, acuminate, green, shorter than the white inner segments; fruit spiny or naked, with a thick, dark red skin breaking irregularly from top downward; flesh red; seeds numerous, black.

Three other species are known, natives of Central and South America.

Ribs usually 3, rarely 4, thick.

Joints 8 to 10 cm. wide, deeply crenate; spines very stout, subulate.

1. *A. horridus*.

Joints 2 to 8 cm. wide, low-crenate; spines slender.

Spines well developed, subulate-----2. *A. pentagonus*.

Spines short or none, when present acicular-----3. *A. subinermis*.

Ribs 3 to 5, thin-----4. *A. occidentalis*.

1. *Acanthocereus horridus* Britt. & Rose, Cactaceae 2: 122. 1920.

Oaxaca. Guatemala.

Plants stout, the joints strongly 3-angled or 3-winged, the young growth 5 or 6-angled; areoles large, 3 to 6 cm. apart; spines brown or blackish when young; radial spines 1 to 6, very short, conic, less than 1 cm. long; central spine usually 1, sometimes 2, often very stout and elongate, sometimes 8 cm. long; flower 18 to 20 cm. long; tube 4 cm. long, including the funnelform throat 12 cm. long; throat 4 cm. broad at mouth; outer perianth segments linear, brown or greenish, 6 cm. long; inner perianth segments 3 to 4 cm. long; stamens white; fruit 3.5 cm. long, light red, glossy, covered with large areoles bearing white felt; skin thick, finally splitting; pulp red.

2. *Acanthocereus pentagonus* (L.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 432. 1909.

Cactus pentagonus L. Sp. Pl. 467. 1753.

Cactus pitajaya Jacq. Enum. Pl. Carib. 23. 1761.

Cereus pentagonus Haw. Syn. Pl. Succ. 180. 1812.

Cactus prismaticus Willd. Enum. Pl. Suppl. 32. 1813.

Cereus prismaticus Haw. Suppl. Pl. Succ. 77. 1819.

Cereus pitajaya DC. Prodr. 3: 466. 1828.

?*Cereus undulatus* DC. Prodr. 3: 467. 1828.

Cereus acutangulus Otto; Pfeiff. Enum. Cact. 107. 1837.

Cereus princeps Pfeiff. Enum. Cact. 108. 1837.

Cereus ramosus Karw.; Pfeiff. Enum. Cact. 108. 1837.

Cereus baxaniensis Karw.; Pfeiff. Enum. Cact. 109. 1837.

Cereus nitidus Salm-Dyck, Cact. Hort. Dyck. 1849. 211. 1850.

Cereus sirul Weber; Goss. Bull. Mus. Hist. Nat. 10: 384. 1904.

Eastern coast of Mexico. Texas, Central America, northern South America, and Guadeloupe.

Stem clambering, usually 2 to 3 or sometimes 7 meters high, but when growing in the open more or less arched and rooting at the tip, then making other arches and thus forming large colonies; old trunk becoming nearly round, 5 cm. in diameter or more; joints 3 to 8 cm. broad, 3 to 5-angled, low-crenate; juvenile growth nearly terete, with 6 to 8 low ribs, approximate areoles, and numerous short acicular spines; areoles on normal branches 3 to 5 cm. apart; spines acicular or gray, subulate; radials at first 6 or 7, 1 to 4 cm. long; central spine often solitary, longer than the radials; spines of old areoles often as many as 12, of which several are centrals; flowers 14 to 20 cm. long; tube and ovary bearing conspicuous areoles with brown felt and several subulate spines; outer perianth segments green; inner perianth segments white, acuminate; fruit oblong, red, edible; cotyledons broadly ovate, 5 to 8 mm. long, thick, united at base, gradually passing below into the spindle-shaped hypocotyl. "Pitahaya," "pitahaya naranjada," "pitahaya morada."¹

3. *Acanthocereus subinermis* Britt. & Rose, Cactaceae 2: 125. 1920.

Type collected between Mitla and Oaxaca, State of Oaxaca.

Plants 1 meter high or higher; joints stout, 5 to 7 cm. broad, strongly 3 or 4-angled, bright green, somewhat shining, usually short; areoles 3 to 4 cm. apart; spines either wanting or short, when present 6 to 10 at an areole, acicular, usually less than 1.5 cm. long; flowers 15 to 22 cm. long; outer perianth segments narrow, reddish, acute; inner perianth segments white; areoles of ovary and flower tube somewhat spiny; fruit globular to short-oblong, 4 cm. long, dull red.

4. *Acanthocereus occidentalis* Britt. & Rose, Cactaceae 2: 125. 1920.

Sinaloa, the type from San Blas.

Stems rather weak, forming dense thickets; branches slender, 4 to 5 cm. in diameter, 3 to 5-angled, dull green, often bronzed; margins of ribs slightly sinuate; areoles 1 to 3 cm. apart, filled with short brown wool; spines numerous, nearly equal, yellowish, acicular, up to 7 cm. long; flowers 14 to 18 cm. long.

16. *HELIOCEREUS* Britt. & Rose, Contr. U. S. Nat. Herb, 12: 127. 1909.

Stems usually weak, procumbent or climbing over rocks and bushes, in cultivation often bushy and erect; branches strongly angled or ribbed; ribs or angles usually 3 or 4, sometimes up to 7; spines of all areoles similar; flowers diurnal, large, funnelform, only 1 at an areole, usually scarlet, some-

¹The name "pitahaya" (also written "pitajaya," and "pitaya") is generally employed in Mexico for fruits of cacti of the *Cereus* alliance. According to Orozco y Berra, the Nahuatl name for plants of this group is "tzapoochtli." Buelna reports the Otomí name as "bazttu"; and Asiain the Huastec names as "ocomtztatza" and "tzalza." The name of the State of the Sinaloa is said to be derived from two Indian words, "sina," pitahaya, and "lobala," round.

times white; tube short but definite; inner perianth segments elongate; stamens numerous, declined; ovary spiny.

One other species is known, a native of Guatemala.

Flowers red.

Inner perianth segments acuminate.

Style not longer than the stamens-----1. *H. elegantissimus*.

Style definitely longer than the stamens-----2. *H. schrankii*.

Inner perianth segments apiculate, rounded or abruptly tipped.

3. *H. speciosus*.

Flowers white-----4. *H. amecamensis*.

1. *Heliocereus elegantissimus* Britt. & Rose, Cactaceae 2: 127. 1920.

Cereus coccineus Salm-Dyck; Pfeiff. Enum. Cact. 122. 1837. Not *C. coccineus* DC. 1828.

Native of Mexico.

Stems at first erect, low, 10 to 20 cm. high; branches often decumbent, light green, 3 to 5 cm. broad, mostly 3 or 4-angled; ribs strongly undulate; areoles large, 1.5 to 2 cm. apart, yellow-felted; spines acicular, 1 cm. long or less, the radial ones bristly and white, the inner stiff and recurved; flowers scarlet, 10 to 15 cm. broad; perianth segments lanceolate, acuminate, 7 cm. long or less; ovary 3 to 4 cm. long, oblong, with a few scattered spreading scales.

2. *Heliocereus schrankii* (Zucc.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 434. 1909.

Cereus schrankii Zucc.; Seltz, Allg. Gartenz. 2: 244. 1834.

Type from Zimapán, Hidalgo.

Stems ascending, branching; joints 1 to 2 cm. broad, 3 or 4-angled, somewhat winged, when young reddish, in age green; areoles 1.5 to 2 cm. apart, somewhat elevated; spines 6 to 8, acicular, white when young, yellowish brown in age; flowers dark red, 14 cm. broad; ovary oblong, 4 cm. long, spiny.

3. *Heliocereus speciosus* (Cav.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 434. 1909.

Cactus speciosus Cav. Anal. Clenc. Nat. Madrid 6: 339. 1803.

Cactus speciosissimus Desf. Mém. Mus. Hist. Nat. 3: 193. 1817.

Cereus bifrons Haw. Suppl. Pl. Succ. 76. 1819.

Cereus speciosissimus DC. Prodr. 3: 468. 1828.

Cereus speciosus Schum. in Engl. & Prantl, Pflanzenfam. 3^{ea}: 179. 1894.

Not *C. speciosus* Sweet, 1826.

Region of the City of Mexico and elsewhere in central Mexico. Reported from Central America.

Stems clambering or hanging, strongly 3 to 5-ribbed; old parts bright green, young parts reddish; ribs strongly undulate; areoles often 3 cm. apart, usually large, with felt and acicular spines; spines numerous, yellow or brownish in age, 1 to 1.5 cm. long; flowers scarlet, 15 to 17 cm. long, lasting for several days; perianth segments oblong, 10 to 12 cm. long, with rounded, often apiculate tips; ovary bearing scattered minute scales; fruit ovoid, 4 to 5 cm. long. "Santa Marta," "xoalacatl" (*Ramírez*).

4. *Heliocereus amecamensis* (Heese) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 129. 1909.

Cereus amecamensis Heese; Rother, Prakt. Ratgeb. 11: 442. 1896.

Cereus amecaensis Heese, Gartenwelt 1: 317. 1897.

Central Mexico; type from Amecameca, State of Mexico.

Plant pale green when young, similar to *H. speciosus* in habit and spines; ribs 3 to 5; flower 11 cm. long, 8 to 12.5 cm. in diameter; flower tube 3.5 cm. long, 1 cm. in diameter, green, with green scales and whitish bristles; outer perianth segments yellowish green, grading into oblanceolate white inner segments, 7 cm. long, 2 cm. wide; ovary cylindric, 6 mm. long.

17. **CARNEGIEA** Britt. & Rose, Journ. N. Y. Bot. Gard. 9: 187. 1908.

A single species is known.

1. **Carnegiea gigantea** (Engelm.) Britt. & Rose, Journ. N. Y. Bot. Gard. 9: 188. 1908.

Cereus giganteus Engelm. in Emory, Mil. Recon. 159. 1848.

Pilocereus engelmannii Lem. Illustr. Hort. Lem. 9: Misc. 97. 1862.

Sonora. Southern Arizona and California; type from the Gila River, Arizona.

Stem simple and upright, up to 12 meters high, or with one or two lateral branches, sometimes with 8 to 12 branches, the branches 30 to 65 cm. in diameter; ribs 12 to 24, obtuse, 1 to 3 cm. high; areoles about 2.5 cm. apart or nearly contiguous on the upper part of the plant, densely brown-felted; spines of two kinds, those at the top of flowering plants acicular, yellowish brown, porrect, those of sterile plants and on the lower parts of flowering plants more or less subulate, the central one stouter than the radials, often 7 cm. long; flowers 10 to 12 cm. long, sometimes nearly as broad as long when fully expanded; tube about 1.5 cm. long, green, its scales broad and short, white-felted in their axils; throat about 3 cm. long, covered with numerous white stamens; style stout, 5 to 6 cm. long, white or cream-colored; ovary somewhat tuberculate, bearing scales with woolly axils; ovules numerous; berry red or purple, obtuse, 6 to 9 cm. long, edible, its few distant scales ovate, 2 to 4 mm. long, with or without 1 to 3 short acicular spines in their axils. "Pitahaya," "saguaro," "sahuaro" (sometimes variously written suwarro, suwarro, suaharo, suguaro).

This is the state flower of Arizona. It is a very abundant and conspicuous plant in the southern part of that State and in northern Sonora.¹ The dried woody ribs of the stems were used by the Indians for lances and for the framework of huts. The fruit was an important article of food among all the Indians of the region. It was eaten raw or cooked and was sometimes dried and preserved for winter use. From it there was prepared a thick syrup which was employed for sweetening other food, and also an intoxicating beverage. The seeds contain much oil, and by the Papagos they were ground into a paste which was spread like butter upon tortillas. They were also eaten raw or ground and made into pinole. The seeds were sometimes collected and eaten after having passed through the body, a practice that was followed also by some of the Californian Indians in the case of *Opuntia* seeds.

18. **RATHBUNIA** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 169. 1909.

Rather slender cacti, simple or bushy, the stems and branches weak, erect or bent; ribs 4 to 8, prominent; spines subulate, those of the flowering areoles not differing from the others; flowers diurnal, scarlet, solitary, usually at the upper areoles, narrowly tubular, the tube bearing distant long scales and

¹ See D. T. MacDougal, The suwarro, or tree cactus. Journ. N. Y. Bot. Gard. 6: 129-133. f. 31, 32. 1905.

united with it except at the tip, elongate, at first straight, or in age somewhat curved, the limb more or less oblique; perianth segments short, spreading or reflexed; filaments exserted; style slender, exserted beyond the tube; stigma lobes narrow; ovary with small scales bearing short felt and sometimes spines in their axils; fruit capped by the withered flower, spiny or becoming smooth, globular; seeds of the typical species black, compressed, minutely pitted, with a large basal oblique hilum.

Only two species are known.

Ribs 5 to 8; flowers 4 to 10 cm. long-----1. *R. alamosensis*.

Ribs 4; flowers 12 cm. long-----2. *R. kerberi*.

1. *Rathbunia alamosensis* (Coulter) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.

Cereus alamosensis Coulter, Contr. U. S. Nat. Herb. 3: 406. 1896.

Cereus sonorensis Rünge; Schum. Monatsschr. Kakteenk. 11: 135. 1901.

Cereus pseudosonorensis Gürke, Monatsschr. Kakteenk. 20: 147. 1910.

Sonora to Tepic; type from Alamos, Sonora.

Columnar, 2 to 3 meters high, at first erect but generally finally bent or curved, 8 cm. thick or less, rooting at or near the tip and thus forming new plants; ribs 5 to 8, obtuse; radial spines 11 to 18, spreading, straight, whitish; centrals 1 to 4, much stouter than the radials, 3 to 5 cm. long, porrect or ascending; flowers scarlet, 4 to 10 cm. long; scales on ovary small, acute or obtuse, with a small tuft of felt and a few bristle-like spines in the axils, those on the flower tube with a tuft of felt and sometimes with a spine; tube proper 1.5 cm. long; ovary tuberculate; fruit red, globular, 3 to 4 cm. in diameter, naked or bearing scattered clusters of 5 or 6 white acicular spines. "Sina," "cina."

2. *Rathbunia kerberi* (Schum.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 415. 1909.

Cereus kerberi Schum. Gesamtb. Kakt. 89. 1897.

Cleistocactus kerberi Goss. Bull. Mens. Soc. Nice 44: 33. 1904.

Type from Volcán de Colima.

Columnar, somewhat branched, 2 meters high; ribs 4, compressed; radial spines about 16, subulate; central spines 4, stouter than the radials, 4.5 cm. long; flowers 12 cm. long; outer perianth segments linear-lanceolate, rose-colored, reflexed; stamens exserted; scales on the ovary lanate in the axils.

19. **LOPHOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 426. 1909.

The genus consists of a single species.

1. *Lophocereus schottii* (Engelm.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus schottii Engelm. Proc. Amer. Acad. 3: 288. 1856.

Cereus sargentianus Orcutt, Gard. & For. 4: 436. 1891.

Cereus palmeri Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 401. 1896.

Sonora and Baja California; type collected near Magdalena, Sonora. Southern Arizona.

Usually branching only at base, forming large clumps sometimes with as many as 50 or even 100 upright or ascending stems, 1 to 7 meters high; ribs usually 5 to 7, sometimes 9, separated by broad intervals; bristles of the flowering areoles numerous, straight, finely acicular, gray, 6 cm. long or less; flowerless areoles smaller, little felted, with 3 to 7 short subulate spreading radial spines swollen at base and 1 or 2 central ones a little longer

and stouter; flowers 3 to 4 cm. long; style, stigma lobes, and filaments whitish; fruit 2 to 3 cm. in diameter, usually naked, rarely spiny; seeds 2.5 mm. long. "Cina," "zina," "sinita" (Sonora); "hombre viejo," "cabeza de viejo," "p'tahaya barbona," "garambullo," "cabeza vieja" (Baja California).

The fruit is edible. For an illustration of the plant see Contr. U. S. Nat. Herb. 16: pl. 125, B.

20. MYRTILLOCACTUS Console, Boll. Ort. Bot. Palermo 1: 8. 1897.

Large cacti, usually with short trunks and large, much branched tops, the stout few-ribbed branches nearly erect, all the areoles bearing the same kind of spines; flowers diurnal, very small, several, sometimes as many as 9 at an areole, with very short tube and widely spreading perianth segments; ovary bearing a few minute scales with tufts of wool in their axils, spineless; fruit small, globular, edible; seed very small, black, with basal hilum.

One other species occurs in Guatemala.

Young branches very blue; central spine elongate, reflexed, dagger-like.

1. M. geometrizzans.

Young branches green; central spine not dagger-like.

Spines usually 3 to 5, with no definite central spine, or this, if present, very short-----**2. M. cochal.**

Spines 6 or more, with definite central spine-----**3. M. schenckii.**

1. Myrtillocactus geometrizzans (Mart.) Console, Boll. Ort. Bot. Palermo 1: 10. 1897.

Cereus geometrizzans Mart.; Pfeiff. Enum. Cact. 90. 1837.

Cereus pugioniferus Lem. Cact. Aliq. Nov. 30. 1838.

Cereus gladiator Otto & Dietr. Allg. Gartenz. 6: 34. 1838.

San Luis Potosí to Oaxaca.

Treelike, with a short definite trunk crowned by a large, much branched top; branches often a little curved, bluish green, usually 5 or 6-ribbed, 6 to 10 cm. in diameter, very blue when young; ribs 2 to 3 cm. high, rounded; areoles 2 to 3 cm. apart; radial and central spines very different, almost filling the areoles; radial spines usually 5, rarely 8 or 9, usually short, 2 to 10 mm. long, but sometimes 3 cm. long, more or less turned backward, a little flattened radially but swollen at base; central spine elongate, dagger-shaped, flattened laterally, 1 to 7 cm. long and sometimes 6 mm. broad; flowers appearing from the upper part of the areole, 2.5 to 3.5 cm. broad, the limb 3 to 4 times as long as the tube; perianth segments oblong, 1.5 cm. long; fruit ellipsoid to subglobose, purplish or bluish, 1 to 2 cm. long. "Garambullo" (Durango, Hidalgo); "Padre Nuestro" (Oaxaca).

The fruit is edible and is offered for sale, both fresh and dried, in the markets.

2. Myrtillocactus cochal (Orcutt) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus cochal Orcutt, West Amer. Sci. 6: 29. 1889.

Baja California, the type from Bahía de Todos Santos.

Plant 1 to 3 meters high, much branched; trunk short, woody, sometimes 30 cm. in diameter; ribs 6 to 8, obtuse, separated by shallow intervals; spines grayish to black; radial spines 5, short; central spines when present 2 cm. long; flowers open night and day, 2.5 cm. long and fully as broad; perianth segments usually 16, light green, the outer ones tinged with purple, oblong; fruit slightly acid, globular, 12 to 18 mm. in diameter, red. "Cochal."

The fruit is edible, and the stems are used for fuel.

3. *Myrtillocactus schenckii* (Purpus) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 427. 1909.

Cereus schenckii Purpus, Monatsschr. Kakteenk. 19: 38. 1909.

Puebla and Oaxaca; type from Sierra de Mixteca, Puebla.

Treelike, 3 to 5 meters high, with a very stout trunk and many short ascending branches, dark green; areoles circular, crowded with black felt, about 5 mm. apart; radial spines 6 to 8, straight, 5 to 12 mm. long, black or brownish; central spine 1, usually 2 cm. long, sometimes 5 cm. long; fruit oblong, 10 to 15 mm. long, naked; seeds black, pitted. "Vichishovo" (*Conzatti*).

21. **HYLOCEREUS** Britt. & Rose, Contr. U. S. Nat. Herb. 12: 428. 1909.

Climbing cacti, often epiphytic, with elongate stems normally 3-angled or 3-winged, and branches emitting aerial roots, the areoles bearing a tuft of felt and several short spines, or spineless in one species; areoles on seedlings and juvenile growths often bearing bristles; flowers very large, nocturnal, funnelform, the limb as broad as long and as long as the tube or longer; ovary and tube bearing large foliaceous scales but no spines, felt, wool, or hairs; outer perianth segments similar to the scales on the tube but longer; petaloid perianth segments narrow, acute or acuminate, mostly white, rarely red; stamens very many, in two series, equaling or shorter than the style; style cylindric, rather stout and thick, the linear stigma lobes numerous, simple or branched; fruit spineless but with several or many persistent foliaceous scales, mostly large and edible; seeds small, black.

Numerous other species are found in tropical America.

Stems bluish or more or less whitened or gray.

- | | |
|--------------------------|--------------------------|
| Spines short, conic----- | 1. <i>H. purpusii</i> . |
| Spines acicular----- | 2. <i>H. ocamponis</i> . |
| Stems bright green----- | 3. <i>H. undatus</i> . |

1. *Hylocereus purpusii* (Weing.) Britt. & Rose, Cactaceae 2: 184. 1920.

Cereus purpusii Weing. Monatsschr. Kakteenk. 19: 150. 1909.

Lowlands of western Mexico, the type from Tuxpan.

Stems bluish, climbing, elongate, epiphytic; ribs 3 or 4, with horny margins only slightly undulate; areoles small; spines 3 to 6, short; flowers 25 cm. long and nearly as broad when fully expanded; outer perianth segments narrow, purplish; middle perianth segments golden; inner perianth segments broad, white except at the golden tips.

2. *Hylocereus ocamponis* (Salm-Dyck) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Cereus ocamponis Salm-Dyck, Cact. Hort. Dyck. 1849. 220. 1850.

Perhaps native of Mexico; original locality either Mexico or Colombia; specimens closely related but probably distinct have been collected in Sinaloa.

Stems strongly 3-angled, at first bright green, soon glaucous, dull bluish green in age; ribs rather deeply undulate, their margins with a horny brown border; areoles 2 to 4 cm. apart, borne near the bottom of each undulation; spines 5 to 8, acicular, 5 to 12 mm. long; flowers 25 to 30 cm. long and fully as broad; outer perianth segments narrow, long-acuminate, greenish, spreading or reflexed, the inner oblong, acuminate, white; ovary covered with imbricate ovate acute purplish-margined scales.

3. *Hylocereus undatus* (Haw.) Britt. & Rose; Britton, Fl. Bermuda 256. 1918.

Cereus undatus Haw. Phil. Mag. 7: 110. 1830.

Cereus tricostatus Goss. Bull. Soc. Bot. France 54: 664. 1907.

Widely cultivated in Mexico and often naturalized. Native country not known, but widely distributed in cultivation in the tropics; originally described from Chinese plants.

Stem long, clambering over bushes and trees or creeping up the sides of walls; ribs mostly 3, broad, thin, green; margin usually strongly undulate, more or less horny in age; areoles 3 to 4 cm. apart; spines 1 to 3, small, 2 to 4 mm. long; flowers up to 29 cm. long or more; outer perianth segments yellowish green, all turned back, some strongly reflexed; inner perianth segments pure white, erect, broad, oblanceolate, entire, with apiculate tips; fruit oblong, 10 to 12 cm. in diameter, red, covered with large foliaceous scales, or nearly smooth when mature; seeds black. "Pitahaya" (Jalisco, Yucatán, Costa Rica, El Salvador, Porto Rico); "pitahaya orejona" (Oaxaca, *Reko*); "tasajo" (Durango, *Patoni*); "junco," "juco tapatío" (*Conzatti*); "chacoub," "zacoub" (Yucatán); "caliz" (Philippines).

This species has often been reported from Mexico as *Cereus triangularis* (a species known only from Jamaica) and as *C. trigonus*. The large fruit is of excellent quality and is much eaten. Grosourdy reports that the juice of the stems is acrid and caustic and is employed externally and internally as a vermicide, although internal use is dangerous. The plant is the best known of all the night-blooming cereuses, and produces very showy flowers.

22. SELENICEREUS Britt. & Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Slender, trailing, climbing or clambering, elongate cacti, the joints ribbed or angled, irregularly giving off aerial roots; areoles small, sometimes elevated on small knobs, bearing small spines or in one species spineless; flowers large, often very large, nocturnal; flower tube elongate, somewhat curved; scales of ovary and flower tube small, usually with long felt, hairs, and bristles in their axils; upper scales and outer perianth segments similar, narrow, greenish, brownish, or orange; inner perianth segments broad, white, usually entire; filaments elongate, weak, numerous, in two clusters distinctly separated, one cluster forming a circle at top of flower tube, the other scattered over the long slender throat; style elongate, thick, often hollow; stigma lobes slender, numerous, entire; fruit large, reddish, covered with clusters of deciduous spines, bristles, and hairs.

Several other species occur in tropical America.

Areoles of flower tube and ovary without long hairs.

Spines of the branch areoles acicular-----7. *S. vagans*.

Spines of the branch areoles short, conic.

Ribs 7 or 8, obtuse; spines from areoles on ovary 1 to 3----8. *S. murrillii*.

Ribs 4 to 6, acute; spines from areoles on ovary 10 or more.

9. *S. spinulosus*.

Areoles of flower tube and ovary bearing long hairs.

Branches with a stout deflexed spur under each areole----6. *S. hamatus*.

Branches not spurred.

Spines of branch areoles acicular.

Hairs of flower areoles tawny or whitish-----1. *S. grandiflorus*.

Hairs of flower areoles bright white-----2. *S. coniflorus*.

Spines of branch areoles short, conic.

Branches 9 or 10-ribbed; branch areoles with many appressed hairs.

3. *S. donkelaarii*.

Branches 4 to 6-ribbed; young branch areoles with few long hairs.

Stems stout, 3 to 5 cm. thick-----4. *S. pteranthus*.

Stems slender, 1.5 to 3 cm. thick-----5. *S. boeckmannii*.

1. *Selenicereus grandiflorus* (L.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 430. 1909.

Cactus grandiflorus L. Sp. Pl. 467. 1753.

Cereus grandiflorus Mill. Gard. Dict. ed. 8. *Cereus* no. 11. 1768.

Commonly cultivated in Mexico, and elsewhere in tropical regions. Native of Jamaica and Cuba.

Stems clambering, often 2.5 cm. in diameter, green or bluish green; ribs usually 7 or 8, sometimes fewer, low, separated by broad rounded intervals; spines acicular, 1 cm. long or less, yellowish brown or brownish, in age gray, intermixed with the numerous whitish hairs; flower buds covered with tawny hairs; flowers about 18 cm. long; outer perianth segments narrow, salmon-colored; inner perianth segments white, acute, entire; fruit ovoid, 8 cm. long. "Organillo" (Tamaulipas); "reina de la noche"; "gigante" (Durango); "reina de las flores" (Porto Rico).

This is a well-known night-blooming cereus, often cultivated for its handsome fragrant flowers. The fruit is edible. The flowers and stems contain several acrid principles, including probably an alkaloid and a glucoside, to one of which the name cactine has been given. The drug obtained from the plant has an action similar to that of digitalis, and is used also in the treatment of rheumatism.

2. *Selenicereus coniflorus* (Weing.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 199. 1909.

Cereus coniflorus Weing. Monatsschr. Kakteenk. 14: 118. 1904.

Selenicereus pringlei Rose, Contr. U. S. Nat. Herb. 12: 431. 1909.

Cereus jalapensis Vaupel, Monatsschr. Kakteenk. 23: 26. 1913.

Eastern Mexico, especially in Veracruz.

Stems high-climbing, giving off numerous aerial roots, pale green, becoming purplish along the ribs, 5 or 6-ribbed; intervals between the ribs either depressed or shallow; margins of the ribs slightly wavy to strongly knobby; spines acicular, pale yellow, the radials 4 to 6, with 1 central, porrect, 1 to 1.5 cm. long; bristles from the lower part of areoles 2, reflexed; buds globular, covered with white hairs; flowers 22 to 25 cm. long; outer perianth segments linear, light orange or bronze to lemon-yellow; inner perianth segments pure white, apiculate; scales on ovary and flower tube linear, reddish, their axils bearing white hairs and spines; fruit globose, about 6 cm. in diameter.

The plant is reported to have been gathered in large quantities in Veracruz and shipped to the United States for use in the preparation of medicine.

3. *Selenicereus donkelaarii* (Salm-Dyck) Britt. & Rose, Cactaceae 2: 200. 1920.

Cereus donkelaarii Salm-Dyck, Allg. Gartenz. 13: 355. 1845.

Yucatán.

Stems elongate, creeping or ascending, 8 meters long or more, slender, about 1 cm. thick; ribs 9 to 10, obtuse, often indistinct; spines in clusters of 10 to 15, the radials 3 to 4 mm. long, setaceous, appressed; central spines 1 or several, 1 to 2 mm. long; flowers 18 cm. long, the slender tube 6 to 7 cm. long; outer perianth segments reddish, linear; inner perianth segments white, entire, 6 to 8 cm. long, about 1 cm. wide, acuminate.

4. *Selenicereus pteranthus* (Link & Otto) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 431. 1909.

Cereus pteranthus Link & Otto, Allg. Gartenz. 2: 209. 1834.

Cereus nycticallus Link; Dietr. Wochenschr. Ver. Beförd. Gartenb. 10: 372. 1834.

Cereus brevispinulus Salm-Dyck, Hort. Dyck. 339. 1834.

Mexico, but known only from cultivated plants or from plants escaped from gardens.

Stems stout, often 3 to 5 cm. in diameter, bluish green to purple, strongly 4 to 6-angled; ribs of young branches sometimes 2 to 3 mm. high; spines 1 to 4, 1 to 3 mm. long, dark, conic; flowers 25 to 30 cm. long, very fragrant, the tube and throat 13 cm. long, swollen above, 5 cm. in diameter; outer perianth segments linear, 12 cm. long; inner perianth segments white, spatulate-oblong, 3 to 4 cm. broad above, acuminate; tube proper about 2 cm. long, yellow within; ovary covered with long white silky hairs and bristles, 10 to 12 mm. long; fruit globular, red, 6 to 7 cm. in diameter.

5. *Selenicereus boeckmannii* (Otto) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 429. 1909.

Cereus boeckmannii Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 217. 1850.

Cereus irradians Lem. Illustr. Hort. Lem. 11: Misc. 74. 1864.

Cereus vaupelii Weing. Monatsschr. Kakateenk. 22: 106. 1912.

Eastern Mexico. Cuba and Hispaniola.

Stems light green, 1 to 2 cm. in diameter, strongly angled; ribs 3 to 8, slightly if at all undulating; areoles at first brownish but white in age; spines and hairs in the areoles at first purplish, the spines 3 to 6, becoming yellowish, 2 mm. long or less; flowers not fragrant, 24 to 39 cm. long; outer perianth segments and scales linear, brownish; inner perianth segments oblanceolate, 10 cm. long by 3 cm. broad at widest place, pure white; tube and throat 14 cm. long, bearing scattered short linear acute reddish scales, their axils bearing long brown silky hairs and brown bristles; ovary strongly tuberculate; fruit globular, 5 to 6 cm. in diameter.

6. *Selenicereus hamatus* (Scheidw.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 203. 1909.

Cereus hamatus Scheidw. Allg. Gartenz. 5: 371. 1837.

Cereus rostratus Lem. Cact. Aliq. Nov. 29. 1838.

Southern and eastern Mexico.

Stem bright green, long and clambering, the branches strongly 4-angled, rarely 3-angled, about 1.5 cm. thick; areoles with spines and black wool, remote, at the upper edges of knobby projections, these often forming obtuse deflexed spurs about 1 cm. long; spines on juvenile plants bristle-like, white, on old branches fewer, stouter, brown or black; flower 20 to 25 cm. long; upper scales dark green, tinged with red; outer perianth segments pale green, narrow, about 8 cm. long; inner perianth segments broad, white; flower tube 10 cm. long, 22 mm. in diameter, its areoles long-hairy.

7. *Selenicereus vagans* (K. Brandeg.) Britt. & Rose, Cactaceae 2: 205. 1920.

Cereus vagans K. Brandeg. Zoe 5: 191. 1904.

Cereus longicaudatus Weber; Goss. Bull. Mus. Hist. Nat. 10: 384. 1904.

Western coast of Mexico; type from Mazatlán, Sinaloa.

Stems creeping over rocks, often forming large clumps, more or less rooting, 1 to 1.5 cm. in diameter; ribs about 10, low; areoles 1 to 1.5 cm. apart; spines acicular, numerous, less than 1 cm. long, brownish yellow; flower 15 cm. long; tube, including throat, about 9 cm. long, slightly curved, brownish, with small scattered scales bearing clusters of 5 to 8 acicular spines in their axils; throat narrow, 5 cm. long; outer perianth segments linear, brownish to greenish white, 6 cm. long; inner perianth segments white, oblanceolate, 6 cm. long, with short acuminate tips, the margins undulate or toothed, especially above; ovary covered with acicular spines.

8. *Selenicereus murrillii* Britt. & Rose, *Cactaceae* 2: 206. 1920.

Type from Colima.

A slender vine 6 meters long or more, 8 mm. in diameter, dark green, the ribs more or less purplish; ribs 7 or 8, low, obtuse, separated by broad intervals; areoles 1 to 2 cm. apart, small, bearing white wool and minute spines; spines 5 or 6, the two lower ones reflexed, 1 to 2 cm. long, the others conic, greenish to black; flower 15 cm. long, the tube and throat 6 cm. long, bearing a few slightly elevated areoles, these white-felted and bearing 1 or 2 minute spines; outer perianth segments greenish yellow, linear to linear-lanceolate, acute, the inner pure white, broadly spatulate, obtuse; ovary bearing numerous rather large areoles, these white-felted and with 1 to 3 short spines but no long hairs.

9. *Selenicereus spinulosus* (DC.) Britt. & Rose, *Contr. U. S. Nat. Herb.* 12: 431. 1909.

Cereus spinulosus DC. *Mém. Mus. Hist. Nat.* 17: 117. 1828.

Tamaulipas and elsewhere in eastern Mexico. Southern Texas.

Stems clambering, 2 to 4 meters long, 1 to 2 cm. in diameter, producing numerous aerial roots, light green, somewhat shining, usually angled but sometimes nearly terete; ribs 4 to 6, or sometimes more; spines very short, yellowish or becoming blackish; radial spines 5 or 6, with 2 reflexed bristles at base of the areole; central spine 1, rarely 2, on juvenile branches more numerous and more acicular, white; flower 12 to 14 cm. long; tube about 5 cm. long, with a few clusters of small spines; outer perianth segments narrowly oblong, 5 to 6 cm. long, acute, spreading; inner perianth segments pinkish to white, narrowly oblong, acute; ovary covered with clusters of spines similar to those on the tube.

23. *DEAMIA* Britt. & Rose, *Cactaceae* 2: 212. 1920.

The genus consists of a single species.

1. *Deamia testudo* (Karw.) Britt. & Rose, *Cactaceae* 2: 213. 1920.

Cereus testudo Karw.; *Zucc. Abh. Akad. Wiss. München* 2: 682. 1837.

Cereus pterogonus Lem. *Cact. Hort. Monv.* 59. 1839.

Cereus pentapterus Otto; *Salm-Dyck, Cact. Hort. Dyck.* 1849. 221. 1850.

Cereus miravallensis Weber, *Bull. Mus. Hist. Nat.* 8: 459. 1902.

Veracruz and elsewhere in southern Mexico. Central America and Colombia.

Stems and joints various, 3 to 10 cm. broad, or perhaps even more; ribs thin, winglike, 1 to 3 cm. high; areoles 1 to 2 cm. apart or on juvenile growth much closer; spines spreading, 10 or more, 1 to 2 cm. long, brownish; flowers 28 cm. long, with a long slender tube 10 cm. long expanding into a broad throat nearly as long as the tube; inner perianth segments linear-oblong, acuminate, 8 to 10 cm. long; stamens numerous; style slender, 24 to 25 cm. long; stigma lobes linear, numerous; scales on ovary 1 mm. long or less; hairs on ovary and flower tube brown, 1 to 3 cm. long.

DOUBTFUL SPECIES.

CEREUS ACANTHOSPHERA Weing. *Monatsschr. Kakteenk.* 24: 81. 1914. Type from Río de Santa María, Veracruz. Perhaps a species of *Deamia*.

24. *APOROCACTUS* Lem. *Illustr. Hort. Lem.* 7: Misc. 67. 1860.

Slender vinelike cacti, creeping or clambering, sending out aerial roots freely, day-blooming; flowers rather small, one at an areole, funnelform, pink to red, the tube nearly straight, or bent just above the ovary, the limb some-

what oblique; outer perianth segments linear, spreading or recurved, scattered; inner perianth segments broad, more compact than the outer ones; stamens exserted, in a single, somewhat 1-sided cluster; filaments all along the throat; tube proper about the length of the narrow throat; fruit globose, small, reddish, setose; seeds few, reddish brown, obovate.

The species here listed are the only ones known.

Flowers strongly bent just above the ovary.

Branches very slender; ribs 7 or 8-----1. *A. leptophis*.

Branches stouter; ribs 10 to 12.

Outer perianth segments narrow, the inner ones apiculate.

2. *A. flagelliformis*.

Outer perianth segments oblong, the inner ones acuminate.

3. *A. flagriformis*.

Flowers nearly straight.

Inner perianth segments acute-----4. *A. conzattii*.

Inner perianth segments acuminate-----5. *A. martianus*.

1. *Aporocactus leptophis* (DC.) Britt. & Rose, Contr. U. S. Nat. Herb. 12: 435. 1909.

Cereus leptophis DC. Mém. Mus. Hist. Nat. 17: 117. 1828.

Native of Mexico.

Often creeping; branches cylindric, 8 to 10 mm. thick, rather strongly 7 or 8-ribbed; ribs obtuse, somewhat repand; areoles velvety, with 12 or 13 rigid setaceous spines; perianth segments narrowly oblong, 2 to 3 cm. long, about 6 mm. wide.

2. *Aporocactus flagelliformis* (L.) Lem. Illustr. Hort. Lem. 7: Misc. 68. 1860.

Cactus flagelliformis L. Sp. Pl. 467. 1753.

Cereus flagelliformis Mill. Gard. Dict. ed. 8. *Cereus* no. 12. 1768.

Common in cultivation in Mexico, and elsewhere in tropical regions; native habitat not known.

Stems at first ascending or erect, but weak and slender or pendent, 1 to 2 cm. in diameter; branches often prostrate and creeping or even pendent; ribs 10 to 12, low and inconspicuous, a little tuberculate; areoles 6 to 8 mm. apart; radial spines 8 to 12, acicular, reddish brown; central spines 3 or 4, brownish with yellow tips; flowers 7 to 8 cm. long, opening for 3 or 4 days, crimson; outer perianth segments narrow, more or less reflexed; inner perianth segments broader, only slightly spreading; fruit globose, 10 to 12 mm. in diameter, red, bristly; pulp yellowish. "Flor del cuerno," "floricuerno," "flor del látigo," hierba de la alferecía," "junco," "junquillo," "cuerno."

This plant is much cultivated in Mexico, and also in the United States, where it is known as rat-tail cactus. An infusion of the dried flowers is employed in Mexico for heart affections. The juice of the plant is said to be acrid and caustic. It is administered internally as a vermifuge, but its use is said to be dangerous.

3. *Aporocactus flagriformis* (Zucc.) Lem.; Britt. & Rose, Contr. U. S. Nat. Herb. 12: 435. 1909.

Cereus flagriformis Zucc.; Pfeiff. Enum. Cact. 111. 1837.

Native of Mexico, the type from San José del Oro, Oaxaca.

At first erect and rather stout, afterwards creeping, very much branched; branches green, 10 to 24 mm. in diameter; ribs 11, very low, obtuse, somewhat tuberculate; areoles small, 4 to 6 mm. apart; radial spines 6 to 8, 4 mm. long, acicular, horn-colored; central spines 4 or 5, shorter than the radials but

stouter, brown; flowers dark crimson, 10 cm. long, 7.5 cm. broad or more; flower tube 3 cm. long or more; perianth segments in 3 series, the series well separated; inner perianth segments oblong, 10 mm. broad, acuminate; stamens red, erect, exserted.

4. *Aporocactus konzattii* Britt. & Rose, Cactaceae 2: 220. 1920.

Type from Cerro San Felipe, Oaxaca.

Creeping, clambering, or hanging from a support, developing aerial roots here and there; stems 12 to 25 mm. in diameter; ribs 8 to 10, rather prominent, low-tuberculate; areoles 3 to 4 mm. apart; spines 15 to 20, acicular, light brown, unequal, the longest 12 mm. long; buds nearly erect, covered with brown acicular spines or bristles; flowers 8 to 9 cm. long; tube nearly straight, red, bearing a few ovate scales, their axils short-woolly and with a few bristle-like spines; upper inner perianth segments arching forward, the lower ones somewhat reflexed, all narrow, 6 to 7 mm. broad, acute, brick-red; tube proper 2 to 2.5 cm. long; throat about 1 cm. long, narrow, bearing stamens all over its surface.

5. *Aporocactus martianus* (Zucc.) Britt. & Rose, Cactaceae 2: 220. 1920.

Cereus martianus Zucc. Flora 15²: Beibl. 66. 1832.

Eriocereus martianus Riccobono, Boll. Ort. Bot. Palermo 8: 240. 1909.

Central Mexico.

Stems rather stout, somewhat branched, 15 to 18 mm. in diameter; ribs about 8, low, obtuse; areoles 12 mm. apart; spines 6 to 8, acicular to bristle-like; flowers a deep rose, 8 to 10 cm. long; outer perianth segments narrowly lanceolate, acuminate; perianth segments similar but long-acuminate; fruit globular, 2 cm. in diameter, greenish, spiny.

25. **ECHINOCEREUS** Engelm. in Wislitz. Mem. North. Mex. 91. 1848.

Plants always low, perennial, erect or prostrate, sometimes pendent over rocks and cliffs, single or cespitose, globular to cylindric, prostrate or pendent if elongate; spines of flowering and sterile areoles similar; flowers usually large, in some species small, diurnal, in some not closing at night; perianth campanulate to short-funnelform, scarlet, crimson, purple, or rarely yellow, the tube and ovary always spiny; stigma lobes always green; fruit more or less colored, thin-skinned, spiny, the spines easily detached when mature; seeds black, tuberculate.

Besides the species listed here, several others occur in the southwestern United States. The fruit of most of the species is edible and often of superior quality.

Flowers small, 1.2 cm. long or less-----45. *E. barthelowanus*.

Flowers large, usually conspicuous, rarely only 2 to 3 cm. long.

Stems covered with long weak bristles or hairs-----1. *E. delaetii*.

Stems covered with spines, or rarely spineless.

Flowers scarlet to salmon-colored, opening once but lasting for several days.

Stems usually weak, often trailing or at least becoming prostrate; ribs nearly continuous.

Flowers rosy red-----2. *E. scheeri*.

Flowers orange-red to salmon-colored.

Flowers 8 to 11 cm. long; wool from areoles on flower tube long.

Flowers 8 to 10 cm. long; radial spines 9 or fewer.

3. *E. salm-dyckianus*.

Flowers 11 cm. long; radial spines 10 to 12--4. *E. huitcholensis*.

Flowers 6 cm. long or less; wool from areoles on flowers shorter than the subtending scales-----5. *E. pensilis*.

Stems usually erect and stout; ribs more or less tuberculate.

Plants forming large mounds, sometimes with 500 to 800 joints; spines white, long and flexuous-----6. *E. mojavensis*.

Plants in much smaller clusters; spines brownish or grayish, not long and flexuous.

Plant body with 12 to 14 ribs-----7. *E. leeanus*.

Plant body with 5 to 11 ribs (in one species 12).

Axils of flower scales filled with long cobwebby hairs.

Flowers 5 to 6 cm. long; spines yellowish at first.

8. *E. polyacanthus*.

Flowers 3 cm. long; spines reddish at first-----9. *E. pacificus*.

Axils of flower scales bearing short hairs.

Stems elongate and thin-----10. *E. acifer*.

Stems short and thick-----11. *E. rosei*.

Flowers usually purple, sometimes yellow or greenish yellow, rarely pink or nearly white, broad, rotate to campanulate, opening in sunlight, closing at night.

Flowers yellow or greenish white.

Plants densely cespitose-----12. *E. maritimus*.

Plants usually solitary.

Ribs very stout.

Ribs 5 to 8; spines on flower tube and ovary short.

13. *E. subinermis*.

Ribs 8 or 9; spines on flower tube and ovary acicular.

14. *E. luteus*.

Ribs low, usually hidden by the spines.

Flowers 2.5 cm. long or less-----15. *E. chloranthus*.

Flowers 5 to 10 cm. long.

Flowers greenish white-----16. *E. grandis*.

Flowers yellow-red.

Central spines in more than one row--17. *E. dasyacanthus*.

Central spines in one vertical row-----18. *E. ctenoides*.

Flowers purple.

Stems weak, slender, and creeping.

Stems 2 cm. thick or less.

Areoles distant; spines not interlocking.

Perianth segments narrowly oblong or linear-oblongate.

19. *E. blanckii*.

Perianth segments oblong-erose-----20. *E. pentalophus*.

Areoles approximate; spines densely interlocking--21. *E. sciurus*.

Stems 3 to 4 cm. thick-----22. *E. cinerascens*.

Stems stout, usually erect or ascending.

Areoles elliptic to circular, closely set, often with pectinate spines.

Areoles circular; spines not pectinate.

Areoles about 5 mm. apart; spines densely interlocking.

28. *E. scopulorum*.

Areoles about 1 cm. apart; spines scarcely interlocking.

29. *E. roetteri*.

Areoles elliptic; spines pectinate.

Central spine often very long-----23. *E. adustus*.

Central spine, if present, short.

Spines of ovary and flower tube slender and weak, the surrounding hairs long and cobwebby--24. *E. reichenbachii*.

Spines of ovary and flower tube short and stout, the surrounding hairs short.

Central spines none.

Stems cylindric-----25. *E. rigidissimus*.

Stems globular-----26. *E. weinbergii*.

Central spines present-----27. *E. pectinatus*.

Areoles nearly circular, not so closely set; spines never pectinate.

Ovary strongly tuberculate-----30. *E. chlorophthalmus*.

Ovary not strongly tuberculate.

Flowers small, 2.5 to 5 cm. long.

Plants strongly angled; flowers pinkish--31. *E. knippelianus*.

Plants not strongly angled; flowers purple.

Central spines none.

Spines 3 to 5; flower tube and ovary without long wool from the areoles-----32. *E. pulchellus*.

Spines 6 to 8; flower tube and ovary bearing long cobwebby wool from the areoles-----33. *E. amoenus*.

Central spines 1 or more.

Central spine one-----34. *E. palmeri*.

Central spines several, much elongate, dagger-like.

35. *E. brandegeei*.

Flowers large, 6 to 12 cm. long.

Central spines none-----36. *E. hempelii*.

Central spines present.

Central spine solitary, rarely 2.

Spines red at base-----37. *E. merkeri*.

Spines not red at base.

Plants stout, erect-----38. *E. fendleri*.

Plants weak, becoming prostrate 39. *E. enneacanthus*.

Central spines several.

Spines not white.

Spines yellowish brown to red---40. *E. engelmannii*.

Spines bluish to blackish-----41. *E. sarissophorus*.

Spines usually white or straw-colored.

Ribs 7 to 9-----42. *E. dubius*.

Ribs 11 to 13.

Flowers campanulate-----43. *E. conglomeratus*.

Flowers short-funnelform-----44. *E. stramineus*.

1. *Echinocereus delaetii* Gürke, Monatsschr. Kakteenk. 19: 131. 1909.

Cephalocereus delaetii Gürke, Monatsschr. Kakteenk. 19: 116. 1909.

Known only from the Sierra de Paila, north of Parras, Coahuila.

Low, 10 to 20 cm. high, densely cespitose, completely hidden by the long white curled hairs; ribs indistinct; areoles closely set, bearing 15 or more white reflexed hairs 8 to 10 cm. long and a few stiff reddish bristles; flowers appearing near the top of plant; perianth segments pink, oblanceolate, acute; ovary covered with clusters of long white bristly spines.

In appearance this resembles small plants of *Cephalocereus senilis*.

2. *Echinocereus scheeri* (Salm-Dyck) Rümpler; Först. Handb. Cact. ed. 2. 801. 1885.

Cereus scheeri Salm-Dyck, Cact. Hort. Dyck. 1849. 190. 1850.

Chihuahua, the type collected near the City of Chihuahua.

Cespitose; stems procumbent, prostrate or ascending, decidedly narrowed toward the tip, 10 to 22 cm. long, yellowish green; ribs 8 to 10, rather low, not at all sinuate, somewhat spiraled; spines 7 to 12, acicular, white with brown or blackish tips; flowers 12 cm. long, rose-red to crimson, with an elongate tube; perianth segments oblanceolate, acute.

3. *Echinocereus salm-dyckianus* Scheer in Seem. Bot. Voy. Herald 291. 1856.

Cereus salm-dyckianus Hemsl. Biol. Centr. Amer. Bot. 1: 545. 1880.

Echinocereus salmianus Rümpler; Först. Handb. Cact. ed. 2. 809. 1885.

Cereus salmianus Weber, Dict. Hort. Bois 279. 1894.

Chihuahua and Durango; type collected near the City of Chihuahua.

Cespitose; stems more or less decumbent, 2 to 4 cm. in diameter, elongate, yellowish green; ribs 7 to 9, low, more or less sinuate; radial spines 8 or 9, acicular, yellowish, about 1 cm. long; central spine solitary, porrect, a little longer than the radials; flowers orange-colored, 8 to 10 cm. long, narrow, the tube elongate, the areoles of the flower tube and ovary bearing white bristly spines and cobwebby hairs; perianth segments oblanceolate to spatulate.

4. *Echinocereus huitcholensis* (Weber) Gürke, Monatsschr. Kakteenk. 16: 23. 1906.

Cereus huitcholensis Weber, Bull. Mus. Hist. Nat. 10: 383. 1904.

Known only from the type locality, Sierra de Nayarit, Jalisco.

Plants 4 to 6 cm. in diameter; radial spines 10 to 12; central spine usually solitary; flowers 11 cm. long, or less, narrow, with a pronounced tube; color of perianth segments uncertain but perhaps orange; spines on ovary and tube weak, acicular; areoles of flower tube bearing long cobwebby hairs.

5. *Echinocereus pensilis* (K. Brandeg.) Purpus, Monatsschr. Kakteenk. 18: 5. 1908.

Cereus pensilis K. Brandeg. Zoe 5: 192. 1904.

Cape Region of Baja California, the type from Sierra de la Laguna.

More or less cespitose, the stems often erect, 30 cm. high or when growing on cliffs hanging and then nearly 2 meters long, 3 to 4 cm. in diameter; ribs 8 to 10, low; areoles about 10 mm. apart; spines needle-like, at first yellow, becoming reddish gray, the longest not over 2 cm. long; radial spines about 8; central spine 1; flowers orange-red, narrow, 5 to 6 cm. long; areoles on ovary and tube bearing short, yellow or white wool and chestnut-colored bristly spines; fruit globular, 1.5 to 2 cm. in diameter; seeds black, rugose, very oblique at base.

6. *Echinocereus mojavensis* (Engelm. & Bigel.) Rümpler; Först. Handb. Cact. ed. 2. 803. 1885.

Cereus mojavensis Engelm. & Bigel. Proc. Amer. Acad. 3: 281. 1856.

Cereus bigelovii Engelm. U. S. Rep. Miss. Pacif. 4: pl. 4, f. 8. 1856.

Reported from Sonora. Southwestern United States, the type from the Mojave River, California.

Cespitose, growing in massive clumps, often forming mounds, with hundreds of stems (500 to 800 have been recorded); stems globose to oblong, 5 to 20 cm. long, pale green; ribs 8 to 13, 5 to 6 mm. high, but becoming indistinct on old parts of stem, somewhat undulate; areoles circular, about 1 cm. apart; spines all white, or in age gray; radial spines about 10, acicular, spreading, curved, 1 to 2.5 cm. long; central spine subulate, porrect or somewhat spreading, often weak, 3 to 5 cm. long; flowers rather narrow, 5 to 7 cm. long, crimson; perianth segments broad, obtuse or even retuse; areoles on ovary with white felt and short acicular spines; fruit oblong, 2.5 to 3 cm. long.

7. *Echinocereus leeanus* (Hook.) Lem.; Först. Handb. Cact. ed. 2. 828. 1885.
Cereus leeanus Hook. in Curtis's Bot. Mag. 75: pl. 4417. 1849.

Echinocereus multicostratus Cels; Först. Handb. Cact. ed. 2. 828. 1885.

Native of Mexico, but the range unknown.

Plant erect, about 30 cm. high, 10 cm. thick at base, tapering gradually toward the top, simple so far as known; ribs 12 to 14, acute, bearing rather closely set areoles; spines about 12, acicular, very unequal in length, the central and longest about 2.5 cm. long; flowers brick-red, 5 to 6 cm. long; inner perianth segments somewhat spreading, spatulate to obovate, 3 cm. long, acute.

8. *Echinocereus polyacanthus* Engelm. in Wislitz. Mem. North. Mex. 104. 1848.
Cereus polyacanthus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Chihuahua and Durango; type from Cosihuiriachi, Chihuahua. Arizona.

Cespitose, forming clumps of 20 to 50 stems, pale green but often tinged with red; ribs usually 10, low; areoles approximate; spines gray when old, at first pale yellow, becoming more or less purplish; radial spines about 12; centrals 4, straight, elongate; flowers crimson, 6 cm. long; spines on ovary and flower tube yellow, intermixed with cobwebby wool. "Pitahaya."

9. *Echinocereus pacificus* (Engelm.) Britt. & Rose, Cactaceae 3: 12. 1922.

Cereus phoeniceus pacificus Engelm. West Amer. Sci. 2: 46. 1886.

Cereus pacificus Coulter, Contr. U. S. Nat. Herb. 3: 397. 1896.

Northern Baja California; type from Bahía de Todos Santos.

Cespitose, growing in clumps 30 to 60 cm. in diameter, sometimes containing 100 stems, these 15 to 25 cm. long, 5 to 6 cm. in diameter; ribs 10 to 12, obtuse; spines gray, with a reddish tinge; radial spines 10 to 12, 5 to 10 mm. long; central spines 4 to 5, the longest sometimes 25 mm. long; flowers deep red, rather small, about 3 cm. long; areoles on ovary and flower tube bearing long tawny wool and reddish brown bristly spines; fruit spiny.

10. *Echinocereus acifer* (Otto) Lem.; Först. Handb. Cact. ed. 2. 798. 1885.

Cereus acifer Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 189. 1850.

Echinocereus durangensis Rümpler; Först. Handb. Cact. ed. 2. 799. 1885.

Reported from Durango and Coahuila.

Cespitose, glossy green, erect; ribs 10, strongly tubercled; radial spines 5 to 10, 10 to 16 mm. long, pale brownish, bulbous and purplish at base; centrals 4, stout, purplish brown, the three upper erect, the lower and stouter one subdeflexed; flowers scarlet.

11. *Echinocereus rosei* Woot. & Standl. Contr. U. S. Nat. Herb. 19: 457. 1915.

Chihuahua. Western Texas and southern New Mexico; type from Agricultural College, New Mexico.

Cespitose, forming small compact clumps, the stems 10 to 20 cm. long, 5 to 8 cm. in diameter, sometimes as many as 40; ribs 8 to 11, obtuse; areoles rather closely set; spines pinkish to brownish gray; radial spines about 10, spreading; centrals 4, 4 to 6 cm. long; flowers 4 to 6 cm. long, scarlet; inner perianth segments broad, obtuse; spines on ovary and flower tube brownish or yellowish, intermixed with short hairs; fruit spiny.

12. *Echinocereus maritimus* (Jones) Schum. Gesamtb. Kakt. 273. 1898.

Cereus maritimus Jones, Amer. Nat. 17: 973. 1883.

Cereus flaviflorus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 391. 1896.

Echinocereus flaviflorus Schum. Gesamtb. Kakt. 274. 1898.

West coast of Baja California; type from Ensenada.

Decidedly cespitose, often forming clumps 60 to 90 cm. broad and 30 cm. high, sometimes containing 200 joints; individual joints globose to short-cyl-

indric, 5 to 16 cm. long; ribs 8 to 10; areoles 10 to 12 mm. apart; radial spines about 10, spreading; central spines 4, stout and angled, 2.5 to 3.5 cm. long; flowers 3 to 4 cm. long, arising from near the top of the plant, light yellow; inner perianth segments oblanceolate, rounded at apex; ovary not very spiny.

13. *Echinocereus subinermis* Salm-Dyck in Seem. Bot. Voy. Herald 291. 1856.

Cereus subinermis Hemsl. Biol. Centr. Amer. Bot. 1: 546. 1880.

Northern Mexico; type collected near Chihuahua.

At first simple, 10 to 12 cm. high, afterwards a little branching at base, when young pale green, afterwards bluish and finally darker green, erect; ribs 5 to 8, broad, somewhat sinuate; spines all radial, small, conic, 1 to 2 mm. long, yellow, 3 or 4, deciduous; flowers 5 to 7 cm. long, yellow; perianth segments oblanceolate, acute; spines of areoles on ovary and flower tube short, white.

14. *Echinocereus luteus* Britt. & Rose, Contr. U. S. Nat. Herb. 16: 239. 1913.

Sonora and Sinaloa; type from Alamos, Sonora.

Stem short to elongate, sometimes branching near base, bluish green, more or less purplish, 8 or 9-ribbed; ribs rather thin, barely undulate, rounded; areoles small, 10 to 12 mm. apart; spines small, the radials 6 to 8, unequal, 2 to 8 mm. long, widely spreading, white with darker tips; central spine single, porrect; areoles on ovary and flower tube bearing white wool and light-colored spines with dark tips; flowers pale yellow, sweet-scented, 7 cm. long; outer perianth segments streaked with red; inner perianth segments lemon-yellow, oblanceolate, acute.

15. *Echinocereus chloranthus* (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 814. 1885.

Cereus chloranthus Engelm. Proc. Amer. Acad. 3: 278. 1856.

Northern Mexico. Western Texas and southern New Mexico; type from El Paso.

Cylindric, usually simple, 8 to 15 cm. long, 5 to 7 cm. in diameter; ribs about 13, often nearly hidden by the densely set spines; areoles nearly circular; radial spines several, spreading; centrals 3 or 4, not angled, in a vertical row, one much more elongate than the others, 2 to 3 cm. long; flowers yellowish green, 2 cm. long; fruit nearly globular, 5 to 10 cm. long, dark purplish red, covered with small bristly spines; seeds black, dull, pitted, the hilum nearly basal, round.

16. *Echinocereus grandis* Britt. & Rose, Cactaceae 3: 18. 1922.

Islands of Baja California; type from San Esteban Island.

Stems usually single or in small clusters, subcylindric, 10 to 40 cm. high, 8 to 12 cm. in diameter; ribs 21 to 25, low; areoles large, longer than broad, about 1 cm. apart; spines dull white or cream-colored, rather short and stiff, the radials 15 to 25, the centrals 8 to 12, often in 2 rows; flower 5 to 6 cm. long, unusually narrow, with a short limb; ovary and flower tube densely clothed with clusters of pale straw-colored spines intermixed with white hairs; outer perianth segments white, with a green medial line, inner ones narrow, 1.5 cm. long, white with green bases; fruit densely spiny.

17. *Echinocereus dasyacanthus* Engelm. in Wislitz. Mem. North. Mex. 100. 1848.

Cereus dasyacanthus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Echinocereus spinosissimus Walton, Cact. Journ. 2: 162. 1899.

Echinocereus rubescens Dams, Monatsschr. Kakteenk. 15: 92. 1905.

Chihuahua. Western Texas and southern New Mexico; type from El Paso.

Plants usually simple, cylindric, 10 to 30 cm. high, very spiny; ribs 15 to 21, 2 to 3 cm. high; areoles 3 to 5 mm. apart, short-elliptic; radial spines 16 to 24, more or less spreading, 1.5 cm. long or less, at first pinkish but gray in age; central spines 3 to 8, a little stouter than the radials, never in a single row; flowers from near the apex, often 10 cm. long, yellowish, or drying reddish; outer perianth segments linear-oblong, 4 to 5 cm. long, acute, inner ones oblong, 5 cm. long; ovary very spiny; fruit nearly globular, 2.5 to 3.5 cm. in diameter, purplish, edible.

18. *Echinocereus ctenoides* (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 819. 1885.

Cereus ctenoides Engelm. Proc. Amer. Acad. 3: 279. 1856.

Chihuahua. Texas, the type from Eagle Pass.

So far as known simple, cylindric, elongate, 10 to 40 cm. long, 8 to 10 cm. in diameter, decidedly banded with pink and gray as in the rainbow cactus; ribs 15 to 17, low; areoles crowded together, short-elliptic; radial spines often as many as 20, not spreading but standing out at an angle to the ribs; central spines 8 to 10, arranged in a single row or sometimes a little irregular; flowers up to 10 cm. long, about as wide as long when fully expanded, bright to reddish yellow; ovary and fruit very spiny.

19. *Echinocereus blanckii* (Poselger) Palmer, Rev. Hort. 36: 92. 1865.

Cereus blanckii Poselger, Allg. Gartenz. 21: 134. 1853.

Cereus berlandieri Engelm. Proc. Amer. Acad. 3: 286. 1856.

Echinocereus poselgerianus Linke, Allg. Gartenz. 25: 239. 1857.

Echinocereus leonensis Mathsson, Monatsschr. Kakteenk. 1: 66. 1891.

Northeastern Mexico; type from Camargo, Tamaulipas. Southern Texas.

Procumbent; joints slender, 3 to 15 cm. long, 2 to 2.5 cm. in diameter; ribs 5 to 7, strongly tuberculate, or when turgid scarcely tubercled; areoles 1 to 1.5 cm. apart; radial spines 6 to 8, 8 to 10 mm. long, white; central spine solitary, 10 to 50 mm. long, brownish to black; flowers purple, 5 to 8 cm. long; perianth segments narrow, oblanceolate, acute. "Alicoche" (Tamaulipas).

20. *Echinocereus pentalophus* (DC.) Rümpler; Först. Handb. Cact. ed. 2. 774. 1885.

Cereus pentalophus DC. Mém. Mus. Hist. Nat. 17: 117. 1828.

Cereus propinquus DC.; Salm-Dyck, Allg. Gartenz. 1: 366. 1833.

Echinocereus leptacanthus Schum. Gesamtb. Kakt. 260. 1898.

Eastern Mexico. Southern Texas.

Procumbent, with ascending branches, deep green; ribs 4 to 6, somewhat undulate, bearing low tubercles; radial spines 4 or 5, very short, white with brown tips; central spine 1, rarely wanting; flowers reddish violet, 7 to 12 cm. long; perianth segments broad, rounded at apex; scales on the ovary and flower tube bearing long cobwebby hairs and brownish spines.

21. *Echinocereus sciurus* (K. Brandeg.) Britt. & Rose, Cactaceae 3: 22. 1922.

Cereus sciurus K. Brandeg. Zoe 5: 192. 1904.

Southern Baja California; type from San José del Cabo.

Densely cespitose, with many individuals forming clumps sometimes 60 cm. broad; stems slender, often 20 cm. long, often nearly hidden by the many spines; ribs 12 to 17, low, divided into numerous tubercles 5 to 6 mm. apart; areoles small, approximate, circular, at first woolly, becoming naked; radial spines 15 to 18, sometimes 15 mm. long, slender, pale except the brownish tips; centrals usually several, shorter than the radials; flowers described as 7 cm. long, about 9 cm. broad when fully open; inner perianth segments in 2 to 4 rows, bright magenta; seeds 1 mm. long, tuberculate.

22. *Echinocereus cinerascens* (DC.) Rümpler; Först. Handb. Cact. ed. 2. 786. 1885.

Cereus cinerascens DC. Mém. Mus. Hist. Nat. 17: 116. 1828.

Cereus deppei Salm-Dyck, Hort. Dyck. 338. 1834.

Echinocereus cirrhiferus Rümpler; Först. Handb. Cact. ed. 2. 778. 1885.

Echinocereus glycimorphus Rümpler; Först. Handb. Cact. ed. 2. 800. 1885.

Central Mexico.

Growing in patches 60 to 120 cm. broad, branching at base, the stems ascending to about 30 cm.; ribs about 12, not very prominent, obtuse; areoles rather scattered, orbicular; spines white or pale, straight, rough, 1.5 to 2 cm. long; radials about 10; centrals 3 or 4; flowers 6 to 8 cm. long, the tube very short; scales on ovary and tube small, acute, their axils crowded with short white wool and 6 to 8 long white bristles; inner perianth segments, when dry, deep purple, 3 to 4 cm. long, obtuse.

23. *Echinocereus adustus* Engelm. in Wislitz. Mem. North. Mex. 104. 1848.

Echinocereus rufo-spinus Engelm. in Wislitz. Mem. North. Mex. 104. 1848.

Echinocereus radians Engelm. in Wislitz. Mem. North. Mex. 105. 1848.

Cereus adustus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Chihuahua; type from Cosihuiriachi.

Simple, short-cylindric, often only 4 to 6 cm. high; ribs 13 to 15; areoles closely set, elliptic; radial spines 16 to 20, appressed-pectinate, pale, the central spines wanting or solitary, sometimes elongate and porrect; flowers purplish, 3 to 4 cm. long; inner perianth segments narrow; ovary and calyx tube covered with clusters of short brown spines and long wool.

24. *Echinocereus reichenbachii* (Terscheck) Haage; Ind. Kew. 2: 813. 1893.

Echinocactus reichenbachii Terscheck; Walp. Repert. Bot. 2: 320. 1843.

Cereus caespitosus Engelm. Bost. Journ. Nat. Hist. 5: 247. 1845.

Echinocereus caespitosus Engelm. in Wislitz. Mem. North. Mex. 110. 1848.

Cereus reichenbachianus Labouret, Monogr. Cact. 318. 1853.

Echinocereus rotatus Linke, Wochenschr. Gärtn. Pflanz. 1: 85. 1858.

Northern Mexico. Texas.

More or less caespitose; stems simple, globose to short-cylindric, 2.5 to 20 cm. long, 5 to 9 cm. in diameter; ribs 12 to 19; areoles approximate, elliptic; spines 20 to 30, white to brown, pectinate, interlocking, 5 to 8 mm. long, spreading, more or less recurved; centrals 1 or 2, like the radials, or often wanting; flowers often 6 to 7 cm. long and fully as broad, light purple; perianth segments narrow, the margin more or less erose; fruit ovoid, about 1 cm. long; seeds black.

25. *Echinocereus rigidissimus* (Engelm.) Rose, Contr. U. S. Nat. Herb. 12: 293. 1909.

Cereus pectinatus rigidissimus Engelm. Proc. Amer. Acad. 3: 279. 1856.

Sonora. Southern Arizona.

Plants simple, erect, rigid, short-cylindric, 10 to 20 cm. high, 4 to 10 cm. in diameter, usually hidden by the closely set interlocking spines; ribs 18 to 22, low; areoles approximate, elliptic, 5 to 6 mm. long; radial spines about 16, gray to reddish brown, arranged in horizontal bands, pectinate, rigid, 15 mm. long or less, often recurved; central spines none; flowers purple, 6 to 7 cm. long, fully as broad when expanded; perianth segments oblong, 3 to 4 cm. long, acute; areoles on ovary somewhat floccose, very spiny; fruit globular, 3 cm. in diameter, very spiny; seeds black, tuberculate, 1.5 mm. in diameter. "Cabeza del viejo."

This species is often cultivated under the name of rainbow cactus.

- 26. *Echinocereus weinbergii* Weing.** Monatsschr. Kakteenk. **22**: 83. 1912.

Probably a native of Mexico, but known only from cultivated plants.

Very stout, usually simple, at first globose, becoming conical, at least in cultivation, 13 cm. in diameter; ribs 15, acute, more or less undulate; areoles elliptic, approximate; radial spines 9 to 12, pectinate, 3 to 12 mm. long, at first white or rose but in age yellowish; central spines none; flowers diurnal, 3.6 cm. broad, rose-colored; inner perianth segments in several series, 1.5 to 3 cm. long, 4 to 5 mm. broad, lanceolate, acuminate.

- 27. *Echinocereus pectinatus* (Scheldw.) Engelm.** in Wislitz. Mem. North. Mex. **109**. 1848.

Echinocactus pectinatus Scheldw. Bull. Acad. Brux. **5**: 492. 1838.

Echinocactus pectiniferus Lem. Cact. Hort. Monv. **25**. 1839.

Cereus pectinatus Engelm. in A. Gray, Pl. Fendl. **50**. 1849.

Central Mexico; type from Villa del Peñasco.

Plants simple, erect, cylindric, 10 to 15 cm. long, 3 to 6 cm. in diameter, almost hidden by the many short interlocking spines; ribs 20 to 22, usually straight; areoles approximate, but not touching one another, elliptic, 3 mm. long; radial spines about 30, pectinate, usually much less than 10 mm. long, white or rose-colored, the colors more or less in bands about the plant; central spines several, more or less porrect; flowers purplish, 6 to 8 cm. long; areoles on ovary and flower tube felted, very spiny; fruit spiny, becoming naked, 2 to 3 cm. in diameter.

- 28. *Echinocereus scopulorum* Britt. & Rose,** Cactaceae **3**: 30. 1922.

Sonora and Sinaloa; type from Guaymas, Sonora.

Stems single, cylindric, 10 to 40 cm. long, nearly hidden by the closely set spines; ribs 13 or more, low, somewhat tuberculate; areoles circular, devoid of wool (at least in areoles of the previous year); spines highly colored, pinkish or brownish with blackish tips, in age, however, gray and stouter; radials somewhat spreading; centrals 3 to 6, similar to the radials; flowers with a delicate rose perfume, widely spreading when fully expanded, 9 cm. broad; tube 2 cm. long, broadly funnelform, bearing greenish tubercles; inner perianth segments 4 cm. long, rose or purplish rose, much paler on the outside, sometimes nearly white, oblanceolate to spatulate, crosely dentate, acute.

- 29. *Echinocereus roetteri* (Engelm.) Rümpler;** Först. Handb. Cact. ed. 2. **829**. 1885.

Cereus roetteri Engelm. Proc. Amer. Acad. **3**: 345. 1856.

Echinocereus kunzei Gürke, Monatsschr. Kakteenk. **17**: 103. 1907.

Chihuahua. Texas and New Mexico; type from El Paso.

Cespitose, or perhaps sometimes simple and occasionally budding above, 10 to 25 cm. high; ribs 13, straight, more or less undulate; areoles circular, or a little longer than broad, about 1 cm. apart; radial spines 15 to 17, acicular, about 1 cm. long, white or purplish; central spines 1 to 5, not in a single row, a little stouter but scarcely longer than the radials; flowers appearing below the top of the plant, 6 to 7 cm. long, light purple; outer perianth segments greenish yellow; inner perianth segments oblanceolate, acute, 3 to 4 cm. long; ovary and fruit spiny.

- 30. *Echinocereus chlorophthalmus* (Hook.) Britt. & Rose,** Contr. U. S. Nat. Herb. **16**: 242. 1913.

Echinocactus chlorophthalmus Hook. in Curtis's Bot. Mag. **74**: pl. 4373. 1848.

Known only from the type locality, Real del Monte, Hidalgo.

Cespitose, nearly globose, glaucous-green; ribs 10 to 12, somewhat tuberculate; areoles circular; radial spines 7 to 10, slender, needle-like, 12 to 18 mm. long, spreading; central spine one, stouter than the radials, the central as well as the radials pale brown but reddish at base when young; inner perianth segments spatulate, acute, somewhat serrate toward the tip, glossy above, purple, whitish at base; ovary and fruit spiny.

31. *Echinocereus knippelianus* Liebner, Monatsschr. Kakteenk. 5: 170. 1895.

Echinocereus liebnerianus Carp. Balt. Cact. Journ. 2: 262. 1896.

Echinocereus inermis Haage, Monatsschr. Kakteenk. 8: 130. 1898.

Cereus knippelianus Orcutt, West. Amer. Sci. 13: 27. 1902.

Native of Mexico, but range not known.

At first simple, stout, a little higher than broad, about 10 cm. high, but in cultivation elongate, 20 cm. high or more, branching, very deep green, becoming turgid and flabby; ribs 5 to 7, more prominent toward the top of the plant, sometimes strongly tuberculate, at other times only slightly sinuate; areoles minute, white-felted, 5 to 6 mm. apart; spines 1 to 3, weak, 3 to 6 mm. long, yellow; flowers pinkish, 2.5 to 3 cm. long; perianth segments spreading, oblanceolate, acute; fruit not known.

32. *Echinocereus pulchellus* (Mart.) Schum. in Engl. & Prantl, Pflanzenfam. 3^{ea}: 185. 1894.

Echinocactus pulchellus Mart. Nov. Act. Nat. Cur. 16: 342. 1828.

Cereus pulchellus Pfeiff. Enum. Cact. 74. 1837.

Probably in central Mexico; type said to have come from Pachuca, Hidalgo.

Stems obovate-cylindric, 5 to 7 cm. high, simple, glaucous; ribs 12, obtuse, more or less divided into tubercles; spines 3 to 5, short, straight, deciduous, yellowish; flowers rosy white, about 4 cm. broad; inner perianth segments lanceolate, acuminate.

33. *Echinocereus amoenus* (Dietr.) Schum. in Engl. & Prantl, Pflanzenfam. 3^{ea}: 185. 1894.

Echinopsis amoena Dietr. Allg. Gartenz. 12: 187. 1844.

Cereus amoenus Hemsl. Biol. Centr. Amer. Bot. 1: 540. 1880.

San Luis Potosí.

Plants low, almost buried in the ground; ribs usually 13, low, somewhat tuberculate; young areoles bearing 6 to 8 rather stout short spreading spines; old areoles spineless; flowers about 5 cm. broad, magenta; inner perianth segments spatulate, with an ovate acute tip; areoles of the ovary and flower tube bearing brown spines and cobwebby wool.

34. *Echinocereus palmeri* Britt. & Rose, Cactaceae 3: 34. 1922.

Type from the City of Chihuahua.

Plants 5 to 8 cm. high, 2 to 3 cm. in diameter; areoles closely set, round; radial spines 12 to 15, spreading, slender, brown-tipped; central spine one, porrect, 1.5 to 2 cm. long, brown to blackish; flower 3.5 cm. long, purple; areoles on the ovary bearing a cluster of brown spines and white wool.

35. *Echinocereus brandegeei* (Coulter) Schum. Gesamtb. Kakt. 290. 1898.

Cereus brandegeei Coulter, Contr. U. S. Nat. Herb. 3: 389. 1896.

Cereus sanborgianus Coulter, Contr. U. S. Nat. Herb. 3: 391. 1896.

Southern Baja California; type from Campo Alemán.

Always growing in clumps; joints sometimes one meter long or more, 5 cm. in diameter, but usually much narrowed toward the base; ribs strongly tubercled; areoles circular; spines at first light yellow tinged with red, in age

dark gray; radial spines about 12, spreading, acicular; central spines usually 4, very much stouter, more or less flattened, erect or porrect, the lowest one decidedly so, sometimes 8 cm. long; flowers purplish, about 5 cm. long; areoles on ovary and tube closely set, filled with pale acicular spines and long white wool; fruit globular, 3 cm. in diameter, spiny; seeds black, tuberculately roughened.

For an illustration of this species see Contr. U. S. Nat. Herb. 16: *pl.* 124.

36. *Echinocereus hempelii* Fobe, Monatsschr. Kakteenk. 7: 187. 1897.

Native of Mexico, but known only from cultivated plants.

Plant, so far as known, simple, erect, 15 cm. long or more, 6 to 7 cm. in diameter, dark green; ribs 10, strongly tuberculate; radial spines 6, spreading, white with brown tips, acicular, 1 cm. long or less; central spines none; flowers from near the top of plant, 6 to 8 cm. broad, violet; inner perianth segments about 14, loosely arranged, oblong, 3 cm. long, strongly toothed above; ovary bearing conspicuous red scales, spiny.

37. *Echinocereus merkeri* Hildmann; Schum. Gesamtb. Kakt. 277. 1898.

Cereus merkeri Berger, Rep. Mo. Bot. Gard. 16: 81. 1905.

Durango, Coahuila, and San Luis Potosí.

Cespitose; joints erect, 12 to 15 cm. in diameter, light green; ribs 8 or 9, sinuate; radial spines 6 to 9, white, shining; central spines 1 or rarely 2, often yellowish, larger than the radials, red at base; flowers purple, about 6 cm. long; inner perianth segments short-oblong, 3 cm. long, rounded at apex, sometimes mucronate; scales on ovary 2 to 3 cm. long, ovate, acuminate, bearing 2 to 5 long spiny bristles in their axils.

38. *Echinocereus fendleri* (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 801. 1885.

Cereus fendleri Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Sonora and Chihuahua. Texas to Utah and Arizona; type from Santa Fe, New Mexico.

Cespitose; stems about 8, ascending or erect, 10 to 30 cm. long, 5 to 7.5 cm. in diameter; ribs rather prominent, 9 to 12, somewhat undulate; spines very variable as to color, length, and form; radial spines 5 to 10, more or less spreading, 1 to 2 cm. long, acicular to subulate; central spine solitary, usually porrect, 4 cm. long or less, dark-colored, often black-bulbose at base; flowers borne at the upper part of the plant, 10 cm. broad when fully expanded, but sometimes smaller, deep purple; inner perianth segments spatulate, 3 to 4 cm. long, acute, the margin sometimes serrulate; ovary deep green, its areoles bearing white felt and white bristly spines; fruit ovoid, 2.5 to 3 cm. long, purplish, edible; seeds 1.4 mm. long.

39. *Echinocereus enneacanthus* Engelm. in Wislitz. Mem. North. Mex. 112. 1848.

Cereus enneacanthus Engelm. in A. Gray, Pl. Fendl. 50. 1849.

Echinocereus carnosus Rümpler; Först. Handb. Cact. ed. 2. 796. 1885.

Northern Mexico; type from San Pablo, Chihuahua. New Mexico and Texas.

Cespitose, with many stems, often forming clumps one meter in diameter or more; joints often elongate, prostrate, 5 to 7 cm. in diameter; ribs 7 or 8, prominent, more or less tuberculate, somewhat flabby, dull green; areoles 2.5 cm. apart; radial spines unequal, usually less than 12 mm. long, acicular, at first yellowish, becoming brownish; central spine solitary, usually elongate,

nearly terete, 3 to 5 cm. long; flower purple, 7.5 cm. broad; perianth segments nearly oblong; fruit globular, juicy, edible.

Because of the delicious strawberry-like flavor of the fruit, this plant is known in Texas as strawberry cactus. The fruit is eaten raw and also used for making preserves.

40. *Echinocereus engelmannii* (Parry) Rümpler; Först. Handb. Cact. ed. 2. 805. 1885.

Cereus engelmannii Parry, Amer. Journ. Sci. II. 14: 338. 1852.

Sonora and Baja California. Utah and Arizona to California; type from San Felipe, California.

Cespitose, forming large clumps; joints erect or ascending, cylindric, 10 to 30 cm. long, 5 to 6 cm. in diameter; ribs 11 to 14, low, obtuse; areoles large, nearly circular; radial spines about 10, appressed, stiff, about 1 cm. long; central spines 5 or 6, very stout, more or less curved and twisted, terete or somewhat flattened, sometimes 7 cm. long, yellowish to brown, more or less variegated; flowers 5 to 8 cm. long, and even broader when fully expanded, purple; perianth segments oblong, 3 to 4 cm. long, acuminate; scales on ovary 3 to 5 mm. long, acuminate; areoles felted and bearing stout bristles; fruit ovoid to oblong, spiny, about 3 cm. long; seeds black, nearly globular, or a little oblique, 1.5 mm. in diameter or less, tuberculate.

41. *Echinocereus sarissophorus* Britt. & Rose, Cactaceae 3: 38. 1922.

Chihuahua and Coahuila; type from Saltillo, Coahuila.

Cespitose; stems short, thick, pale green, about 10 cm. thick; ribs 9; radial spines 7 to 10, slender; centrals several, 5 to 8 cm. long, often bluish, somewhat angled; flowers purplish, 7 to 8 cm. long; inner perianth segments broad; areoles on ovary and flower tube bearing short white wool and 3 to 5 long pale bristle-like spines; fruit globular, 2 to 3 cm. in diameter, covered with clusters of deciduous spines; seeds black.

42. *Echinocereus dubius* (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 787. 1885.

Cereus dubius Engelm. Proc. Amer. Acad. 3: 282. 1856.

Western Texas, the type from El Paso; doubtless also in Chihuahua.

Somewhat cespitose; stems 12 to 20 cm. long, pale green, of soft flabby texture, 7 to 9-ribbed; ribs broad; spines white; radial spines 5 to 8, 12 to 30 cm. long; centrals 1 to 4, 3.5 to 7.5 cm. long, angled, often curved; flowers pale purple, 6 cm. long or more, with rather few and narrow perianth segments; scales on flower tube bearing 1 to 3 white bristles in their axils; fruit very spiny, 2.5 to 3 cm. long; seeds covered with confluent tubercles.

43. *Echinocereus conglomeratus* Först. Gartenflora 39: 405. 1890.

Cereus conglomeratus Berger, Rep. Mo. Bot. Gard. 16: 81. 1905.

Nuevo León, Coahuila, and Zacatecas; type from Rinconada, near Monterrey, Nuevo León.

Cespitose, forming large clumps; joints simple, often half covered in the ground, 10 to 20 cm. long; ribs 11 to 13, slightly undulate; areoles 1 to 1.5 cm. apart, small, circular, slightly felted; spines white to brownish; radial spines acicular, 1.5 to 2.5 cm. long, spreading; central spines several, elongate, often 7 cm. long, very flexible; flowers 6 to 7 cm. long, broad and open, purplish; perianth segments broad, 2 cm. long; spines on ovary and flower long, white, more or less curved; fruit globular, 3 cm. in diameter, somewhat acid, edible; seeds numerous. "Pitahaya," "pitahaya de agosto," "alicoche."

44. *Echinocereus stramineus* (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 797. 1885.

Cereus stramineus Engelm. Proc. Amer. Acad. 3: 282. 1856.

Chihuahua. Western Texas and southern New Mexico; type from El Paso.

Plants grouped in masses forming immense mounds 1 to 2 meters in diameter and 30 to 100 cm. high; joints 12 to 25 cm. long, 3 to 7 cm. in diameter; ribs about 13, almost hidden by the long spines; spines at first brownish to straw-colored, in age nearly white; radial spines 7 to 14, 2 to 3 cm. long, spreading; central spines 3 or 4, 5 to 9 cm. long; flowers purple, 8 to 12 cm. long; perianth segments oblong, 3 to 4 cm. long, rounded at apex; spines from the axils of scales on ovary and flower tube, 2 to 5, short, white; fruit nearly globular, 3 to 4 cm. in diameter, red, spiny at first, becoming glabrous, edible; seeds 1.5 mm. in diameter, somewhat oblique. "Pitahaya."

45. *Echinocereus barthelowanus* Britt. & Rose, Cactaceae 3: 41. 1922.

Type from Santa María Bay, Baja California.

Plants cespitose, forming large clusters; stems cylindric, 10 to 20 cm. long, 4 to 5 cm. in diameter; ribs about 10, somewhat tuberculate below, but completely hidden by the stout numerous spines; areoles 2 to 5 mm. apart, white-felted when young; spines numerous, acicular, sometimes 7 cm. long, pinkish when quite young, afterwards white or yellow with brown or blackish tips, in age becoming gray; flowers only 10 to 12 mm. long; perianth segments oblong, 3 to 4 mm. long; ovary minute, strongly tubercled, hidden under the mass of spines; spine clusters on ovary with 6 to 12 white or pinkish-tipped spines, half as long as the flower.

46. *Echinocereus mamillatus* (Engelm.) Britt. & Rose, Cactaceae 3: 41. 1922.

Cereus mamillatus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 405. 1896.

Southern Baja California; type from Mulegé.

Cespitose; stems ascending, 20 to 30 cm. long, cylindric, 3.5 to 6 cm. in diameter; ribs 20 to 25, sometimes oblique, strongly tuberculate; spines white or pinkish; radial spines 10 to 25, acicular, 3 to 12 mm. long; central spines 3 or 4, much stouter than the radials, 1 to 2.5 cm. long.

This and the following species are omitted from the key because their characters are still imperfectly known.

47. *Echinocereus ehrenbergii* (Pfeiff.) Rümpler; Först. Handb. Cact. ed. 2. 775. 1885.

Cereus ehrenbergii Pfeiff. Allg. Gartenz. 8: 282. 1840.

Central Mexico.

Cespitose, 20 cm. high; joints often procumbent, pale or leaf-green; ribs 6, obtuse, sinuate; areoles 2 cm. apart, white-felted; radial spines 8 to 10, slender, white; central spines 3 or 4, yellowish at base.

48. *Echinocereus longisetus* (Engelm.) Rümpler; Först. Handb. Cact. ed. 2. 822. 1885.

Cereus longisetus Engelm. Proc. Amer. Acad. 3: 280. 1856.

Coahuila; type from Santa Rosa.

Plants simple or nearly so, cylindric, 15 to 25 cm. long, 5 to 7.5 cm. in diameter; ribs 11 to 14, somewhat tubercled; areoles circular; spines slender, elongate, white; radial spines 18 to 20, spreading, the lower 10 to 15 mm. long, much longer than the upper; central spines 5 to 7, very unequal, the lower elongate, 2.5 to 5.5 cm. long, deflexed; flowers said to be red.

26. ARIOCARPUS Scheidw. Bull. Acad. Brux. 5: 491. 1838.

Plants spineless, usually simple, low, with flat or round top; tubercles tough, horny, or cartilaginous, triangular, imbricate, spirally arranged, the lower part tapering into a claw, the upper or bladelike part expanded; areoles terminal or at the bottom of a triangular groove near the middle of tubercle, filled with hair when young; flowers appearing from near the center on young tubercles, diurnal, rotate-campanulate, white to purple; fruit oblong, smooth; seeds black, tuberculately roughened, with a large basal hilum; embryo described as obovate, straight.

The following are the only species known:

- Tubercles not grooved on upper side-----1. *A. retusus*.
 Tubercles grooved on the upper side.
 Plants small, 3 to 5 cm. broad-----2. *A. kotschoubeyanus*.
 Plants large, 10 to 15 cm. broad-----3. *A. fissuratus*.

1. *Ariocarpus retusus* Scheidw. Bull. Acad. Brux. 5: 492. 1838.

Anhalonium prismaticum Lem. Cact. Hort. Monv. 1. 1839.

Anhalonium retusum Salm-Dyck, Cact. Hort. Dyck. 1844. 15. 1845.

Anhalonium elongatum Salm-Dyck, Cact. Hort. Dyck. 1849. 77. 1850.

Anhalonium areolosum Lem. Illustr. Hort. Lem. 6: Misc. 35. 1859.

Anhalonium pulvilligerum Lem. Illustr. Hort. Lem. 16: Misc. 72. 1869.

Mamillaria areolosa Hemsl. Biol. Centr. Amer. Bot. 1: 503. 1880.

Mamillaria elongata Hemsl. Biol. Centr. Amer. Bot. 1: 509. 1880.

Mamillaria prismatica Hemsl. Biol. Centr. Amer. Bot. 1: 519. 1880.

Mamillaria furfuracea S. Wats. Proc. Amer. Acad. 25: 150. 1890.

Anhalonium trigonum Weber, Dict. Hort. Bois 90. 1893.

Coahuila, Zacatecas, and San Luis Potosí.

Plants globular or more or less depressed, usually 10 to 12 cm. broad, grayish green to purplish, very woolly at the center; tubercles horny, imbricate, 5 cm. long or less, ovate, more or less 3-angled, acute to acuminate, often with a woolly areole on the upper side near the tip and this sometimes spinescent; flowers borne at the axils of young tubercles near the center, white or nearly so, up to 6 cm. long; outer perianth segments pinkish, narrow, acute to acuminate; inner perianth segments at first white, afterwards pinkish, narrowly oblanceolate, with mucronate tip; fruit oblong, white, naked; seeds globular, 1.5 mm. in diameter, black, tuberculate-roughened. "Chaute," "chautle."

According to Ochoterena, the name "peyote" is sometimes erroneously applied to this species.

2. *Ariocarpus kotschoubeyanus* (Lem.) Schum. in Engl. & Prantl, Pflanzenfam. Nachtr. 259. 1897.

Anhalonium kotschoubeyanum Lem., Bull. Cercl. Confér. Hort. Seine. 1842.

Anhalonium sulcatum Salm-Dyck, Cact. Hort. Dyck. 1849. 5. 1850.

Central Mexico.

Plants grayish green, 3 to 5 cm. broad, only the flat crown appearing above the surface of the ground, with a thickened fleshy rootstock, and with several spindle-shaped roots from the base; upper part of tubercle flattened, triangular, 6 to 8 mm. long, grooved along its middle almost to the tip, the groove very woolly; flowers 2.5 to 3 cm. long, originating in the center of the plant from the axils of the young tubercles, surrounded by a cluster of hairs; outer perianth segments few, brownish, obtuse; inner perianth segments up to 2 cm. long, oblanceolate, obtuse or apiculate, sometimes retuse, rose-colored to light purple, widely spreading; ovary naked; seeds oblong, 1 mm. long. "Pezúfia de venado" (Nuevo León).

This species was first collected by Karwinsky, who sent to Germany three plants of it about 1840. One of these plants is said to have been sold for 1,000 francs.

3. *Ariocarpus fissuratus* (Engelm.) Schum. in Engl. & Prantl, Pflanzenfam. 3^{6a}: 195. 1894.

Mammillaria fissurata Engelm. Proc. Amer. Acad. 3: 270. 1856.

Anhalonium fissuratum Engelm. U. S. & Mex. Bound. Cact. 75. 1859.

Ariocarpus lloydii Rose, Contr. U. S. Nat. Herb. 13: 308. 1911.

Coahuila and Zacatecas. Western Texas, the type collected near the mouth of the Pecos River.

Plant body scarcely appearing above the ground, flat or somewhat rounded, sometimes 15 cm. broad; tubercles imbricate, ovate, the upper part 2 to 3 cm. broad at base, acute or obtuse, the whole surface more or less fissured and irregularly warty; areoles filled with a dense mass of hairs; flowers 3 to 4 cm. broad, white to purple; inner perianth segments oblong-ob lanceolate; fruit oval, pale green, 10 mm. long; seeds black, tuberculate-roughened. "Chaute," "chautle," "peyote cimarrón."

The name "peyote" is said to be sometimes incorrectly applied to this species.

27. *LOPHOPHORA* Coulter, Contr. U. S. Nat. Herb. 3: 131. 1894.

A single species is known.

1. *Lophophora williamsii* (Lem.) Coulter, Contr. U. S. Nat. Herb. 3: 131. 1894.

Echinocactus williamsii Lem.; Salm-Dyck, Allg. Gartenz. 13: 385. 1845.

Anhalonium williamsii Lem.; Först. Handb. Cact. ed. 2. 233. 1885.

Anhalonium lewinii Hennings, Gartenflora 37: 410. 1888.

Lophophora lewinii Thompson, Rep. Mo. Bot. Gard. 9: 133. 1898.

Central and eastern Mexico. Southern Texas.

Plants dull bluish green, globular to top-shaped or somewhat flattened at top, 5 to 8 cm. broad, with a thickened tap-root sometimes 10 cm. long or more; ribs 7 to 13, nearly vertical or irregular and indistinct, tubercled; flowers central, each surrounded by a mass of long hair, in color pale pink to white, 2.5 cm. broad when fully open, with a broad funnelform tube; outer perianth segments nearly white; style white below, pinkish above, shorter than the perianth segments; stigma lobes 5, linear, pinkish; ovary naked; fruit 2 cm. long or less; seeds 1 cm. in diameter, with a broad basal hilum. "Peyote"; "hikuli" (Huichol and Tarahumare); "kamaba" (Tepehuane, *Ochoterena*); "señí," "wokowi" (Querétaro, *Ramírez*).

This is a well-known plant in Mexico, and an account of it was published by Sahagún in the sixteenth century. The peyote contains a narcotic substance that has been the subject of much study with regard to its chemical and physiological properties. The name anhalonin has been given to a supposed alkaloid separated from the plant, but other persons claim that the narcotic properties are due to the presence of certain resinous bodies.

The dried plants have been in use among the native people since precolumbian times, and are still employed, although their use is forbidden by law. Eating a piece of the dried plant results in remarkable visions and hallucinations, and the general effects are somewhat like those resulting from the use of hashish.¹

¹ See Manuel Urbina, El peyote y el ololuhqui, Anal. Mus. Nac. Méx. 7: 25-48. pl. 1. 1900.

28. EPITHELANTHA Weber; Britt. & Rose, Cactaceae 3: 92. 1922.

A single species is known.

1. *Epithelantha micromeris* (Engelm.) Weber; Britt. & Rose, Cactaceae 3: 93. 1922.

Mammillaria micromeris Engelm. Proc. Amer. Acad. 3: 260. 1856.

Mammillaria micromeris greggii Engelm. Proc. Amer. Acad. 3: 261. 1856.

Mammillaria greggii Safford, Ann. Rep. Smiths. Inst. 1908: 531. 1909.

Northern Mexico. Western Texas.

Plants small, simple or cespitose, nearly globular, but depressed at apex, 6 cm. in diameter or less; tubercles very low, small, arranged in many spirals, 1 mm. long; spines numerous, white, the lower radials about 2 mm. long, the upper radials on the young tubercles 6 to 8 mm. long and connivent over the apex, narrowly clavate, the upper half finally falling off; flowers from near the center of the plant in a tuft of wool and spines; flower very small, whitish to light pink, 6 mm. broad; perianth segments 8 to 10; stamens 10 to 15; stigma lobes 3; fruit 8 to 12 mm. long; seeds 1.5 mm. broad.

The fruits, known as "chilotes," are slightly acid and edible.

29. HAMATOCACTUS Britt. & Rose, Cactaceae 3: 104. 1922.

A single species is known.

1. *Hamatocactus setispinus* (Engelm.) Britt. & Rose, Cactaceae 3: 104. 1922.

Echinocactus setispinus Engelm. Bost. Journ. Nat. Hist. 5: 246. 1845.

Echinocactus muehlenpfordtii Fennel, Allg. Gartenz. 15: 65. 1847.

Echinocactus hamatus Mühlenpf. Allg. Gartenz. 16: 18. 1884. Not *E. hamatus* Forbes. 1837.

Echinocactus hamulosus Regel, Ind. Sem. Hort. Petrop. 34. 1856.

Echinopsis nodosa Linke, Wochenschr. Gärt. Pflanz. 1: 85. 1858.

Echinocactus nodosus Hemsl. Biol. Centr. Amer. Bot. 1: 535. 1880.

Northern Mexico. Southern Texas, the type collected along the Colorado River.

Plants up to 15 cm. high, with long fibrous roots; ribs usually 13, more or less oblique, thin, high, undulate on the margin; radial spines 12 to 16, slender, often 4 cm. long, some white, others brownish; central spines 1 to 3, longer than radials; flower 4 to 7 cm. long, yellow, with a red center; inner perianth segments oblong, acute, widely spreading; fruit 8 mm. in diameter, nearly naked; seeds 1.2 to 1.6 mm. in diameter.

30. STROMBOCACTUS Britt. & Rose, Cactaceae 3: 106. 1922.

A single species is known.

1. *Strombocactus disciformis* (DC.) Britt. & Rose, Cactaceae 3: 106. 1922.

Mammillaria disciformis DC. Mém. Mus. Hist. Nat. 17: 114. 1828.

Echinocactus turbiniformis Pfeiff. Allg. Gartenz. 6: 275. 1838.

Mammillaria turbinata Hook. in Curtis's Bot. Mag. 69: pl. 3984. 1843.

Echinocactus disciformis Schum. in Engl. & Prantl, Pflanzenfam. 3^{ea}: 189. 1894.

Central Mexico; type from Mineral del Monte, Hidalgo.

Plants small, depressed, turbinate or semiglobose, 5 to 6 cm. broad; tubercles somewhat chartaceous, imbricate, more or less winged, bearing 1 to 4 white acicular spines when young, naked when old; young areoles with white wool, naked in age; flowers from center of plant, 2 cm. long or less; scales and outer perianth segments dark red, with whitish margins; inner perianth seg-

ments white, lanceolate, acute, spreading; filaments much shorter than the inner perianth segments, purple; stigma lobes about 7, long, twisted; ovary naked except at top, small; fruit 7 mm. long; seeds 3 mm. in diameter.

31. LEUCHTENBERGIA Hook. in Curtis's Bot. Mag. 74: pl. 4393. 1848.

A single species is known.

1. Leuchtenbergia principis Hook. in Curtis's Bot. Mag. 74: pl. 4393. 1848.

Central and northern Mexico; type from Real del Monte, Hidalgo.

Plants up to 50 cm. high, 5 to 7 cm. in diameter, with a large or branched tap-root, often 12 cm. long; tubercles erect, ascending or widely spreading, very woolly in their axils, bluish green, 10 to 12.5 cm. long, more or less 3-angled, nearly truncate at apex, gradually dying off below and leaving broad scars on the trunk; spines papery, thin; radial spines 8 to 14, about 5 cm. long; central spines 1 or 2, sometimes 10 cm. long; flowers lasting for several days, fragrant, solitary, from just below the tips of the young tubercles, more or less funnelform, the limb when widely expanded 10 cm. broad; outer perianth segments reddish with a brown stripe down the middle; inner perianth segments oblong, acute, serrate at apex; stamens and style somewhat exserted; stigma lobes 9 to 12, linear; fruit probably dry; seeds dark brown, minutely tuberculate.

The plants are said to be employed as a remedy for wounds in beasts of burden.

32. ECHINOFOSSULOCACTUS Lawrence; Loud. Gard. Mag. 17: 317. 1841.

Mostly rather small plants, rarely over 10 cm. in diameter, but generally much smaller, usually solitary, rarely clustered, deep-seated in the ground, globular or depressed, or very old plants becoming short-cylindric; ribs usually numerous, in one species as few as 10, in other 50 to 100, usually very thin, more or less wavy; areoles on each rib sometimes only 1 or 2, always felted when young; spines in numerous clusters often covering the plant, some of them strongly flattened and ribbon-like; flowers small, campanulate to sub-rotate with a very short tube; stamens numerous, shorter than the perianth segments; scales on the perianth and ovary few to numerous, scarious, naked in their axils; fruit globular to short-oblong, bearing a few papery scales, these perhaps deciduous in age; seeds black with a broad basal truncate hilum.

All the species of the genus are natives of Mexico.

Ribs thick at base, triangular in cross-section.

Ribs 10 to 14-----1. *E. coptonogonus*.

Ribs about 35-----2. *E. hastatus*.

Ribs always numerous, very thin, even at base.

Ribs 100 or more-----3. *E. multicostatus*.

Ribs 25 to 55.

Radial spines all or partly acicular.

Upper radial spines, like the others, acicular, white, straight.

Flowers greenish yellow.

Central spines terete-----4. *E. wippermannii*.

Central spines narrow but flattened-----5. *E. heteracanthus*.

Flowers not greenish yellow.

Central spines 4-----6. *E. albatius*.

Central spines 3.

Central spines annulate; apex of plant not depressed.

7. *E. lloydii*.

Central spines not annulate; apex of plant umbilicate.

8. *E. zacatecasensis*.

Upper radial spines subulate, some of them flattened.

Spines all yellow or white.

Spines 5 or 6-----9. *E. lamellosus*.

Spines 8 to 11-----10. *E. grandicornis*.

Spines partly (central and upper ones) brownish-----11. *E. arrigens*.

Radial spines never acicular.

Perianth segments much elongate and widely spreading or recurved.

20. *E. lancifer*.

Perianth segments rather short.

Spines all appressed against the plant-----12. *E. violaciflorus*.

Spines partly erect or porrect.

Ribs about 25.

Spines partly (four upper ones) much elongate.

13. *E. obvallatus*.

Spines all similar.

Spines 5-----14. *E. pentacanthus*.

Spines 10 or more-----15. *E. crispatus*.

Ribs 30 or more.

Radial spines white-----16. *E. dichroacanthus*.

Radial spines brown.

Flowers purplish-----17. *E. anfractuusus*.

Flowers yellow.

Upper and flattened spines 3, rather short, red.

18. *E. tricuspidatus*.

Upper and flattened spines usually 1, rarely 2.

19. *E. phyllacanthus*.

1. *Echinofossulocactus coptonogonus* (Lem.) Lawrence; Loud. Gard. Mag. 17: 317. 1841.

Echinocactus coptonogonus Lem. Cact. Aliq. Nov. 23. 1838.

Reported from San Luis Potosí and Hidalgo.

Simple or perhaps cespitose, globular or a little depressed, 7 to 10 cm. high, glaucous-green; ribs stout, 1.5 cm. high, 10 to 14, acute; areoles about 2 cm. apart, when young abundantly floccose, but in age naked; spines 3 to 5, stout, a little incurved, the longest 3 cm. long, flattened; flowers 3 cm. long, 4 cm. broad; inner perianth segments numerous, linear-oblong, acute, purple with white margins; ovary brownish violet, bearing thin scales.

2. *Echinofossulocactus hastatus* (Hopffer) Britt. & Rose, Cactaceae 3: 111. 1922.

Echinocactus hastatus Hopffer; Schum. Gesamtb. Kakt. 376. 1898.

Hidalgo.

Simple, depressed-globose, 10 cm. high, 12 cm. in diameter; ribs 35, triangular in section, light green, somewhat crenate; radial spines 5 or 6, very short, straight, yellow, the upper ones flattened, often 3 cm. long; central spine solitary, 4 cm. long, porrect; flowers white (the largest in this genus); fruit becoming dry; seeds obovate, 1.5 mm. long, brownish gray, shining, finely punctate.

3. *Echinofossulocactus multicostatus* (Hildemann) Britt. & Rose, Cactaceae 3: 111. 1922.

Echinocactus multicostatus Hildemann; Mathsson, Gartenflora 39: 465. 1890.

Eastern Mexico; type said to have come from Saltillo, Coahuila.

Simple, usually globose, but sometimes depressed, 6 to 10 cm. in diameter; ribs 100 or more, very thin, wavy, each bearing only a few areoles; areoles

pubescent when young; spines usually 6 to 9, divided into two classes, the 3 upper spines elongate, 4 to 8 cm. long, erect or ascending, flexible, rather thin but not very broad, yellowish to brownish; lower spines spreading, weak-subulate, 5 to 15 mm. long; flowers 2.5 cm. long; outer perianth segments oblong, acuminate; inner perianth segments oblong, acute or obtuse; scales on the flower tube oblong, acuminate; scales on the ovary broadly ovate, acute to acuminate, very thin, more or less papery, early deciduous.

4. *Echinofossulocactus wippermannii* (Mühlenpf.) Britt. & Rose, *Cactaceae* 3: 111. 1922.

Echinocactus wippermannii Mühlenpf. *Allg. Gartenz.* 14: 370. 1846.
Hidalgo.

Simple, obovoid, 15 cm. high, 5 to 6 cm. in diameter, dull green; ribs 35 to 40, compressed, slightly undulate; areoles 12 mm. apart, hairy when young, glabrate in age; radial spines 18 to 22, setaceous, white, 15 mm. long; central spines 3 or 4, erect, elongate, 2 to 5 cm. long, subulate, terete, blackish; flowers 1.5 mm. long, dull yellow.

5. *Echinofossulocactus heteracanthus* (Mühlenpf.) Britt. & Rose, *Cactaceae* 3: 112. 1922.

Echinocactus heteracanthus Mühlenpf. *Allg. Gartenz.* 13: 345. 1845.

Echinocactus tetraxiphus Otto; Schum. *Gesamtb. Kakt.* 363. 1898.

Hidalgo, the type from Real del Monte.

Globose to short-cylindric, light green, nearly hidden by the closely set spines; ribs 30 to 34, much compressed, somewhat undulate; areoles white, hairy when young; radial spines 11 to 13 (16 to 18, according to Schumann), acicular, white, spreading; central spines 4, brownish to flesh-colored, more or less annulate, compressed; flowers greenish yellow (according to Schumann).

6. *Echinofossulocactus albatu*s (Dietr.) Britt. & Rose, *Cactaceae* 3: 112. 1922.

*Echinocactus albatu*s Dietr. *Allg. Gartenz.* 14: 170. 1846.

Mexico, but range not known.

Simple, depressed-globose, 10 to 12 cm. in diameter, glaucous, the apex covered with spines; ribs about 35, flat, undulate; spines yellowish white; radial spines 10, setaceous, 1 cm. long; central spines 4, the uppermost flat and annulate, the central terete, porrect; flowers white, 2 cm. long.

7. *Echinofossulocactus lloydii* Britt. & Rose, *Cactaceae* 3: 113. 1922.

Zacatecas.

Nearly globular, 12 cm. in diameter or more, crowned by the long overtopping connivent spines; ribs very numerous, thin, more or less folded; areoles brown, woolly when young; radial spines acicular, 10 to 15, white, 2 to 8 mm. long, spreading; central spines 3, light brown, much elongate, somewhat incurved and connivent, the two lateral ones similar and not so papery, the middle one very thin, annulate, 4 to 9 cm. long; flowers small, nearly white; outer perianth segments with a green stripe on the midvein; inner perianth segments thin, narrowly oblong, acute; scales on the ovary ovate, acute, very thin.

8. *Echinofossulocactus zacatecasensis* Britt. & Rose, *Cactaceae* 3: 113. 1922.

Zacatecas.

Plants solitary, globular, 8 to 10 cm. in diameter; ribs pale green, very thin, about 55; radial spines 10 to 12, spreading, acicular, white, 8 to 10 mm. long; central spines 3, brownish, 2 of them terete, but the middle one flattened,

erect or connivent, longer than the other 2, sometimes 3 to 4 cm. long, never annulate; flowers 3 to 4 cm. broad, nearly white; inner perianth segments linear-oblong, with an ovate apiculate tip, slightly tinged with lavender, 15 mm. long; scales on the ovary broadly ovate, apiculate, scarious.

9. *Echinofossulocactus lamellosus* (Dietr.) Britt. & Rose, *Cactaceae* 3: 113. 1922.

Echinocactus lamellosus Dietr. *Allg. Gartenz.* 15: 177. 1847.

Hidalgo.

Subglobose to short-cylindric, more or less depressed at apex; ribs about 30, strongly flattened, more or less undulate; areoles remote, tomentose when young; spines 5 or 6, white with brown tips; flowers tubular, 3.5 to 4 cm. long; inner perianth segments linear to linear-lanceolate, acute.

10. *Echinofossulocactus grandicornis* (Lem.) Britt. & Rose, *Cactaceae* 3: 114. 1922.

Echinocactus grandicornis Lem. *Cact. Hort. Monv.* 30. 1839.

Mexico, the range not known.

Plants simple, globose to slender-cylindric, 10 cm. high, 5 to 6 cm. in diameter, glaucous-green, the apex hidden by the spines; ribs 34 or 35, much compressed, acute, undulate; areoles only a few to each rib, tomentose when young, naked in age; spines 8 to 11, at first yellowish; upper spines erect, stout, flat, 5 cm. long, the 2 lateral ones not so stout, a little shorter and nearly terete, the other spines slender; flowers whitish purple.

11. *Echinofossulocactus arrigens* (Link) Britt. & Rose, *Cactaceae* 3: 114. 1922.

Echinocactus arrigens Link; Dietr. *Allg. Gartenz.* 8: 161. 1840.

Echinocactus sphaerocephalus Mühlenpf. *Allg. Gartenz.* 14: 370. 1846.

Echinocactus allardtianus Dietr. *Allg. Gartenz.* 15: 178. 1847.

Mexico, the range not known.

Plant simple, deep-seated in the soil, globular, 5 to 7 cm. in diameter, glaucescent, more or less depressed at apex; ribs 24, thin and wavy; spines 8 to 11, yellow; uppermost spine elongate, 2 to 4 cm. long, flattened, brownish; central spines 2 or 3, more slender and not quite so long as the uppermost one; radial spines 6 to 8, acicular, usually pale, spreading; flowers small, 2 to 2.5 cm. long; inner perianth segments oblong, apiculate, with deep purple stripe down the center and with pale, nearly white margins.

The following species have been referred here by some authors: *Echinocactus xiphacanthus* Miquel (*Linnaea* 12: 1. 1838); *E. ensiferus* Lem. (*Cact. Aliq. Nov.* 26. 1838); *Echinofossulocactus ensiformis* Lawrence (*Loud. Gard. Mag.* 17: 317. 1841).

12. *Echinocactus violaciflorus* (Quehl) Britt. & Rose, *Cactaceae* 3: 114. 1922.

Echinocactus violaciflorus Quehl, *Monatsschr. Kakteenk.* 22: 102. 1912.

Zacatecas (type locality) and Aguascalientes.

Simple, at first globose, but becoming columnar, 8 to 10 cm. in diameter; ribs about 35, thin, deeply crenate; spines about 7, the 4 or 5 lower ones 7 to 12 mm. long, appressed or incurved, white, subulate, the 3 upper spines flattened, 3 to 6 cm. long, ascending and the uppermost ones connivent over the top of the plant; flowers 2 to 2.5 cm. long; perianth segments narrow, acuminate, white with violet or purplish stripe down the middle; scales on the ovary more or less imbricate, in 3 or 4 rows, broadly ovate, apiculate with scarious margins.

13. *Echinofossulocactus obvallatus* (DC.) Lawrence in Loud. Gard. Mag. 17: 317. 1841.

Echinocactus obvallatus DC. Prodr. 3: 462. 1828.

Hidalgo.

Obovoid to globose, depressed at apex; ribs about 25, rather thin and undulate; spines about 8, 4 spines subulate, ascending or spreading, 4 spines short, perhaps not one-fourth the length of the longer ones; flowers central, very large; perianth segments linear-oblong.

14. *Echinofossulocactus pentacanthus* (Lem.) Britt. & Rose, Cactaceae 3: 115. 1922.

Echinocactus pentacanthus Lem. Cact. Aliq. Nov. 27. 1883.

Echinocactus biceras Jacobi, Allg. Gartenz. 16: 370. 1848.

Reported from San Luis Potosí and Hidalgo.

Simple, depressed-globose to short-cylindric, more or less glaucous; ribs about 25, perhaps even 40 to 50; areoles only a few to the rib; spines 5, unequal, grayish red, hardly angled, flattened; 3 upper spines erect or spreading; 2 lower spines much slenderer and shorter than the upper; flowers large for this group, deep violet; perianth segments with white margins.

15. *Echinofossulocactus crispatus* (DC.) Lawrence in Loud. Gard. Mag. 17: 317. 1841.

Echinocactus crispatus DC. Prodr. 3: 461. 1828.

Reported from Hidalgo.

Plants obovoid, somewhat depressed at apex; ribs about 25, more or less folded, somewhat undulate; spines 10 or 11, rigid, unequal; flowers central, rather small; perianth segments in 2 series, purplish, oblong-linear, acute; flower tube covered with imbricate scales.

The following species have been referred here by some authors: *Echinocactus flexispinus* Salm-Dyck (Cact. Hort. Dyck. 1849. 159. 1850); *E. undulatus* Dietr. (Allg. Gartenz. 12: 187. 1844.

16. *Echinofossulocactus dichroacanthus* (Mart.) Britt. & Rose, Cactaceae 3: 117. 1922.

Echinocactus dichroacanthus Mart.; Pfeiff. Enum. Cact. 62. 1837.

Hidalgo.

Plant obovoid, dull green, 15 cm. high, 10 cm. in diameter, somewhat umbilicate at apex; ribs 32, thin, acute, undulate, somewhat wavy; areoles only a few on each rib, white-tomentose; upper spines 3, erect, flattened, purplish; radial spines 4 to 6, white.

17. *Echinofossulocactus anfractuosus* (Mart.) Lawrence in Loud. Gard. Mag. 17: 317. 1841.

Echinocactus anfractuosus Mart.; Pfeiff. Enum. Cact. 63. 1837.

Hidalgo.

Plant simple, somewhat longer than broad, 12.5 cm. long, 6 cm. in diameter, dull green; ribs many (about 30, according to Schumann), compressed, wavy, each bearing only a few areoles; spines somewhat curved, straw-colored with brown tips; radial spines 7, stout, the 3 upper radials much larger, about 3 cm. long, the 4 lower radials slender; central spine solitary, 2.5 cm. long, brownish; perianth segments purple with white margins.

18. *Echinofossulocactus tricuspидatus* (Scheidw.) Britt. & Rose, Cactaceae 3: 117. 1922.

Echinocactus tricuspидatus Scheidw. Allg. Gartenz. 9: 51. 1841.

Echinocactus melmsianus Wegener, Allg. Gartenz. 12: 65. 1844.

San Luis Potosí.

Globose to short-cylindric, 5 to 8 cm. broad; ribs numerous, 30 to 55, thin, wavy; areoles at first lanate, afterwards naked; spines 5, the upper one thin, compressed, sometimes 3-toothed at apex, 8 to 33 mm. long, reddish with a black tip, the other 4 spines spreading, more or less appressed, straight or recurved, gray or reddish with black tips, much shorter than the upper one; flowers greenish yellow, 1.5 cm. long; inner perianth segments short-oblong, obtuse, the outer ones more or less acute or apiculate; scales on the ovary broadly ovate with a scarious margin and a more or less prominent cusp.

19. *Echinofossulocactus phyllacanthus* (Mart.) Lawrence in Loud. Gard. Mag. 17: 317. 1841.

Echinocactus phyllacanthus Mart. Allg. Gartenz. 4: 201. 1836.

Echinocactus phyllacanthoides Lem. Cact. Hort. Monv. 28. 1839.

Central Mexico.

Simple, depressed-globose to short-cylindric, 3 to 15 cm. high, 4 to 10 cm. in diameter, dull green; ribs 30 to 35, thin, undulate; areoles only a few to a rib, white-tomentose when young; spines 5 to 9; upper spine, or rarely 2 spines, much elongate, erect or connivent over the top of the plant, flattened, thin, somewhat annulate, 4 cm. long; other spines weak-subulate, usually pale and spreading; flowers 15 to 20 mm. long, yellowish; inner perianth segments acute.

20. *Echinofossulocactus lancifer* (Dietr.) Britt. & Rose, Cactaceae 3: 118. 1922.

Echinocactus lancifer Dietr. Allg. Gartenz. 7: 154. 1839.

Echinocactus dietrichii Heynhold, Nom. 2: 92. 1846.

Mexico, the locality not known.

Nearly ovoid, somewhat depressed at apex; ribs numerous, strongly compressed, undulate; areoles few to each rib, when young tomentose; spines 8, white or brownish at apex, some of them broad and flat; flowers rather large, rose-colored; flower tube described as long; perianth segments linear-oblong, widely spreading.

21. *Echinofossulocactus gladiatus* (Link & Otto) Lawrence in Loud. Gard. Mag. 17: 317. 1841.

Echinocactus gladiatus Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: 426. 1827.

Probably native of eastern Mexico.

Plant glaucescent, ovoid to oblong, 12.5 cm. high, 10 cm. in diameter with a depressed apex covered with connivent spines; ribs prominent, rather broad, obtuse, 14 to 22; spines 10, gray, 4 upper spines subulate, of these 3 usually ascending, the central spreading or porrect, the largest 5 cm. long, 4 lower spines acicular.

22. *Echinofossulocactus confusus* Britt. & Rose, Cactaceae 3: 120. 1922.

Native of Mexico, the range not known.

Simple, pale green,* stout, columnar to short-clavate, 6 to 15 cm. high, 6 to 8 cm. in diameter; ribs 26 to 30, thin, low, wavy; areoles 4 or 5 on each rib, 2 to 3 cm. apart; spines all yellow, subulate; radial spines 4 or 5, only slightly flattened, 7 to 10 mm. long; central spine solitary, up to 4 cm. long, usually porrect; flowers purplish, 4 cm. broad; perianth segments oblong, acute.

The following species of *Echinocactus* are perhaps referable to *Echinofossulocactus*, but they are still imperfectly unknown: *E. acanthion* Salm-Dyck, *E. acroacanthus* Stieber, *E. adversispinus* Mühlenpf., *E. brachycentrus* Salm-Dyck, *E. cereiformis* DC., *E. debilispinus* Berg, *E. ellemeetii* Berg, *E. flexuosus*

Dietr., *E. fluctuosus* Dietr., *E. foersteri* Stieber, *E. griseispinus* Jacobi, *E. hexacanthus* Mühlenpf., *E. heyderi* Dietr., *E. hookeri* Mühlenpf., *E. hystriochentrus* Berg, *E. linkeanus* Dietr., *E. macrocephalus* Mühlenpf., *E. mammillifer* Miquel, *E. ochroleucus* Jacobi, *E. octacanthus* Mühlenpf., *E. quadrinatus* Wagoner, *E. raphidacanthus* Salm-Dyck, *E. raphidocentrus* Jacobi, *E. sulphureus* Dietr., *E. teretispinus* Lem., *E. tribolacanthus* Monville, *E. trifurcatus* Jacobi.

33. FEROCACTUS Britt. & Rose, Cactaceae 3: 123. 1922.

Globular to cylindric, often large cacti; ribs thick and prominent; spines well developed, either straight or hooked; areoles usually large, bearing flowers only when young and then only just above the spine clusters, more or less felted when young; flowers usually large, broadly funnel-shaped to campanulate, usually with a very short tube; stamens numerous, borne on the throat, short; ovary and flower tube very scaly; scales naked in their axils; fruit oblong, usually thick-walled and dry, dehiscing by a large basal pore; seeds black, pitted, never tuberculate; embryo curved.

Besides the species here listed, one other is known, a native of the southwestern United States. The species of *Ferocactus* are well known in the arid regions of Mexico and the United States because of their large size and abundance, and the varied uses made of them. In the United States they are usually known by the name barrel cactus. By the Indians they were sometimes employed as cooking vessels, the interior being scooped out and mashed, and the water thus obtained being replaced in the cavity and heated with hot stones, after which meat and other substances were placed in the liquid and cooked. The liquid obtained by crushing the pulp has sometimes been used as a substitute for water in the desert. The pulp is often fed to horses and cattle.

The candied pulp makes an excellent sweetmeat, which is much used in Mexico and the southwestern United States, and is often sold in the eastern United States as "cactus candy." The Papago Indians of Arizona are reported to have prepared a sweetmeat by boiling the pulp in the syrup of *Carnegiea gigantea*.

The usual Mexican name for plants of the genus is "biznaga" or "viznaga." The name *biznaga* is applied in Spain to the parsnip (*Pastinaca sativa*), and the word is of Arabic origin. The Mexican word, however, is believed to have been derived from the Nahuatl, *huitzli*, spine, and *nahuac*, around, i. e., covered with spines. Concerning these plants Robelo¹ writes as follows: "It is well known that the Mexicans in their bloody and gloomy religion performed the rite of sacrificing their flesh, drawing blood from the ears, thighs, arms, and legs, nose, and even the tongue. For such sacrifices they employed the spines of the *biznaga* and *metl* [maguey]; and these objects being consecrated or even deified, the biznaga founded a cult, which was personified by a deity, Huitznahuatl, to whom was erected a temple, Huitznahua-teapan, and to the place where the spines were kept was given the name Huitzcalco." The Mexicans also used the name *teocomitl*, "divine vessel," for the plants; while Hernández mentions the "comitl," "tepenexcomitl," and "hueycomitl," all of which probably belong to this genus. The biznaga was sacred to the god Mixcoatl.

Buelna reports the Otomí name as "pe," and the name "caballuña" is reported for an unidentified species.

Clavigero gives a description of one of the species of *Ferocactus* occurring in Baja California, and says: "In New Spain some people use the spines for

¹Anal. Mus. Nac. II. 2: 375. 1905.

toothpicks, and in some of the missions of California they employed them for knitting stockings, straightening out the tips and reducing the thicker part. Among these spines the *viznaga* produces its handsome flowers, tinged with white, red, and yellow, which are followed by the fruit, much smaller than that of the *tammiá*, and full, like that of the *cardón*, with viscous juice and seeds, which latter the Californians eat, after preparing them like those of the *cardón*. In Mexico they make a good sweetmeat from the juicy pulp of the *viznaga*." Clavigero also makes the following shrewd statement, which indicates that he had no mean knowledge of plants: "It is certainly wonderful that the plants of which I have spoken, and others of which I shall speak later, have more juice in arid places than other kinds of trees have in humid regions; but it is still more remarkable that they maintain themselves without any deterioration with little or no dew, although it may not rain for 10 months or more, as often happens in California. I believe that these plants are more juicy because they transpire less, inasmuch as they have no leaves, for these, as is the fundamental belief of physicists, are the principal organs of transpiration among plants: it may be conjectured that the Creator denied these plants leaves because He destined them to inhabit dry lands."

Plants very large, often 1 meter high or more (except apparently nos. 2, 4, and 5).

Areoles with a marginal row of bristles or hairs.

Areoles with weak marginal hairs.

Central spines yellowish; flowers yellow-----1. *F. stainesii*.

Central spines bright red; flowers red-----2. *F. pringlei*.

Areoles with marginal bristles.

Central spines hooked.

Central spines up to 12 cm. long and 8 mm. wide----7. *F. horridus*.

Central spines 8 cm. long or less, 4 to 6 mm. wide.

Inner perianth segments pink.

Inner perianth segments linear-----3. *F. fordii*.

Inner perianth segments oblong-----4. *F. townsendianus*.

Inner perianth segments yellow to red, the outer pinkish.

Inner perianth segments about 2 cm. long; spines yellow to red.

5. *F. chrysacanthus*.

Inner perianth segments 4 to 5 cm. long; spines white to reddish.

6. *F. wislizeni*.

Central spines straight or more or less curved but not hooked.

Central spines flexible, thin.

Central spines more or less appressed; seeds less than 2 mm. long.

8. *F. lecontei*.

Central spines more or less tortuous and spreading; seeds more than 3 mm. long-----9. *F. acanthodes*.

Central spines dagger-like, straight, erect-----10. *F. santa-maria*.

Areoles without marginal hairs or bristles.

Spines all alike-----11. *F. diguetii*.

Spines unlike, the radials different from the central.

Central spines more or less hooked.

Central spine one-----12. *F. covillei*.

Central spines 4-----13. *F. peninsulae*.

Central spines not hooked.

Flowers lemon-yellow; inner perianth segments elongate.

14. *F. rectispinus*.

Flowers crimson; perianth segments all short-----15. *F. orcuttii*.

Plants much smaller, 60 cm. or less in diameter, sometimes forming large clumps.

Areoles with stout spines and weak bristles-----16. *F. robustus*.

Areoles with stout spines only.

Spines never hooked.

Spines all straight.

Scales on ovary linear, with long-ciliate margins---20. *F. flavovirens*.

Scales on ovary broader than linear, not with long-ciliate margins.

Flowers 4 to 5 cm. long; plants green.

Plants flattened; ribs acute; margin of scales of ovary not ciliate-----17. *F. echidne*.

Plants rounded; ribs obtuse; margin of scales of ovary ciliate-----18. *F. alamosanus*.

Flowers 2 cm. long; plants glaucous-----19. *F. glaucescens*.

Spines more or less curved.

Flowers 3.5 cm. long or less; ribs up to 24---21. *F. melocactiformis*.

Flowers larger; ribs fewer.

Scales on ovary acute-----22. *F. macrodiscus*.

Scales on ovary obtuse-----23. *F. viridescens*.

Spines, at least some of them, hooked or recurved at the tip.

Central spines, or one of them, broad and short.

Central spine solitary-----24. *F. nobilis*.

Central spines several.

Radial spines all straight-----25. *F. latispinus*.

Radial spines on lower side of areoles hooked_26. *F. crassihamatus*.

Central spines slender and elongate.

Flowers large, yellow-----27. *F. hamatacanthus*.

Flowers small, pinkish to brownish-----28. *F. uncinatus*.

1. *Ferocactus stainesii* (Hook.) Britt. & Rose, Cactaceae 3: 124. 1922.

Echinocactus stainesii Hook.; Audot, Rev. Hort. 6: 248. 1845.

Echinocactus pilosus Galeotti; Salm-Dyck, Cact. Hort. Dyck. 1849. 148. 1850. San Luis Potosí.

Simple or proliferous, globular, up to 1.5 meters high; ribs 13 to 20, compressed, more or less undulate; areoles distant, circular; radial spines reduced to long white hairs; central spines several, subulate, at first purplish, becoming pale yellow in age; flowers yellow.

2. *Ferocactus pringlei* (Coulter) Britt. & Rose, Cactaceae 3: 125. 1922.

Echinocactus pilosus pringlei Coulter, Contr. U. S. Nat. Herb. 3: 365. 1896.

Echinocactus pringlei Rose, Contr. U. S. Nat. Herb. 10: 127. 1906.

Coahuila and Zacatecas; type from Jimulco, Coahuila.

Growing in clumps, becoming cylindric, sometimes 3 meters high and 30 to 40 cm. in diameter; ribs usually 16 to 18, more or less compressed; areoles numerous, closely set or contiguous, the outer margin with a row of white or straw-colored hairs 2 to 4 cm. long; spines red, the three lower ones slender, almost acicular, the innermost much stouter, somewhat flattened, angular, curved or nearly straight; flowers red without, yellow within, 2.5 cm. long; scales on the ovary numerous, orbicular, imbricate; inner perianth segments oblanceolate, obtuse or apiculate; fruit yellow, somewhat succulent, dehiscing by a basal pore, 3 to 4 cm. long, crowned by the persisting perianth; seeds 1.5 mm. long, brownish, pitted, with a small basal hilum. "*Biznaga colorada*" (Zacatecas).

3. *Ferocactus fordii* (Orcutt) Britt. & Rose, Cactaceae 3: 126. 1922.*Echinocactus fordii* Orcutt, Rev. Cact. 1: 56. 1899.

Baja California, the type from Lagoon Head.

Globose to short-cylindric, grayish green, 12 cm. in diameter; ribs usually 21, about 1 cm. high; areoles about 2 cm. apart; radial spines whitish, acicular, widely spreading, about 15; central spines usually 4; one of the centrals flattened, porrect, longer than the others, with a curved or hooked tip, about 4 cm. long, the others subulate, somewhat angled; flowers rose-colored, 3.5 to 4 cm. long; outer perianth segments ovate to ovate-oblong, acute; inner perianth segments linear, acuminate; scales on the ovary broadly ovate.

4. *Ferocactus townsendianus* Britt. & Rose, Cactaceae 3: 127. 1922.

Type from San Josef Island, Baja California.

Short-cylindric, 40 cm. high or more; ribs about 16, often spiraled, somewhat undulate; areoles large, distant; radial spines widely spreading, 14 to 16, 3 to 4 cm. long, most of them threadlike, but often 2 or more above and below subulate; central spines subulate, grayish, usually one curved or hooked at apex, the others straight, all annulate; flowers 5 to 6 cm. long; outer perianth segments ovate, reddish, with narrow yellow margins; inner perianth segments oblong-lanceolate with a narrow pink stripe down the center with greenish yellow margins.

5. *Ferocactus chrysacanthus* (Orcutt) Britt. & Rose, Cactaceae 3: 127. 1922.*Echinocactus chrysacanthus* Orcutt, Rev. Cact. 1: 56. 1899.

Baja California; type from Cedros Island.

Globose to cylindric; ribs about 18, tubercled; radial spines 4 to many, slender, white; central spines sometimes as many as 10, 5 cm. long, either red or yellow, curved; flowers from near the center of the plant, 5 cm. broad when fully open; scales naked in the axils, closely set and overlapping, the lower one orbicular and green, the upper ones more oval, brownish or with brown tips, the margin thin, sometimes ciliate or ragged; outer perianth segments rather stiff, pinkish brown; inner perianth segments 2 cm. long, satiny yellow with a jagged or toothed margin; fruit yellow, 3 cm. long; seeds large, black.

6. *Ferocactus wislizeni* (Engelm.) Britt. & Rose, Cactaceae 3: 127. 1922.*Echinocactus wislizeni* Engelm. in Wisliz. Mem. North. Mex. 96. 1848.*Echinocactus emoryi* Engelm. in Emory, Mil. Recon. 157. 1848.*Echinocactus falconeri* Orcutt, West Amer. Sci. 12: 162. 1902.

Chihuahua, Sonora, and Sinaloa. Texas to Arizona; type from Dona Ana, New Mexico.

At first globular but becoming cylindric, when very old, 2 meters long or more, usually simple, but when injured often giving off several heads or branches; ribs numerous, often 25, 3 cm. high; areoles elliptic, sometimes 2.5 cm. long, brown-felted, 2 to 3 cm. apart, or the flowering ones often approximate; spines variable; radials absent in young plants, threadlike to acicular, the longest 5 cm. long; central spines several, white to red, annular, all subulate, one of them much stouter, usually strongly flattened, strongly hooked; flowers yellow, some red, 5 to 6 cm. long; fruit yellow, oblong, scaly, 4 to 5 cm. long; seeds dull black, the surfaces covered with shallow indistinct pits. "Biznaga."

The Pima Indians of Arizona ate the flesh of the plant after cutting it in strips and boiling it.

7. *Ferocactus horridus* Britt. & Rose, Cactaceae 3: 128. 1922.

Type from San Francisquito Bay, Baja California.

Globular, 30 cm. in diameter or more; ribs 13, broad, 2 cm. high, obtuse, not tubercled; areoles 1.5 to 2.5 cm. apart, large; radial spines 8 to 12, acicular, spreading, white, 3 to 4 cm. long; central spines 6 to 8, very diverse, all reddish, either spreading or porrect, all straight except 1, this much elongate, often 12 cm. long, much flattened, very strongly hooked.

8. *Ferocactus lecontei* (Engelm.) Britt. & Rose, Cactaceae 3: 129. 1922.

Echinocactus lecontei Engelm. Proc. Amer. Acad. 3: 274. 1856.

Sonora and Baja California. Utah, Arizona, and southern California.

Becoming cylindric, 2 meters high or more, rather slender; ribs 20 to 30, somewhat undulate; areoles longer than broad; some of the radial spines threadlike or bristly, the other radials and the central spines flattened and flexible, usually appressed against the plant, most of them ascending, rarely if ever hooked, white to red; flowers originally described as yellow, also reported as red, 5 to 6 cm. long; fruit oblong, yellow; seeds minute, less than 2 mm. long, black, shiny, reticulate, slightly compressed.

9. *Ferocactus acanthodes* (Lem.) Britt. & Rose, Cactaceae 3: 129. 1922.

Echinocactus acanthodes Lem. Cact. Hort. Monv. 106. 1839.

Echinocactus cylindraceus Engelm. Proc. Amer. Acad. 3: 275. 1856.

Northern Baja California. Nevada and southern California.

At first globular but in age cylindric, sometimes nearly 3 meters high, very spiny; ribs often as many as 27, acute, 1 to 2 cm. high; areoles 1 cm. in diameter or more, densely brown-felted when young, closely set, often nearly contiguous; spines often white or pinkish or sometimes bright red; radial spines weak, setiform or acicular, usually pungent, often spreading; central spines subulate, slender, spreading, more or less flattened, annulate, tortuous and more or less curved, but never hooked at tip, the longest 10 to 12 cm. long; flowers yellow to orange, 4 to 6 cm. long, usually broader than long; scales on ovary and flower tube imbricate, ovate, with a large purple blotch on their back, gradually passing upward into the perianth segments; inner perianth segments glossy, narrowly oblong to spatulate, obtusish, often toothed; fruit oblong, 3 cm. long, crowned by the scaly perianth, dry, dehiscing by a basal pore; seeds black, 3.5 mm. long, pitted.

10. *Ferocactus santa-maria* Britt. & Rose, Cactaceae 3: 131. 1922.

Type from Santa María Bay, Baja California.

Cylindric, 60 cm. high or more; ribs about 14; outer spines several, threadlike; central spines in 2 series, all straight, grayish, annulate, subulate, the central one stouter, flatter, ascending, somewhat curved at tip; old flowers persisting, 6 to 7 cm. long; fruit 3 to 4 cm. long, bearing orbicular scales; seeds 2 mm. long, finely reticulate.

11. *Ferocactus diguetii* (Weber) Britt. & Rose, Cactaceae 3: 131. 1922.

Echinocactus diguetii Weber, Bull. Mus. Hist. Nat. 4: 100. 1898.

Islands of the Gulf of California; type from Santa Catalina Island.

Plants very stout, usually 1 to 2 meters but sometimes 4 meters, high, 60 to 80 cm. in diameter or more; ribs sometimes as many as 39, rather thin; areoles 1 to 1.5 cm. long, somewhat elliptic, approximate or on old plants coalescent; spines 6 to 8, yellow, subulate, 3 to 4 cm. long, slightly curved and a little spreading; flowers numerous, 3 to 3.5 cm. long; scales on ovary and flower tube ovate, closely imbricate, thin on the margin and somewhat lacerate; inner perianth segments red with yellow margins, oblong, 2 cm. long; tube of flower below stamens very short; fruit scaly. "Biznaga."

12. *Ferocactus covillei* Britt. & Rose, Cactaceae 3: 132. 1922.

Sonora, the type from Altar. Southern Arizona.

Plant simple, globular to short-cylindric, often 1.5 meters high; ribs 22 to 32, 2 to 4 cm. high, rather thin, when young more or less tubercled, but when old hardly undulate; areoles on small plants distant, often 3 to 4 cm. apart, on old and flowering plants approximate or contiguous, densely brown-felted when young, naked in age, the spine-bearing areoles large and circular, the flowering areoles more elongate and complex, divided into three parts, the lower part bearing spines, the central part spinescent bands, and the upper part the flower; spines sometimes red to white; radial spines 5 to 8, somewhat spreading, subulate, straight or more or less curved backward, 3 to 6 cm. long, annulate; central spine always solitary, very variable, straight or with the tip bent or even strongly hooked, annulate, terete to strongly flattened or 3-angled, 3 to 8 cm. long; upper areoles of old plants bearing 5 to 7 glands, becoming spinescent, 5 to 6 mm. long; flowers described as red, tipped with yellow, sometimes reported as yellow throughout, 6 to 7 cm. long; inner perianth segments linear-oblong, acuminate, often serrate; fruit oblong, 5 cm. long, bearing a few broad scales; seeds black, dull or shining, nearly smooth or slightly pitted, 2 mm. long.

13. *Ferocactus peninsulæ* (Weber) Britt. & Rose, Cactaceae 3: 133. 1922.

Echinocactus peninsulæ Weber, Bull. Mus. Hist. Nat. 1: 320. 1895.

Southern Baja California.

Simple, erect, 2.5 meters high, clavate to cylindric; ribs 12 to 20, prominent; areoles 4 cm. apart or even less in old plants; spines red with yellow tips; radial spines 11, spreading, straight, terete, more or less annulate, the lower ones stouter and more colored; central spines 4.

14. *Ferocactus rectispinus* (Engelm.) Britt. & Rose, Cactaceae 3: 134. 1922.

Echinocactus emoryi rectispinus Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 362. 1896.

Echinocactus rectispinus Britt. & Rose, Journ. N. Y. Bot. Gard. 12: 269. 1911.

Central Baja California; type from Mulegé.

Globose to cylindric, 1 to 2 meters high; radial spines 8 to 12, the three upper spines stouter and sometimes curved; central spine one, 9 to 13 cm. long, rather slender, nearly straight, never hooked; flowers 6 cm. long, yellowish; scales on ovary rounded, thin-margined, sometimes ciliate, naked in the axils; inner perianth segments lemon-yellow, lanceolate, 5 cm. long, acuminate.

15. *Ferocactus orcuttii* (Engelm.) Britt. & Rose, Cactaceae 3: 134. 1922.

Echinocactus orcuttii Engelm. West. Amer. Sci. 2: 46. 1886.

Type from Palm Valley, Baja California.

Single, or cespitose in clusters of 15 to 20 stems, 60 to 130 cm. high, 25 to 45 cm. in diameter; ribs 13 to 30, somewhat spiraled, obtuse, somewhat tuberculate; areoles approximate; spines reddish, straight or simply curved, all annulate, angled or flat; radial spines 9 to 13, spreading; central spines 4, stouter than the radials; flower 3 to 5 cm. long, dull crimson; perianth segments short-oblong, rounded at apex with a more or less erose margin; scales on the ovary orbicular, small; fruit described as pulpy, crimson, scaly; seeds numerous, small.

16. *Ferocactus robustus* (Link & Otto) Britt. & Rose, Cactaceae 3: 135. 1922.

Echinocactus robustus Link & Otto, Allg. Gartenz. 1: 364. 1833.

Puebla, the type from Tehuacán.

In large clumps, often 3 meters, rarely 5 meters in diameter, 1 to 1.3 meters high, with hundreds of branches; ribs 8, prominent in young growth, but be-

coming indistinct in age, somewhat undulate; areoles brown-felted when young; radial spines ascending, about 10, often threadlike; central spines subulate, about 6, brown at first, somewhat flattened, annulate, often 6 cm. long; flowers 3.5 to 4 cm. long; inner perianth segments oblong, acute, yellowish; scales on ovary broad, rounded at tip; fruit 2 to 2.5 cm. long; seeds black, oblong, 1.5 mm. long.

17. *Ferocactus echidne* (DC.) Britt. & Rose, Cactaceae 3: 136. 1922.

Echinocactus echidne DC. Mém. Cact. 19. 1834.

Echinocactus vanderheyi Lem. Cact. Aliq. Nov. 20. 1838.

Echinocactus dolichanthus Lem. Cact. Aliq. Nov. 25. 1838.

Echinocactus gilvus Dietr. Allg. Gartenz. 13: 170. 1845.

Echinocactus victoriensis Rose, Contr. U. S. Nat. Herb. 12: 291. 1909.

Tamaulipas to Hidalgo; type from Hidalgo.

Depressed-globose, 12.5 cm. high, 18 cm. in diameter, green; ribs 13, acute, broad at base; areoles remote, velvety when young, oval; radial spines rigid, about 7, about 2 cm. long, yellow; central spine solitary, porrect, 3 cm. long or more; flowers lemon-yellow; perianth segments linear-oblong, acute, sometimes toothed near apex; scales on the ovary ovate, acute. "Biznaga" (Tamaulipas).

18. *Ferocactus alamosanus* Britt. & Rose, Cactaceae 3: 137. 1922.

Echinocactus alamosanus Britt. & Rose, Contr. U. S. Nat. Herb. 16: 239. 1913.

Sonora, the type from Alamos.

Plants usually single, sometimes in clusters, somewhat flattened above, green, 30 cm. in diameter or more; ribs about 20, narrow; spines all yellow; radials usually 8, 3 to 4 cm. long, more or less spreading; central single, porrect or erect, somewhat flattened laterally, 6 cm. long and a little longer than the radials; flower buds covered with ovate ciliate scales, these brownish except in the margin.

19. *Ferocactus glaucescens* (DC.) Britt. & Rose, Cactaceae 3: 137. 1922.

Echinocactus glaucescens DC. Mém. Mus. Hist. Nat. 17: 115. 1828.

Echinocactus pfeifferi Zucc.; Pfeiff. Enum. Cact. 58. 1837.

Eastern central Mexico; type from Toluimán.

Globular, 20 to 40 cm. in diameter, or a little higher than broad, glaucous; ribs 11 to 15, somewhat flattened, acute, 2 to 3 cm. high; areoles 8 to 12 mm. apart, oblong, 12 to 20 mm. long, yellowish, tomentose when young; radial spines 6, nearly equal, rigid, only slightly spreading, straight, 2.5 to 3 cm. long, pale yellow at first, when old blackish, more or less banded; central spine solitary, similar to the radials; flowers yellow, 2 cm. long, perhaps broader when fully expanded; outer perianth segments ovate, acuminate, sometimes brownish on the back, ciliate; inner perianth segments oblong, usually only acute, somewhat toothed or lacerate; scales on the ovary brownish, ovate, acute, ciliate, imbricate.

20. *Ferocactus flavovirens* (Scheidw.) Britt. & Rose, Cactaceae 3: 138. 1922.

Echinocactus flavovirens Scheidw. Allg. Gartenz. 9: 50. 1841.

Vicinity of Tehuacán, Puebla.

Plant caespitose, forming great masses, pale green, 30 to 40 cm. high; stems 10 to 20 cm. in diameter; ribs 13, rarely 11 or 12, 1 to 2 cm. high, acute, somewhat sinuate; areoles 2 cm. apart, large, grayish, woolly; spines pale brown, becoming gray in age, long and stout; centrals 4, much longer than the radials, somewhat unequal, the longer ones 5 to 8 cm. long; flower buds globular, covered with long linear imbricate scales, their margins ciliate with long hairs.

21. Ferocactus melocactiformis (DC.) Britt. & Rose, *Cactaceae* 3: 138. 1922.*Echinocactus melocactiformis* DC. Prodr. 3: 462. 1828.*Echinocactus histrix* DC. Mém. Mus. Hist. Nat. 17: 115. 1828.*Echinocactus coulteri* Don, Hist. Dichl. Pl. 3: 162. 1834.*Echinocactus oxypterus* Zucc.; Pfeiff. Enum. Cact. 57. 1837.*Echinocactus electracanthus* Lem. Cact. Aliq. Nov. 24. 1838.*Echinocactus lancifer* Reichenb.; Terscheck, Cat. Suppl. 2.

Eastern Mexico.

Simple, cylindric, 50 to 60 cm. in diameter, bluish green; ribs about 24; areoles 2 to 3 cm. apart; spines usually 10 to 12, a little curved, yellow, becoming brown, of these 6 to 8 slender-subulate, 2 to 3 cm. long, more or less spreading, 3 or 4 spines more central than the others, but usually only one definitely so, much stouter and longer, 4 to 6 cm. long, porrect or ascending, annulate; flowers 2.5 to 3.5 cm. long, bright yellow, sometimes reddish without; inner perianth segments linear-oblong, acute, somewhat spreading; scales on the ovary ovate, acute, small, 2 to 4 mm. long, somewhat ciliate; fruit short-oblong, about 2 cm. long, somewhat edible; seeds minute, 1 mm. long, brown. "Biznaga costillona" (Durango, *Patoni*).

22. Ferocactus macrodiscus (Mart.) Britt. & Rose, *Cactaceae* 3: 139. 1922.*Echinocactus macrodiscus* Mart. Nov. Act. Nat. Cur. 16: 341. 1832.

San Luis Potosí and southward.

Simple, depressed-globose or sometimes short-cylindric, sometimes 45 cm. in diameter; ribs 16, perhaps more in some specimens, somewhat flattened, sometimes acute, somewhat depressed at the distant areoles; spines all yellow, more or less curved backward; radial spines 6 to 8, mostly 2 to 3 cm. long; central spines 4, stouter and flatter than the radials, 3.5 cm. long; flowers 5 cm. long, dark red to purple, obconic; inner perianth segments linear-oblong, acute.

23. Ferocactus viridescens (Torr. & Gray) Britt. & Rose, *Cactaceae* 3: 140. 1922.*Echinocactus viridescens* Torr. & Gray, Fl. N. Amer. 1: 554. 1840.*Echinocactus limitus* Engelm.; Coulter, Contr. U. S. Nat. Herb. 3: 374. 1896.

Northern Baja California. Southern California, the type from San Diego.

At first nearly globose or somewhat depressed, in age becoming cylindric, 30 to 45 cm. high, 25 to 35 cm. in diameter, simple or cespitose, deep green, somewhat glossy; ribs 13 to 21, somewhat rounded, 1 to 2 cm. high, obtuse, undulate; areoles narrow, elliptic, 1 to 2 cm. long, spine-bearing in the lower part, felted in upper part, flower-bearing and also with several reddish glands, these becoming elongate and spinescent in age; spines at first bright red, becoming duller by age or turning yellow or horn-colored; radial spines 9 to 20, more or less spreading, 1 to 2 cm. long; central spines 4, the lower one stouter and more flattened, up to 3.5 cm. long; flowers yellowish green, 4 cm. long; perianth segments oblong, obtuse, sometimes apiculate, more or less serrulate; scales on the ovary orbicular, imbricate; fruit 1.6 to 2 cm. long, reddish, with a pleasant acid taste; seeds 1.6 mm. long, pitted.

24. Ferocactus nobilis (L.) Britt. & Rose, *Cactaceae* 3: 141. 1922.*Cactus nobilis* L. Mant. Pl. 243. 1767.*Cactus recurvus* Mill. Gard. Dict. ed. 8. *Cactus* no. 3. 1768.*Echinocactus recurvus* Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: pl. 20. 1827.*Echinocactus spiralis*, Karw.; Pfeiff. Enum. Cact. 60. 1837.

Echinocactus curvicornis Miquel, *Linnaea* 12: 5. 1838.

Echinocactus stellatus Scheidw. *Allg. Gartenz.* 8: 338. 1840.

Echinocactus solenacanthus Scheidw. *Allg. Gartenz.* 9: 50. 1841.

Eastern Mexico.

Globular; ribs 15; radial spines straight, widely spreading; central spine solitary, erect, 7 cm. long, broad and flat, recurved at tip, brownish red; flowers 2.5 to 4 cm. long; perianth segments narrow, acute, red with white margins; ovary covered with ovate imbricate scales; fruit short, oblong, 2 cm. long, 12 mm. in diameter.

25. *Ferocactus latispinus* (Haw.) Britt. & Rose, *Cactaceae* 3: 143. 1922.

Cactus latispinus Haw. *Phil. Mag.* 63: 41. 1824.

Echinocactus cornigerus DC. *Mém. Mus. Hist. Nat.* 17: 36. 1828.

Echinocactus latispinus Hemsl. *Biol. Centr. Amer. Bot.* 1: 533. 1880.

Widely distributed in Mexico.

Plant simple, globular or somewhat depressed, 25 to 40 cm. high, 40 cm. in diameter; ribs 15 to 23, but usually 21, prominent; areoles large; radial spines 6 to 10, slender, annulate, white to rose, 2 to 2.5 cm. long; central spines 4 or more, stouter and more highly colored than the radials, all straight except one, this much flattened and hooked; flowers campanulate, 2.5 to 3.5 cm. long, rose to purple; perianth segments narrowly oblong, acute; scales on ovary closely imbricate, thin and papery, ovate, with thin ciliate margins; scales on flower tube similar to those on ovary but more elongate; fruit elongate, 4 cm. long; seeds described as reniform, slightly pitted, 1.5 mm. long. "Biznaga de chilitos" (Durango, Oaxaca); "biznaga ganchuda" (Zacatecas, Patoni).

26. *Ferocactus crassihamatus* (Weber) Britt. & Rose, *Cactaceae* 3: 144. 1922.

Echinocactus crassihamatus Weber, *Dict. Hort. Bois* 468. 1896.

Echinocactus mathssonii Berger, *Monatsschr. Kakteenk.* 7: 76. 1897.

Querétaro.

Simple, globose to short-cylindric, pale green, somewhat glaucous; ribs 13, rather prominent, obtuse, strongly undulate; areoles large, only a few on each rib; radial spines 8, spreading, the upper ones straight, 2 or 3 of the lower ones hooked; central spines 5, longer and stouter than the radials, usually red, the stoutest one porrect and hooked; flowers about 2 cm. long, purple; inner perianth segments linear-oblong, acute.

27. *Ferocactus hamatacanthus* (Mühlenpf.) Britt. & Rose, *Cactaceae* 3: 144. 1922.

Echinocactus hamatacanthus Mühlenpf. *Allg. Gartenz.* 14: 371. 1846.

Echinocactus flexispinus Engelm. in Wislitz. *Mem. North. Mex.* 111. 1848.

Echinocactus longihamatus Galeotti; Pfeiff. *Abbild. Beschr. Cact.* 2: pl. 16. 1848.

Echinocactus sinuatus Dietr. *Allg. Gartenz.* 19: 345. 1851.

Echinocactus treculianus Labour. *Monogr. Cact.* 202. 1853.

Echinocactus flavispinus Meinsh. *Wochenschr. Gärt. Pflanz.* 1: 28. 1858.

Echinocactus haematochroanthus Hemsl. *Biol. Centr. Amer. Bot.* 1: 532. 1880.

Northern Mexico. Texas and New Mexico.

Solitary, globular to oblong, up to 60 cm. high; ribs usually 13, sometimes 17, strongly tubercled, 2 to 3 cm. high; areoles large, 1 to 3 cm. apart; radial spines about 12, acicular, terete, 5 to 7 cm. long; central spines 4, elongate, angled, sometimes 15 cm. long, one of them hooked at apex; flowers 7 to 8 cm. long, yellow, in some forms said to be scarlet within; fruit oblong, 2 to

5 cm. long, fleshy, edible, dark brown to drab-colored; seeds pitted. "Biznaga de tuna" (Tamaulipas); "biznaga de limilla" (Nuevo León); "limilla," "biznaga costillona," "biznaga espinosa," "biznaga ganchuda" (Durango, *Patoni*).

Safford reports that in Nuevo León the fruit is used in cooking as a substitute for lemons.

28. *Ferocactus uncinatus* (Galeotti) Britt. & Rose, Cactaceae 3: 146. 1922.

Echinocactus uncinatus Galeotti; Pfeiff. Abbild. Besch. Cact. 2: pl. 18. 1848.

Echinocactus ancylacanthus Monville; Labour. Monogr. Cact. 201. 1853.

Central and eastern Mexico. Western Texas.

Plant short-cylindric, 10 to 20 cm. high, bluish, slightly glaucous, with spindle-shaped roots; ribs usually 13, straight, strongly tubercled, undulate; flowering areoles narrow, extending from the spine clusters to the base of the tubercles with the flower at the opposite end, felted; areoles also bearing one or more large flat yellow glands, these surrounded by a ring of short yellow hairs; central spine usually solitary, 12 cm. long or less, erect, yellow below, reddish above, hooked at tip; 3 lower radial spines spreading or reflexed, hooked; upper radials straight; flowers brownish, 2 to 2.5 cm. long, widely spreading; perianth segments numerous, linear-oblong; scales on ovary and flower tube triangular, scarious-margined, in age broadly auriculate at base; fruit oblong, 2 cm. long, at first green, turning brown to crimson and finally scarlet, naked except the appressed scales, somewhat fleshy, edible; seeds black, oblong, 1 to 1.5 mm. long, with basal hilum.

29. *Ferocactus rostratus* Britt. & Rose, Cactaceae 3: 146. 1922.

Northern Baja California. Southeastern California.

Sometimes growing in clumps of 8 to 10 heads but usually slender-cylindric, up to 3 meters high; ribs 16 to 22, rather low (hardly 1 cm. high), obtuse, somewhat tubercled; areoles large, white-felted, approximate; spine clusters closely set, the spines interlocking and almost hiding the body of the plant; radial bristles sometimes wanting but when present 2 to 8, white or yellowish; spines about 12, sometimes fewer, 3 or 4 central, those on the lower part of the plant more or less spreading, those at or near the top erect, somewhat flexible, flattened, annulate, pungent, either straight or curved at apex, perhaps never hooked, usually yellow but sometimes reddish on young plants but also turning yellow in age; flowers dark yellow; fruit red.

DOUBTFUL SPECIES.

The following are perhaps of this genus:

ECHINOCACTUS HAEMATACANTHUS Monville; Weber, Dict. Hort. Bois 466. 1896.

Reported from Puebla.

Simple, sometimes perhaps proliferous, short-cylindric, 50 cm. high, 30 cm. in diameter; ribs 12 to 20, stout, light green; spines all straight, reddish with yellowish tips, the radials 6, the centrals 4, 3 to 6 cm. long; flowers funnelform, 6 cm. long, purple; scales of ovary round, white-margined; fruit ovoid, 3 cm. long.

ECHINOCACTUS RAFAELENSIS Purpus, Monatsschr. Kakteenk. 22: 163. 1912.

Type from Minas de San Rafael, San Luis Potosí.

In clusters of 8 to 10, globose to short-cylindric, light green, at the apex slightly depressed and woolly; ribs 13 to 20, prominent; areoles elliptic; radial spines 7 to 9, 3 cm. long, the upper ones somewhat connivent; central spine solitary, 4 to 6 cm. long.

34. ECHINOMASTUS Britt. & Rose, Cactaceae 3: 147. 1922.

Plants small, globular or short-cylindric, ribbed, the ribs low, more or less spiraled, divided into definite tubercles; areoles bearing several acicular spines with or without stouter central ones; flowers central, medium-sized, borne at the spine areoles, usually purple; fruit small, short-oblong, scaly, becoming dry, dehiscing by a basal opening; scales few, their axils naked; seed large, muricate, black, with a depressed ventral hilum.

One other species occurs in Arizona.

Areoles elongate, with more or less pectinate spines.

Central spines unlike, one or two of them different from the others.

1. *E. intertextus*.

Central spines nearly alike-----2. *E. dasyacanthus*.

Areoles circular.

Central spines subulate, some of them strongly curved--3. *E. unguispinus*.

Central spines acicular.

Plants globular; ribs 20 to 25; radial spines white----4. *E. macdowellii*.

Plants ovoid; ribs 18 to 21; radial spines with black tips.

5. *E. durangensis*.

1. Echinomastus intertextus (Engelm.) Britt. & Rose, Cactaceae 3: 149. 1922.

Echinocactus intertextus Engelm. Proc. Amer. Acad. 3: 277. 1856.

Cereus pectinatus centralis Coulter, Contr. U. S. Nat. Herb. 3: 386. 1896.

Echinocereus centralis Rose, Contr. U. S. Nat. Herb. 12: 293. 1909.

Northern Mexico. Texas to Arizona.

Simple, globular or nearly so, 2.5 to 10 cm. in diameter; ribs 13, somewhat acute, more or less divided into tubercles; areoles 5 to 6 mm. apart, somewhat elliptic; spines rigid, red with darker tips; radial spines 16 to 25, appressed, 8 to 15 mm. long, 3 or 4 of the upper radial spines white or nearly so, more slender than the others, almost bristle-like; central spines 4, subulate, 3 of them turned upward and similar to the radials, 10 to 18 mm. long, the other one very short, porrect; flowers 2.5 cm. long, nearly as broad as long, purplish; outer perianth segments about 20, broadly ovate, white-margined; inner perianth segments 20 to 25, oblong, mucronate; fruit nearly globular, 8 to 10 mm. in diameter, with a few scarious scales; seeds black, shining, 2 mm. in diameter.

2. Echinomastus dasyacanthus (Engelm.) Britt. & Rose, Cactaceae 3: 150. 1922.

Echinocactus intertextus dasyacanthus Engelm. Proc. Amer. Acad. 3: 277. 1856.

Southwestern Texas, the type from El Paso; doubtless occurring also in Chihuahua.

Plants cylindric, 10 to 15 cm. high; ribs somewhat spiraled, made up of numerous compressed tubercles; spines slender, more or less purplish; radials 19 to 25, 12 to 22 mm. long; centrals about 4, nearly equal; top of flowering plant and young areoles very woolly; scales and outer perianth segments red with white margins; inner perianth segments white or purplish, about 2.5 cm. long, acute or acuminate; ovary bearing a few ovate scales, these naked in their axils.

3. Echinomastus unguispinus (Engelm.) Britt. & Rose, Cactaceae 3: 150. 1922.

Echinocactus unguispinus Engelm. in Wislitz. Mem. North. Mex. 111. 1848.

Echinocactus trolletii Rebut, Balt. Cact. Journ. 2: 147. 1895.

Chihuahua and Zacatecas; type from Pelayo, Chihuahua.

Plants simple, usually globular, sometimes short-cylindric, 10 to 12 cm. high when mature, pale bluish green; ribs low; areoles woolly when young, circular; armament very peculiar, at times almost hiding the plant, most of the spines being erect or connivent; radial spines widely spreading, often as many as 25, usually white, except the tips, these darker, the upper ones 2 cm. long, a little longer than the lower; central spines 4 to 8, stouter than the radials, at first reddish or black, but becoming grayish blue in age, the lowest turned outward and downward and all more or less curved; flowers 2.5 cm. long, reddish.

4. *Echinomastus macdowellii* (Rebut) Britt. & Rose, Cactaceae 3: 151. 1922.
Echinocactus macdowellii Rebut; Quehl, Monatsschr. Kakteenk. 4: 133. 1894.
 Northern Mexico.

Simple, globular or a little depressed, about 7 cm. high, 12 cm. in diameter, covered with a mass of interlocking spines; ribs 20 to 25, pale green, 5 to 7 mm. high, divided into tubercles; radial spines 15 to 20, white, spreading, up to 1.8 cm. long; central spines 3 or 4, dark colored, the longest up to 5 cm. in length; flowers rose-colored, up to 4 cm. long; ovary globose, said to be scaly.

5. *Echinomastus durangensis* (Rünger) Britt. & Rose, Cactaceae 3: 152. 1922.
Echinocactus durangensis Rünger, Hamb. Gartenz. 46: 231. 1890.
 Zacatecas and Durango.

Simple, ovoid, about 8 cm. long, 7 cm. in diameter; ribs 18 to 21, low; areoles white-woolly when young, but without wool when old; radial spines 15 to 30, the lower shorter than the upper, more or less incurved, white except the black tips, 1.5 cm. long; central spines 3 or 4, a little longer than the radials, acicular, about 2 cm. long.

35. **ECHINOCACTUS** Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: 420. 1827.

Plants very large, thick, cylindric and many-ribbed, or low and several-ribbed, the top clothed with a dense mass of wool or nearly naked; areoles very spiny, large, those on the upper part of old plants sometimes united; flowers from the crown of the plant, often partly hidden by the dense wool at the top, usually yellow, rarely pink, of medium size; outer perianth segments narrow, sometimes terminating in pungent tips; inner perianth segments oblong, thinner than the outer, obtuse; scales on flower tube numerous, imbricate, persistent, pungent; scales on ovary small, often linear, their axils filled with matted wool; fruit densely covered with white wool, thin-walled, oblong; seeds blackish, smooth, shining, or rarely papillose, with a small sub-basal hilum.

One other species is known, a native of Utah and Arizona.

Plants very large, often becoming cylindric.

Spines all bright yellow-----1. *E. grusonii*.

Spines brown to gray, rarely some of them yellowish.

Inner perianth segments linear-oblong, entire-----2. *E. ingens*.

Inner perianth segments oblong, more or less toothed or lacerate.

Spines all of one kind-----3. *E. visnaga*.

Spines both radial and central.

Central spine solitary.

Flowers 4 to 5 cm. long; central spine 4 to 5 cm. long, nearly black-----4. *E. grandis*.

Flowers 3 cm. long; central spine 3 cm. long, grayish in age.

5. *E. platyacanthus*.

Central spines several-----6. *E. palmeri*.

Plants relatively small, subglobose.

Flowers yellow-----7. *E. polycephalus*.
 Flowers pink-----8. *E. horizontalonius*.

1. *Echinocactus grusonii* Hildemann, Monatsschr. Kakteenk. 1: 4. 1891.

San Luis Potosí and Hidalgo.

Plants single, depressed-globose, 20 to 130 cm. high or more, often 40 to 80 cm. in diameter, light green; ribs 21 to 37, rather thin and high; spines when young golden yellow, becoming pale and nearly white, in age dirty brown; radial spines 8 to 10, subulate, 3 cm. long; central spines usually 4, up to 5 cm. long; flowers 4 to 6 cm. long, 5 cm. broad at top, the segments never widely spreading; flower tube 3 cm. broad, covered with lanceolate long-acuminate scales; outer perianth segments long-acuminate, brownish on the outside, yellowish within; inner perianth segments cadmium-yellow, erect, narrowly lanceolate, acuminate; ovary spherical, bearing acuminate scales with an abundance of wool in their axils; fruit oblong to spherical, 12 to 20 mm. long, thin-walled, covered with white wool or becoming naked below; seeds smooth, dark chestnut-brown, shining, 1.5 mm. long.

Echinocactus corynacanthus Scheidw. and *E. galeottii* Scheidw. (Allg. Gartenz. 9: 50. 1841) may belong here.

2. *Echinocactus ingens* Zucc.; Pfeiff. Enum. Cact. 54. 1837.

Hidalgo and elsewhere in central Mexico.

Globular to short-oblong, 150 cm. high, 125 cm. in diameter (but reported by Karwinsky to be 5 to 6 feet in diameter), glaucescent, somewhat purplish, very woolly at the top; ribs numerous, tuberculate; areoles large, distant, 2.5 to 3 cm. apart, bearing copious yellow wool; spines brown, straight, rigid, 2 to 3 cm. long; radial spines 8; central spine 1; perianth 2 cm. long, 3 cm. broad; inner perianth segments linear-oblong, yellow, entire, obtuse; fruit ovoid, 3 cm. long, copiously covered by wool, coming from the axils of small scales; seeds large, black, shining, reniform.

3. *Echinocactus visnaga* Hook. in Curtis's Bot. Mag. 77: pl. 4559. 1851.

San Luis Potosí.

Very large, 2 to 3 meters high, 70 to 100 cm. in diameter, glaucous-green, the summit covered with a mass of tawny wool; ribs 15 to 40, somewhat undulate but hardly tubercled, acute; areoles large, approximate and sometimes almost touching one another; spines 4, stout, subulate, all radial, the upper one erect, 5 cm. long, the 3 lower spreading, pale brown; flowers yellow, 7 to 8 cm. broad when fully expanded; inner perianth segments numerous, oblong, spatulate, acute, serrate, 3.5 long; ovary elongate, 8 to 10 cm. long, crowned by the persistent perianth, densely lanate; scales on upper part of ovary, at least, narrow, subpungent.

4. *Echinocactus grandis* Rose, Contr. U. S. Nat. Herb. 10: 126. 1906.

Puebla, the type from Tehuacán.

Simple, cylindric, 1 to 2 meters high, 60 to 100 cm. in diameter, dull green and, when young, with broad horizontal bands, very woolly at the crown; ribs on young plants as few as 8, broad, high, and more or less undulate, but in old plants very numerous and rather thin; areoles remote on young plants, confluent in old flowering plants; spines stout, subulate, distinctly banded, especially the stouter ones, at first yellowish but soon reddish brown; radial spines usually 5 or 6, 3 to 4 cm. long, central spine solitary, 4 to 5 cm. long, straight; flowers numerous, yellow, 4 to 5 cm. long; scales on the ovary linear, their axils bearing an abundance of wool covering the ovary

with a dense felty mass; upper scales narrow, rigid, more or less spiny-tipped; outer perianth segments ovate, long-apiculate, with ciliate margins; inner segments oblong, obtuse, retuse or apiculate, serrulate; fruit hidden in a mass of soft white wool, oblong, 4 to 5 cm. long; seeds black, shining, 2.5 mm. long.

5. *Echinocactus platyacanthus* Link & Otto, Wochenschr. Ver. Beförd. Gartenb. 3: 423. 1827.

Eastern Mexico.

Stems nearly globular, 50 cm. high, 60 cm. broad, light green, very woolly at apex; ribs 21 to 30, acute; spines brownish at first, grayish in age; radial spines 4, spreading, 12 to 16 mm. long; central spines 3 or 4, spreading, 3 cm. long; flowers 3 cm. long, long-woolly; outer perianth segments lanceolate, mucronate; inner perianth segments obtuse, yellow.

6. *Echinocactus palmeri* Rose, Contr. U. S. Nat. Herb. 12: 299. 1909.

Coahuila to Zacatecas; type from Concepción del Río, Zacatecas.

Stems 1 to 2 meters high, 40 to 50 cm. in diameter; ribs 12 to 26, or perhaps more in large plants; central spines 4, annular, the upper one erect, 6 to 8 cm. long, stout, straight, yellow above, brownish and somewhat swollen at base, the 3 lower ones shorter, spreading, similar in color and markings but flattened; radial spines 5 to 8, much smaller, lighter colored and weaker; flowers yellow, rather small; perianth segments about 2 cm. long, more or less lacerate along the margin; fruit about 3 cm. long, hidden in a dense covering of soft white wool; scales weak and bristle-tipped. "Biznaga burra" (Zacatecas).

7. *Echinocactus polycephalus* Engelm. & Bigel. Proc. Amer. Acad. 3: 276. 1856.

Northern Sonora; reported from Baja California. Utah and Arizona to California; type from the Mojave River, California.

Solitary when young, in age forming large clumps of 20 to 30 heads, each globular to short-cylindric, sometimes as much as 70 cm. high but usually smaller; ribs 13 to 21, rather stout, 2 to 3 cm. high, somewhat undulate, nearly hidden under the dense spine armament; areoles 10 to 12 mm. in diameter, 1 to 3.5 cm. apart; spines 7 to 15, when young covered with a downy felt but afterwards glabrate, reddish, subulate, more or less flattened, the radials 2.5 to 5 cm. long; central spines 4, stouter than the radials, 3 to 9 cm. long, more or less annulate; flowers yellow, 5 to 6 cm. long; scales on ovary minute, hidden under the mass of long wool borne in their axils; scales on flower tube numerous, only a little longer than the wool, chartaceous, pungent; inner perianth segments linear-oblong, 2.5 to 3 cm. long, entire, obtuse; fruit densely woolly, crowned by the somewhat spinescent scales, globose to oblong, dry, 1.5 to 2.5 cm. long, dehiscing by a basal pore; seeds angled, papillose, dull black, 3 to 4 mm. long.

8. *Echinocactus horizontalis* Lem. Cact. Hort. Monv. 19. 1839.

Echinocactus equitans Scheidw. Bull. Acad. Brux. 6¹: 88. 1839.

Echinocactus laticostatus Engelm. & Bigel. U. S. Rep. Expl. Miss. Pacif. 4: 32. 1856.

Northern Mexico. Western Texas to Arizona.

Simple, globular or sometimes depressed or short-cylindric, 4 to 25 cm. high, glaucous; ribs 7 to 13, obtuse, often spirally arranged; spines 6 to 9, somewhat curved or straight, 2 to 4 cm. long, often very stout, more or less flattened, often annulate, reddish or sometimes blackish at base; central spine solitary, stouter than the radials; flowers pale rose to pink, 5 to 7 cm. long before expanding, broader than long when fully open; outer perianth seg-

ments linear with more or less pungent tips; inner perianth segments narrowly oblong, about 3 cm. long; ovary and fruit bearing linear scales, their axils very woolly; fruit dehiscing by a basal pore, oblong, red, 3 cm. long, clothed with long white wool; seeds 2 mm. long, more or less angled, brownish black, papillose. "Manca mula," "biznaga meloncillo," "biznaga de dulce" (Durango, *Patoni*); "manca caballo" (Zacatecas); "biznaga" (Texas).

The flesh of the young plants is said to be employed for making a sweet-meat, like that prepared from *Ferocactus*.

36. HOMALOCEPHALA Britt. & Rose, Cactaceae 3: 181. 1922.

A single species is known.

1. *Homalocephala texensis* (Hopffer) Britt. & Rose, Cactaceae 3: 181. 1922.

Echinocactus texensis Hopffer, Allg. Gartenz. 10: 297. 1842.

Echinocactus platycephalus Mühlenpf. Allg. Gartenz. 16: 9. 1848.

Northern Mexico. Texas and New Mexico; type from Texas.

Usually simple, sometimes globose, but generally much depressed, in large plants 30 cm. broad, 10 to 15 cm. high; ribs 13 to 27, very prominent, acute; areoles only 2 to 6 to a rib, densely white-felted when young, large; radial spines usually 6, rarely 7, spreading or recurved, more or less flattened, unequal, 1.2 to 4 cm. long, rarely 5 cm. long, reddish, more or less annulate; central spine solitary, longer than the radials, 3 to 6.5 cm. long, 3 to 8 mm. broad, much flattened, strongly annulate; flowers broadly campanulate, 5 to 6 cm. long and fully as broad, scarlet and orange below, pink to nearly white above; outer perianth segments linear with more or less lacerate margins and terminated by long spinose tips; inner perianth segments with less pungent tip or without any, but with strongly lacerate margins; stigma lobes 10, linear, pale pink; scales on ovary and flower tube linear, pungent; fruit scarlet, globular, 16 to 40 mm. in diameter, nearly smooth when mature, at first pulpy but becoming dry and apparently splitting open unequally; seeds large, uniform, black, smooth, shining, somewhat flattened, angled on the back, 3 mm. broad. "Manca caballo" (Nuevo León).

37. ASTROPHYTUM Lem. Cact. Hort. Monv. 3. 1839.

Plants globular or more or less flattened to short-cylindric; ribs few, very prominent, more or less covered with white radiating hairy scales; spines usually wanting, weak or subulate in two species; flowers borne at the top of the plant, large, yellowish with a reddish center, soon fading, persistent, campanulate to short-funnelform; fruit globular, covered with brown scarious imbricate scales, these woolly in their axils, and more or less pungent; seeds dark brown, smooth and shining, with a large depressed hilum having inturned margins.

The following are the only species known.

Spines none.

Plants globular to columnar; flowers 4 to 6 cm. long-----1. *A. myriostigma*.

Plants much depressed; flowers 3 cm. long-----2. *A. asterias*.

Spines present.

Spines flat, ribbon-like, hardly pungent-----3. *A. capricorne*.

Spines subulate-----4. *A. ornatum*.

1. *Astrophytum myriostigma* Lem. Cact. Hort. Monv. 4. 1839.

Cereus callicoché Galeotti; Scheidw. Bull. Acad. Brux. 6¹: 88. 1839.

Echinocactus myriostigma Salm-Dyck, Cact. Hort. Dyck. 1844. 22. 1845.

Northern Central Mexico; occurring in Coahuila and San Luis Potosí and elsewhere.

Plants solitary or cespitose, globular to cylindric, up to 60 cm. high; ribs usually 5, sometimes 6, 8, or rarely even 10, very broad, acute, usually covered with white woolly scales but sometimes naked; spines wanting, at least on old plants; flowers 4 to 6 cm. long; outer perianth segments narrow, with brown scarious tips; inner perianth segments oblong; scales on ovary and flower tube scarious, imbricate, narrow, often bristly-tipped, with long wool in their axils. "Mitra" (San Luis Potosí); "birreta de obispo" (Coahuila); "bonete", "peyote cimarrón" (Durango).

2. *Astrophytum asterias* (Zucc.) Lem. Cact. 50. 1868.

Echinocactus asterias Zucc. Abh. Akad. Wiss. München 4²: 13. 1845.

Tamaulipas and Nuevo León, and elsewhere in northern Mexico.

Plant much depressed, only 2 to 3 cm. high, about 8 cm. broad; ribs 8, very low, almost flat on top, the surface bearing numerous depressions, containing tufts of wool; areoles prominent, circular, felted, 4 to 5 mm. apart, spineless; flowers 3 cm. long, yellow. "Peyote."

3. *Astrophytum capricorne* (Dietr.) Britt. & Rose, Cactaceae 3: 184. 1922.

Echinocactus capricornis Dietr. Allg. Gartenz. 19: 274. 1851.

Northern Mexico; type from La Rinconada.

Subglobose or short-cylindric, up to 25 cm. high; ribs 7 or 8, high, acute; areoles 2 to 3 cm. apart; spines several, more or less flattened, weak, hardly pungent, brown, 3 to 5 cm. long; flowers 6 to 7 cm. long; outer perianth segments reddish, gradually passing into the lemon-yellow inner ones, spatulate, acute or cuspidate, entire or more or less toothed; seeds 2.5 mm. broad, shining. "Biznaga de estropajo" (Durango, Patoni).

4. *Astrophytum ornatum* (DC.) Weber; Britt. & Rose, Cactaceae 3: 185. 1922.

Echinocactus ornatus DC. Mém. Mus. Hist. Nat. 17: 114. 1828.

Echinocactus mirbelii Lem. Cact. Aliq. Nov. 22. 1838.

Echinocactus holopterus Miquel, Linnaea 12: 2. 1838.

Echinocactus tortus Scheidw. Bull. Acad. Brux. 5: 493. 1838.

Echinocactus ghiesbrechtii Salm-Dyck, Allg. Gartenz. 18: 395. 1850.

Echinopsis haageana Linke, Wochenschr. Gärt. Pflanz. 1: 86. 1858.

Hidalgo and Querétaro.

Subglobose to cylindric, 3 cm. high or more, the surface more or less white-floccose; ribs 8, rather prominent, 2 cm. high or more, acute; areoles 1 to 5 cm. apart, felted; spines 5 to 11, subulate, yellow at first, becoming brown, often 3 cm. long; flowers lemon-yellow, 7 to 9 cm. broad; inner perianth segments broadly oblong, with a broad, more or less serrate apex; scales on ovary very narrow.

38. **CACTUS** L. Sp. Pl. 466. 1753.

About 18 species are known, natives of tropical America.

1. *Cactus salvador* (Murillo) Britt. & Rose, Cactaceae 3: 228. 1922.

Melocactus salvador Murillo, Circular (about 1897).

Vicinity of Jalapa, Veracruz.

Plants simple, globose, 30 to 40 cm. in diameter; ribs 13; radial spines 1 to 3, longer and stouter than the radials, those near the center of the plant nearly erect, those on the side somewhat curved downward; cephalium 8 cm. in diameter; flowers rose-pink; seeds black.

Two other species of *Melocactus* have been described from Mexico, *M. curvispinus* Pfeiff. (Enum. Cact. 46. 1837) and *M. delessertianus* Lem. (Hort. Univ. 1: 225. 1839), but both are imperfectly known.

39. ANCISTROCACTUS Britt. & Rose, *Cactaceae* 4: 3. 1923.

Small, globular or short-cylindric plants, indistinctly ribbed, strongly tubercled, very spiny, one of the central spines always hooked; flowering tubercles more or less grooved on the upper side; flowers rather small, short, funnelform, borne at the top of the plant; ovary small, bearing a few thin scales, these always naked in their axils; fruit oblong, greenish, juicy, thin-celled, usually naked below but with a few broad cordate thin-margined scales above; seeds globular, rather large, brownish to black.

One other species occurs in Texas.

Radial spines 20 or more, strongly appressed, pectinate; flowering areoles naked ----- 1. **A. megarhizus.**

Radial spines 19 or fewer, more or less spreading, hardly pectinate; flowering areoles woolly ----- 2. **A. scheeri.**

1. **Ancistrocactus megarhizus** (Rose) Britt. & Rose, *Cactaceae* 4: 4. 1923.

Echinocactus megarhizus Rose, *Contr. U. S. Nat. Herb.* 12: 290. 1909.

Type from Victoria, Tamaulipas.

Solitary or in clusters of 3 or 4; plant body nearly globular or a little elongate, 5 to 8 cm. high, usually solitary, from large fleshy roots; ribs spiral, divided into dark green tubercles, 4 to 5 cm. high; radial spines 20 or more, pectinate, at first pale yellow, in age white; in seedlings the spines pubescent; central spines usually 4, the 3 upper similar to the radials, although a little stouter, the lower central spines stout and strongly hooked, 15 mm. long; fruit green, suggesting that of a *Coryphantha*, clavate, bearing a few naked scales near the top; seeds black, smooth, shining.

2. **Ancistrocactus scheeri** (Salm-Dyck) Britt. & Rose, *Cactaceae* 4: 4. 1923.

Echinocactus scheeri Salm-Dyck, *Cact. Hort. Dyck.* 1849. 155. 1850.

Northern Mexico. Texas.

Globular to clavate, 3.5 to 5 cm. long; ribs usually 13, indistinct, somewhat spiraled, strongly divided into stout terete tubercles grooved only to the middle; radial spines 15 to 18, spreading, 12 mm. long or less, white to straw-colored; central spines 3 or 4, the lowest strongly hooked; flowers 2.5 cm. long, greenish yellow; ovary small, nearly naked; seeds large (about 2 mm. long), brown and minutely tuberculate (according to Coulter).

40. THELOCACTUS Britt. & Rose, *Bull. Torrey Club* 49: 251. 1922.

Plants of medium size, globular or somewhat depressed, spiny, often densely so; ribs few, low or even indistinct, often spiraled, divided into large tubercles; flowering tubercles more or less grooved above; flowers from near the center of the plant, borne on very young tubercles, rather large, campanulate, diurnal; scales on ovary usually few, their axils naked; fruit, so far as known, dry, dehiscing by a basal pore; seeds numerous, black, finely tuberculate, with a large basal hilum.

The species here listed are the only ones known.

Ribs indefinite, strongly tubercled.

Spines partly curved outward ----- 5. **T. buekii.**

Spines all straight.

Tubercles not flattened laterally; radial spines 6 to 9.

1. **T. hexaedrophorus.**

Tubercles flattened laterally; radial spines 1 to 5.

Flowers white ----- 2. **T. rinconensis.**

Flowers not white.

Flowers salmon to yellow ----- 3. **T. lophothele.**

Flowers rose-purple ----- 4. **T. phymatothele.**

Ribs definite, but more or less divided into tubercles.

Flowers yellowish.

Ribs 8 to 13-----6. *T. leucacanthus*.

Ribs 20 to 25-----7. *T. nidulans*.

Flowers red to purple.

Spines all straight.

Spines subulate-----8. *T. fossulatus*.

Spines acicular-----9. *T. tulensis*.

Spines more or less curved.

Spines 8 or fewer-----10. *T. lloydii*.

Spines numerous.

Central spines flexible, usually straight, porrect or ascending.

11. *T. bicolor*.

Central spines subulate, rigid, some of them curved and reflexed.

12. *T. pottsii*.

1. *Thelocactus hexaedrophorus* (Lemaire) Britt. & Rose, Bull. Torrey Club 49: 251. 1922.

Echinocactus hexaedrophorus Lem. Cact. Hort. Monv. 27. 1839.

Central Mexico; type from Tampico, Tamaulipas.

Globose or somewhat flattened above or umbilicate, glaucous, strongly tubercled, not ribbed, 13 to 14 cm. in diameter; tubercles prominent, somewhat 6-sided, 27 mm. broad at base, arranged in indefinite spirals; radial spines 6 to 9, spreading, unequal, 11 to 18 mm. long, rigid, straight, subulate, annulate; central spine much stouter than the radials, erect, 2.3 to 3 cm. long; flowers 5.5 cm. long and broader than long when expanded; perianth segments oblong, purplish.

2. *Thelocactus rinconensis* (Poselger) Britt. & Rose, Cactaceae 4: 7. 1923.

Echinocactus rinconensis Poselger, Allg. Gartenz. 23: 18. 1855.

Nuevo León; type from Rinconada.

Simple, globose or somewhat depressed, 6 to 8 cm. high, 12 cm. in diameter; ribs somewhat spiraled, strongly tubercled; tubercles more or less flattened laterally, somewhat angled; spines usually only 3, acicular, 1.5 cm. long; flowers white, 4 cm. long; inner perianth segments lanceolate, acute.

3. *Thelocactus lophothele* (Salm-Dyck) Britt. & Rose, Bull. Torrey Club 49: 251. 1922.

Echinocactus lophothele Salm-Dyck, Allg. Gartenz. 18: 395. 1850.

Chihuahua; type from Chihuahua City.

Simple or in its native state cespitose, globose, sometimes depressed or short-cylindric, up to 25 cm. high, glaucous; ribs indefinite, strongly tuberculate, the tubercles flattened; areoles depressed, grayish-lanate when young; radial spines 3 to 5, stout, purplish brown, 1 to 3 cm. long; central spines wanting or solitary; flowers salmon to rose, about 5 cm. broad; perianth segments nearly linear, acute; scales of ovary glabrous, 6 mm. long.

4. *Thelocactus phymatothele* (Poselger) Britt. & Rose, Cactaceae 4: 8. 1923.

Echinocactus phymatothelos Poselger; Först. Handb. Cact. ed. 2. 602. 1885.

Mexico, the range not known.

Simple, depressed-globose, 5 cm. high, 9 to 10 cm. in diameter; ribs glaucous-green, 13, divided into low irregular tubercles, these somewhat flattened and pointed; spines usually 1 to 3, sometimes wanting, subulate, rigid, 2 cm. long, brown, spreading; flowers 6 cm. broad; inner perianth segments pinkish, narrow, acute; scales present on ovary and flower tube.

5. *Thelocactus buekii* (Klein) Britt. & Rose, *Cactaceae* 4: 8. 1923.

Echinocactus buekii Klein, *Gartenflora* 8: 257. 1859.

Mexico, the locality not known.

Stems simple, deep green; tubercles distinct, somewhat pointed, angled; spines about 7, reddish, unequal, some of them outwardly curved, the longer ones much elongate; flowers dark red; inner perianth segments narrow.

6. *Thelocactus leucacanthus* (Zucc.) Britt. & Rose, *Cactaceae* 4: 8. 1923.

Echinocactus leucacanthus Zucc.; Pfeiff. Enum. Cact. 66. 1837.

Cereus tuberosus Pfeiff. Enum. Cact. 102. 1837.

Cereus maelenii Pfeiff. Allg. Gartenz. 5: 378. 1837.

Echinocactus porrectus Lem. Cact. Aliq. Nov. 25. 1838.

Echinocactus subporrectus Lem. Cact. Aliq. Nov. 25. 1838.

Echinocactus theloideus Salm-Dyck, Allg. Gartenz. 18: 396. 1850.

Central Mexico; type from Zimapan, Hidalgo.

Densely cespitose, short-cylindric, 10 to 15 cm. long; ribs 8 to 13, sometimes spiraled, obtuse, tubercled; radial spines 7 to 20, at first light yellow, in age gray, spreading or recurved, unequal, the longer ones 4 cm. long, more or less annulate; central spines solitary, at first blackish, in age gray, up to 5 cm. long; flowers yellow, 5 cm. long; inner perianth segments numerous, lanceolate, acute; ovary and flower tube bearing broad imbricate scales.

Here should perhaps be referred *Echinocactus ehrenbergii* Pfeiffer (Allg. Gartenz. 6: 275. 1838).

7. *Thelocactus nidulans* (Quehl) Britt. & Rose, *Cactaceae* 4: 9. 1923.

Echinocactus nidulans Quehl, *Monatsschr. Kakteenk.* 21: 119. 1911.

Mexico, the range not known.

Simple, depressed-globose, 10 cm. high, sometimes 20 cm. in diameter, gray, usually glaucous; ribs 20 to 25, rather indistinct, divided into tubercles; spines about 15, all similar, 2 to 6 cm. long; flowers 4 cm. long, yellowish white.

8. *Thelocactus fossulatus* (Scheldw.) Britt. & Rose, *Cactaceae* 4: 10. 1923.

Echinocactus fossulatus Scheldw. Allg. Gartenz. 9: 49. 1841.

San Luis Potosí.

Globose to much depressed, 10 to 15 cm. in diameter; ribs usually 13, slightly glaucous, bronzed; tubercles large, somewhat flabby, more or less compressed, dorsally somewhat angled; flowering areoles narrow, sometimes extending forward to the next tubercle; radial spines 4 or 5, unequal, 1 to 3.5 cm. long, brown; central spine solitary, 3 to 4.5 cm. long, subulate, annulate; flowers central, nearly white or slightly tinged with pink; scales on flower tube ovate, their scarious margins slightly ciliate.

Echinocactus drageanus Moerder (Rev. Hort. 67: 186. 1895) and *E. droegeanus* Hildmann (Schum. Gesamtb. Kakt. 438. 1898) probably belong here.

9. *Thelocactus tulensis* (Poselger) Britt. & Rose, *Cactaceae* 4: 11. 1923.

Echinocactus tulensis Poselger, Allg. Gartenz. 21: 125. 1853.

Tamaulipas; type from Tula.

Plant simple to abundantly cespitose, globular to short-cylindric, up to 26 cm. high; ribs 8 to 13, strongly tubercled; radial spines 6 to 8, more or less spreading, 10 to 15 mm. long, brownish; central spines solitary or sometimes 2, 3 cm. long; flowers 2.5 cm. long, rose-colored; inner perianth segments linear-oblong, acute.

10. *Thelocactus lloydii* Britt. & Rose, Cactaceae 4: 11. 1923.

Zacatecas.

Plants simple, depressed-globose, 8 to 12 cm. broad, pale bluish green, strongly tubercled and strongly armed; tubercles conspicuous but low, often wider than long, sometimes 4 cm. wide; flowering groove rather conspicuous but narrow, extending from the spines halfway to the axil of the tubercle; spines usually 8, sometimes with a smaller accessory one, all ascending from the base and curved outward from the center, terete or somewhat angled at base, often highly colored below, with sharp yellowish crimson tips, the longer ones 6 cm. long; outer perianth segments very pale purple.

11. *Thelocactus bicolor* (Galeotti) Britt. & Rose, Bull. Torrey Club 49: 251. 1922.*Echinocactus bicolor* Galeotti; Pfeiff. Abbild. Beschr. Cact. 2: pl. 25. 1848.*Echinocactus rhodophthalmus* Hook. in Curtis's Bot. Mag. 76: pl. 4486. 1850.*Echinocactus ellipticus* Lem. Jard. Fleur. 3: pl. 270. 1853.*Echinocactus bolansis* Rünge, Gartenflora 38: 106. 1889.

Central and eastern Mexico. Texas.

Plants simple, globose to conic, glaucous, small, up to 3 cm. high, very spiny; ribs usually 8, broad, somewhat tubercled; areoles approximate; spines highly colored, sometimes bright red or yellowish or red and yellow; radial spines 9 to 18, widely spreading or sometimes bent backward at tip, 3 cm. long or less; central spines usually 4, ascending or porrect, all straight, 3 to 5 cm. long, subulate; flowers 5 to 6 cm. long and fully as broad when expanded; outer perianth segments pale purple, the inner ones deep purplish pink, oblong, acute; scales on ovary and flower tube imbricate, ovate, with scarious and ciliate margins; fruit about 1 cm. long, dehiscing by a large irregular basal opening; seeds 2 mm. long, black.

12. *Thelocactus pottsii* (Salm-Dyck) Britt. & Rose, Cactaceae 4: 12. 1923.*Echinocactus pottsii* Salm-Dyck, Allg. Gartenz. 18: 395. 1850.*Echinocactus heterochromus* Weber, Dict. Hort. Bois 466. 1896.

Chihuahua and Coahuila; type from Chihuahua City.

Globular or somewhat depressed, 10 to 15 cm. in diameter, somewhat glaucous, yellowish; ribs 8 or 9, broad and obtuse, more or less distinctly tubercled; areoles large, closely set on old plants, densely felted when young, naked in age; spines variable as to number, shape, size, and color; radial spines 7 to 10, acicular, usually terete, straight or incurved, more or less banded with red and white or pale yellow, 1 to 3 cm. long; central spines several, stout-subulate, more or less flattened, 3 to 4 cm. long, often white, sometimes banded with red; flowers 5 to 6 cm. long; scales on ovary and flower tube ovate, greenish, the margins thin and ciliate; inner perianth segments light purple, darker at base, oblong; fruit globose, 1.5 cm. in diameter; seeds tuberculate, black.

41. **NEOLLOYDIA** Britt. & Rose, Bull. Torrey Club 49: 251. 1922.

Small, more or less cespitose cacti, fibrous-rooted, cylindric, densely spiny, tubercled; tubercles more or less arranged on spiraled ribs, grooved above; radial spines numerous, widely spreading; central spines one to several, much stouter and longer than the radials; flowers large, pink or purple, subcentral from the axils of nascent tubercles, their segments widely spreading; fruit

compressed-globose, dull-colored, thin-walled, becoming papery, dry, with few scales or none; seeds globose, black, dull, tuberculate-roughened, with a large white basal scar.

One other species occurs in Texas.

Plants small, 3 cm. or less in diameter; central spines sometimes wanting.

1. *N. pilispina*.

Plants larger; central spines always present.

Central spines curved or hooked-----2. *N. clavata*.

Central spines all straight.

Central spine solitary.

Central spine stiff, porrect-----3. *N. horripila*.

Central spine weak, ascending or connivent-----4. *N. beguinii*.

Central spines several.

Spines white, or sometimes dark above-----5. *N. ceratites*.

Spines, at least the central ones or part of them, black---6. *N. conoidea*.

1. *Neolloydia pilispina* (Purpus) Britt. & Rose, *Cactaceae* 4: 14. 1923.

Mammillaria pilispina Purpus, *Monatsschr. Kakteenk.* 22: 150. 1912.

San Luis Potosí; type from Minas de San Rafael.

Plants cespitose, about 3 cm. in diameter; ribs indistinct, of very definite, somewhat angled tubercles; young spine areoles clothed with abundant long white wool covering the top of the plant; radial spines 6 or 7, 5 to 6 mm. long, weak and spreading the upper ones longer and connivent over the top of the plant, 2 cm. long or more, white with blackish tips; central spines often wanting, sometimes one; flowers 1.5 to 2 cm. long, purplish; outer perianth segments brownish.

2. *Neolloydia clavata* (Scheidw.) Britt. & Rose, *Cactaceae* 4: 15. 1923.

Mammillaria clavata Scheidw. *Bull. Acad. Brux.* 5: 494. 1838.

Mammillaria stipitata Scheidw. *Bull. Acad. Brux.* 5: 495. 1838.

Mammillaria raphidacantha Lem. *Cact. Hort. Monv.* 34. 1839.

Mammillaria ancistracantha Lem. *Cact. Hort. Monv.* 36. 1839.

? *Mammillaria potosiana* Jacobi, *Allg. Gartenz.* 24: 92. 1856.

Mammillaria sulcoglandulifera Jacobi, *Allg. Gartenz.* 24: 92. 1856.

? *Cactus brunneus* Coulter, *Contr. U. S. Nat. Herb.* 3: 117. 1894.

? *Cactus maculatus* Coulter, *Contr. U. S. Nat. Herb.* 3: 117. 1894.

Mammillaria radicansissima Quehl, *Monatsschr. Kakteenk.* 22: 164. 1912.

San Luis Potosí.

Plants simple, elongate, cylindric, 10 to 15 cm. high, dark bluish green; tubercles in rows of 5, 8, and 13, conic, grooved above, the axils when young bearing short white wool; glands in the groove 1 to several, large, red; radial spines 6 to 12, with reddish or black tips; central spine 1, somewhat longer than the radials, curved or even hooked; flowers small for the genus, about 2 cm. long; outer perianth segments linear, acute, entire, with broad brownish midrib, the inner ones linear, entire, narrow, creamy white.

3. *Neolloydia horripila* (Lem.) Britt. & Rose, *Cactaceae* 4: 16. 1923.

Mammillaria horripila Lem. *Cact. Aliq. Nov.* 7. 1838.

Hidalgo.

Simple or somewhat cespitose, globular to short-cylindric, 10 to 12 cm. high; tubercles glaucous, prominent, rounded at apex; radial spines 8 to 10, acicular, spreading, 15 mm. long, grayish; central spines solitary, straight, a little longer than the radials; flowers deep purple, 3 cm. long; inner perianth segments narrowly oblong, acute.

4. *Neolloydia beguinii* (Weber) Britt. & Rose, Bull. Torrey Club **49**: 252. 1922.

Echinocactus beguinii Weber; Schum. Gesamtb. Kakt. 442. 1898.

Zacatecas and Coahuila; type probably from Saltillo, Coahuila.

Plant body cylindric, 10 to 15 cm. high; ribs spiraled and divided at regular intervals into low tubercles resembling geometric figures, pale bluish green but nearly hidden by the dense covering of spines; radial spines 20 or more, white but with dark tips; centrals usually single, longer and ascending; flowers appearing from the top of the plant, 3 to 4 cm. long, bright pink; ovary without scales; seeds black, tubercled.

5. *Neolloydia ceratites* (Quehl) Britt. & Rose, Cactaceae **4**: 16. 1923.

Mammillaria ceratites Quehl, Monatsschr. Kakteenk. **19**: 155. 1909.

Mexico.

Simple or in small clusters, short-cylindric, 6 to 10 cm. high; tubercles somewhat 4-angled, more or less arranged in ribs; young areoles very woolly but becoming naked; radial spines 15 to 20, more or less spreading, white, 1.5 cm. long; central spines 5 or 6, longer and stouter than the radials, blackish above; flowers purple, 3 to 3.5 cm. long; perianth segments oblong, acute.

6. *Neolloydia conoidea* (DC.) Britt. & Rose, Bull. Torrey Club **49**: 252. 1922.

Mammillaria conoidea DC. Mém. Mus. Hist. Nat. **17**: 112. 1828.

Mammillaria grandiflora Otto; Pfeiff. Enum. Cact. **33**. 1837.

Mammillaria diaphanacantha Lem. Cact. Aliq. Nov. **39**. 1838.

Mammillaria inconspicua Scheidw. Bull. Acad. Brux. **5**: 495. 1838.

Mammillaria echinocactoides Pfeiff. Allg. Gartenz. **8**: 281. 1840.

Mammillaria scheeri Mühlenpf. Allg. Gartenz. **13**: 346. 1845.

Mammillaria strobiliformis Engelm. in Wislitz. Mem. North. Mex. **113**. 1848.

Zacatecas and elsewhere in northern Mexico.

Sometimes simple but usually cespitose, sometimes forming large clusters, often branching or budding above, short-cylindric; tubercles in 5 or 8 spiral rows, obtuse, their axils very woolly; spines very numerous, often completely covering the plant; radial spines white, 25 or more, widely spreading, 8 to 10 mm. long; central spines several, stouter and longer than the radials, 1 to 3 cm. long, blackish; flowers large; outer perianth segments dull purple without, lighter toward the margins, the inner ones rich purple; fruit compressed, globose, dull yellow, mottled with red, becoming dry and papery, then brown; seeds 1 mm. in diameter.

42. MAMILLOPSIS Weber; Britt. & Rose, Cactaceae **4**: 19. 1923.

Cespitose cacti, often forming large clusters, globular or short-cylindric, completely hidden under a mass of long soft white hairlike spines; tubercles not arranged in ribs, more or less conic, not grooved above, spine-bearing at the apex, their axils pubescent and bristly; radial spines numerous, weak, straight; central spines 4 to 6, with yellow hooked tips; flowers from near the top of the plant but apparently from the axils of old areoles, with a regular straight slender scaly tube and a broad spreading limb; perianth segments oblong, obtuse; stamens and style erect, long-exserted beyond the tube; scales on flower tube orbicular, obtuse.

Only the following species are known.

- | | |
|--|-------------------------|
| Flowers 6 to 7 cm. long, orange-yellow | 1. <i>M. senilis</i> . |
| Flowers 3 cm. long, deep red | 2. <i>M. diguetii</i> . |

1. *Mamillopsis senilis* (Lodd.) Weber; Britt. & Rose, Cactaceae 4: 19. 1923.
Mammillaria senilis Lodd.; Salm-Dyck, Cact. Hort. Dyck. 1849. 82. 1850.

High mountains of Chihuahua and Durango.

Stems 6 to 15 cm. high, 3 to 6 cm. in diameter, the flesh juicy and drying red; tubercles 3 to 4 mm. long; spines 30 to 40, 2 cm. long; flowers 6 cm. broad; perianth segments oblong, acute, with serrate margin. "Cabeza de vieja" (*Ochoterena*).

2. *Mamillopsis diguetii* (Weber) Britt. & Rose, Cactaceae 4: 20. 1923.

Mammillaria senilis diguetii Weber, Bull. Mus. Hist. Nat. 10: 383. 1904.

Jalisco and Sinaloa; type from Sierra de Nayarit, Jalisco.

Plants densely cespitose, forming a hemispheric clump of some 35 globular heads, each 25 cm. in diameter; radial spines numerous, dark straw-colored; flowers about 2 cm. broad; ovary bearing small scales.

43. COCHEMIEA Walton, Cact. Journ. 2: 50. 1899.

Plant body cylindric, often much elongate, the surface covered with spirally arranged tubercles, these not milky; tubercles not grooved above; spines both central and radial; flowers borne from the axils of upper old tubercles, narrowly tubular, curved and bilabiate; perianth segments in 2 series; stamens and style red, exserted; ovary naked; fruit indehiscent, globular, red, naked, bearing a large scar at the top; seeds black, reticulate.

The species here listed are the only ones known.

Spines all straight-----1. *C. halei*.

Spines with some or all of the centrals hooked.

Central spine normally solitary-----2. *C. poselgeri*.

Central spines normally 2 to 11 (sometimes only one in No. 3).

Central spines 1 to 4-----3. *C. setispina*.

Central spines 8 to 11-----4. *C. pondii*.

1. *Cochemiea halei* (T. S. Brandeg.) Walton, Cact. Journ. 2: 50. 1899.

Mammillaria halei T. S. Brandeg. Proc. Calif. Acad. II. 2: 161. 1889.

Islands of southern Baja California; type from Magdalena Island.

Cespitose; stems nearly upright, often 30 to 50 cm. high, 5 to 7.5 cm. in diameter, almost entirely covered by the spines; tubercles short, their axils woolly but not setose; radial spines 10 to 20, 10 to 12 mm. long; central spines 3 or 4, 25 mm. long, all straight; flowers central or nearly so, 4 to 5 cm. long; fruit scarlet, 12 mm. long; seeds reticulate.

2. *Cochemiea poselgeri* (Hildmann) Britt. & Rose, Cactaceae 4: 22. 1923.

Mammillaria poselgeri Hildmann, Gartenflora 34: 559. 1885.

Mammillaria roseana T. S. Brandeg. Zoe 2: 19. 1891.

Mammillaria radliana Quehl, Monatsschr. Kakteenk. 2: 104. 1892.

Lower elevations in southern Baja California; type from the Cape Region.

Stems numerous from a central root, spreading or sometimes pendent from rocks or creeping over the ground, often 2 meters long, 4 cm. thick; areoles and upper axils white-woolly, the latter rarely setose; tubercles remote, somewhat flattened; radial spines 7 to 9, 9 to 12 mm. long, straw-colored; central spine 1, hooked, 25 mm. long; flowers appearing in the upper axils, 3 cm. long, scarlet; fruit globular, 6 to 8 mm. in diameter.

3. *Cochemiea setispina* (Coulter) Walton, Cact. Journ. 2: 51. 1899.

Cactus setispinus Coulter, Contr. U. S. Nat. Herb. 3: 106. 1894.

Mammillaria setispina Engelm.; K. Brandeg. Erythea 5: 117. 1897.

Interior of southern Baja California, the type from San Borja.

Stems ascending, 30 cm. high; tubercles short, their axils woolly but not setose; radial spines 10 to 12, white with black tips, widely spreading, unequal, 10 to 34 mm. long, slender; central spines 1 to 4, stouter than the radials, one of them strongly hooked; fruit obovoid, 3 cm. long, scarlet; seeds black and pitted.

4. *Cochemia pondii* (Greene) Walton, Cact. Journ. 2: 51. 1899.

Mammillaria pondii Greene, Pittonia 1: 268. 1889.

Islands off the west coast of northern Baja California; type from Cedros Island.

Stems at first upright, cylindric, simple or few-branched, 7 to 30 cm. high, hidden under a dense covering of spines; axils of tubercles setose; young areoles white-tomentose; radial spines white or whitish or sometimes brownish, 15 to 25, spreading; central spines 8 to 11, much longer and stouter than the radials, the longest 3 cm. long, 1 or 2 hooked; flowers slender, 5 cm. long, bright scarlet; fruit purplish red, 18 mm. long, ovoid to obovoid.

44. *CORYPHANTHA* Lem. Cact. 32. 1868.

Plant body globular to cylindric, either simple or cespitose; tubercles, except the very earliest ones, grooved on the upper surface from apex to base; flowers from near the top of the plant and from the base of young and growing tubercles, large and showy, generally yellow, sometimes purple or red; ovary naked or bearing a few scales in some species; perianth long-persistent; fruit large, ripening slowly, ovoid to oblong, greenish or yellowish; seeds brown, lightly reticulate or nearly smooth.

A few other species occur in the United States, and one is found in Cuba.

Tubercles grooved to middle or a little below; ovary bearing scales with woolly axils.

Tubercles elongate, bright green-----1. *C. macromeris*.

Tubercles short, grayish green-----2. *C. runyonii*.

Tubercles grooved from tip to base; ovary naked.

Grooves of tubercles bearing large yellow or red glands.

Flowers white-----3. *C. ottonis*.

Flowers not white.

Stems globular.

Radial spines more or less recurved-----4. *C. recurvata*.

Radial spines spreading or ascending.

Spines dark, sometimes black-----5. *C. poselgeriana*.

Spines yellow or sometimes tinged with red.

Central spines slender and flexible-----6. *C. muehlenpfordtii*.

Central spines stout and rigid.

Radial spines subulate-----7. *C. guerkeana*.

Radial spines acicular-----8. *C. echinoidea*.

Stems cylindric.

Stems bluish green-----9. *C. clava*.

Stems yellowish green.

Central spine generally one.

Glands in groove red-----10. *C. octacantha*.

Glands in groove yellow-----11. *C. exsudans*.

Central spines 2-----12. *C. erecta*.

Grooves of tubercles without large glands.

Outer perianth segments not ciliate.

Flowers purplish or rose-----13. *C. elephantidens*.

Flowers yellow or white.

Tubercles very large, broader than high-----14. *C. bumamma*.

Tubercles of medium size, if large longer than broad.

Plants large, often 8 cm. in diameter; seeds 3 mm. in diameter.

15. *C. robustispina*.

Plants smaller; seeds 2 mm. or less in diameter.

Central spines usually wanting.

Secondary cluster of spines developed in upper part of areoles
and connivent at top-----16. *C. connivens*.

Secondary cluster of spines not developed.

Spines pectinate-----17. *C. pectinata*.

Spines not pectinate.

Spines 14 or more.

Spines slender, with long black tips----18. *C. nickelsae*.

Spines rather short, with light tips.

Spines subulate-----19. *C. compacta*.

Spines acicular-----20. *C. radians*.

Spines fewer than 14.

Spines slender and weak-----21. *C. sulcolanata*.

Spines not slender-----22. *C. retusa*.

Central spines one to several.

Central spines strongly hooked-----23. *C. palmeri*.

Central spines straight, or at most curved.

Central spines more or less curved.

Central spine one.

Radial spines nearly as long as the central.

24. *C. cornifera*.

Radial spines about half as long as the central.

25. *C. salm-dyckiana*.

Central spines several.

Radial spines 20 or more-----26. *C. pallida*.

Radial spines 12 or fewer-----27. *C. pycnacantha*.

Central spines straight.

Radial spines of two kinds (to be looked for here).

5. *C. poselgeriana*.

Radial spines of one kind-----28. *C. durangensis*.

Outer perianth segments ciliate.

Inner perianth segments very narrow-----29. *C. neomexicana*.

Inner perianth segments narrowly lanceolate-----30. *C. aggregata*.

1. *Coryphantha macromeris* (Engelm.) Lem. Cact. 35. 1868.

Mammillaria macromeris Engelm. in Wislitz. Mem. North. Mex. 97. 1848.

Mammillaria heteromorpha Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 128.
1850.

Mammillaria dactylithele Labour. Monogr. Cact. 146. 1853.

Chihuahua to Zacatecas. Texas and New Mexico; type from Dona Ana,
New Mexico.

Plant branching at base, often many-headed, up to 20 cm. long; tubercles large, soft, loosely arranged, elongate, 12 to 30 cm. long, grooved on upper side about two-thirds their length; spines 10 to 17, slender, the radials white; central spines several, black, the longer ones 5 cm. long; flowers large, purple, 6 to 8 cm. broad; scales on flower tube ciliate; ovary bearing a few scales with hairy axils; fruit 15 to 25 mm. long; seeds globose-obovate, brown but sometimes described as yellow, smooth.

2. *Coryphantha runyonii* Britt. & Rose, Cactaceae 4: 26. 1923.

Along the Rio Grande in Texas, from Brownsville to Rio Grande City, and doubtless occurring on the Mexican side of the river.

Forming low clumps, sometimes 50 cm. in diameter, grayish green; tubercles 1 to 2 cm. long, terete or somewhat flattened, grooved above for half their length; radial spines 6 or more, spreading, acicular, 3 cm. long or less, sometimes all yellow or sometimes one or more brown; central spine on young plants solitary, on old plants sometimes 2 or 3, up to 6 cm. long; flowers purple, 6 cm. broad; outer perianth segments ciliate, the inner ones spatulate-oblong, acute; fruit green; seeds brown.

3. *Coryphantha ottonis* (Pfeiff.) Lem. Cact. 34. 1868.

Mammillaria ottonis Pfeiff. Allg. Gartenz. 6: 274. 1838.

Mammillaria bussleri Mundt; Schum. Monatsschr. Kakteenk. 12: 47. 1902.

Mammillaria golziana Haage, Monatsschr. Kakteenk. 19: 100. 1909.

Central Mexico; type from Mineral del Monte, Hidalgo.

Simple, globular to short-cylindric, 12 cm. high or less, 8 cm. in diameter, glaucous to gray-green; radial spines 8 to 12, nearly equal, 8 to 10 mm. long; central spines 3 or 4, longer and a little stouter than the radials; axils of flowering tubercles woolly; flowers white, 4 cm. long; outer perianth segments oblong, obtuse, the inner ones apiculate.

4. *Coryphantha recurvata* (Engelm.) Britt. & Rose, Cactaceae 4: 27. 1923.

Mammillaria recurvispina Engelm. Proc. Amer. Acad. 3: 266. 1856. Not

M. recurvispina De Vriese, 1839.

Mammillaria recurvata Engelm. Trans. Acad. St. Louis 2: 202. 1863.

Sonora. Arizona.

Plant body depressed-globose, 10 to 20 cm. in diameter, often forming large masses 30 to 90 cm. in diameter and sometimes with over 50 heads; tubercles low; radial spines about 20, yellow to gray, with dark tips, pectinate, recurved; central spines 1, rarely 2, longer and darker than the radials, 12 to 20 mm. long, more or less reflexed, often appressed; flowers 25 to 35 cm. long, said to be brownish outside; inner perianth segments lemon-yellow.

5. *Coryphantha poselgeriana* (Dietr.) Britt. & Rose, Cactaceae 4: 28. 1923.

Echinocactus poselgerianus Dietr. Allg. Gartenz. 19: 346. 1851.

Echinocactus saltillensis Poselger, Allg. Gartenz. 21: 101. 1853.

Echinocactus salinensis Poselger, Allg. Gartenz. 21: 106. 1853.

Mammillaria difficilis Quehl, Monatsschr. Kakteenk. 18: 107. 1908.

Mammillaria valida Purpus, Monatsschr. Kakteenk. 21. 97. 1911. Not *M. valida* Weber. 1898.

Coahuila and Zacatecas; type from Saltillo, Coahuila.

Plant body large for the genus, globular, bluish green; tubercles large, closely packed together and at base strongly angled; radial spines of two kinds, the 4 or 5 lower ones spreading, subulate, reddish to black, about as long as the single central one (2 to 4 cm. long), the upper radials 5 to 8, ascending, yellowish with black tips, weak, acicular; flowers 4 to 5 cm. long and nearly as broad when expanded; flesh-colored; segments spatulate, usually rounded at apex; fruit oblong, 15 mm. long; seeds brownish.

6. *Coryphantha muehlenpfordtii* (Poselg.) Britt. & Rose, Cactaceae 4: 28. 1923.

Mammillaria scheeri Mühlenpf. Allg. Gartenz. 15: 97. 1847. Not *M. scheeri* Mühlenpf. 1845.

Echinocactus muehlenpfordtii Poselg. Allg. Gartenz. 21: 102. 1853.

Chihuahua. Texas and New Mexico.

Plants nearly globular, usually simple, short-oblong, 20 cm. long, 7.5 to 15 cm. in diameter; tubercles 1 to 2.5 cm. long; axils of young tubercles grooved and young spine areoles very woolly; grooves bearing large dark-colored glands; spines variable, reddish to yellow with brown to black tips; radials 6 to 16, usually about 2 cm. long, straight; central spines 1 to 4, subulate, stouter than the radials, 3 to 3.5 cm. long, from nearly straight to curved at tip or even strongly hooked; flowers yellow, 6 cm. long; scales on flower tube and outer perianth segments more or less lacerate; inner perianth segments oblong, entire, acute; fruit greenish, oblong, 3 to 3.5 cm. long, naked; seeds 3 mm. long, brown, shining, smooth.

7. *Coryphantha guerkeana* (Bödeker) Britt. & Rose, *Cactaceae* 4: 29. 1923.
Mammillaria guerkeana Bödeker, *Monatsschr. Kakteenk.* 24: 52. 1914.

Durango.

Plant body globular, 6 to 7 cm. in diameter; tubercles bluish green, somewhat broader than thick, bearing a large red gland at the base of the groove and sometimes at the top; radial spines 9 to 12, yellow when young, spreading-bulbose at base, rather stout; central spines 3 or 4, rarely one of them stouter, often bent slightly at tip; flowering areoles very woolly; ovary oblong, naked.

8. *Coryphantha echinoidea* (Quehl) Britt. & Rose, *Cactaceae* 4: 30. 1923.
Mammillaria echinoidea Quehl, *Monatsschr. Kakteenk.* 23: 42. 1913.

Durango.

Plant solitary, globular or a little broader than high, 5 to 6 cm. in diameter, very woolly at apex; tubercles conic, 1.5 cm. high, 1.2 cm. broad at base; groove with 1 to 3 small grayish glands; areoles elliptic, woolly when young, glabrate in age; radial spines 20 to 25, 1.5 cm. long, white with darker tips; central spines 1 to 3, a little stouter than the radials, one of them porrect, horn-colored; flowers rose-colored, 6 to 8 cm. broad; perianth segments oblong, broad at apex, denticulate, sometimes mucronate.

9. *Coryphantha clava* Lem. *Cact.* 34. 1868.

Mammillaria clava Pfeiff. *Allg. Gartenz.* 8: 282. 1840.

Mammillaria schlechtendalii Ehrenb. *Linnaea* 14: 377. 1840.

Mexico.

Plant body club-shaped, deep green; axils of tubercles filled with white wool and with a red gland at base of the groove; tubercles erect, elongate, somewhat 4-sided; spine areoles white-villous; radial spines usually 7, straight, horn-colored, about equal; central spine 1, a little longer and stouter than the others; flowers very large, sometimes 9 cm. broad, pale yellow, the outer segments tinged with red; perianth segments glossy, linear-oblong to spatulate, the outer ones entire, the inner serrate and mucronate at apex.

10. *Coryphantha octacantha* (DC.) Britt. & Rose, *Cactaceae* 4: 30. 1923.

Mammillaria octacantha DC. *Mém. Mus. Hist. Nat.* 17: 113. 1828.

Mammillaria leucacantha DC. *Mém. Mus. Hist. Nat.* 17: 113. 1828.

Mammillaria lehmanii Otto; Pfeiff. *Enum. Cact.* 23. 1837.

Mammillaria macrothele Mart.; Pfeiff. *Enum. Cact.* 24. 1837.

Mammillaria plaschnickii Otto; Pfeiff. *Enum. Cact.* 24. 1837.

Mammillaria aulacothele Lem. *Cact. Aliq. Nov.* 8. 1838.

Mammillaria biglandulosa Pfeiff. *Allg. Gartenz.* 6: 274. 1838.

Mammillaria sulcimamma Pfeiff. *Allg. Gartenz.* 6: 274. 1838.

Mammillaria martiana Pfeiff. *Linnaea* 12: 140. 1838.

?*Mammillaria thelocamptos* Lehm. *Linnaea* 13: Lit. Ber. 101. 1839.

Mammillaria polymorpha Scheer; Mühlenpf. *Allg. Gartenz.* 14: 373. 1846.
 Central Mexico.

Plant body simple, cylindric, 30 cm. high, 12 to 15 cm. in diameter; axils of tubercles bearing white wool, the groove with 1 or 2 red glands; tubercles elongate, up to 25 mm. long, spreading, somewhat 4-angled but with broad bases; radial spines 8, spreading, rigid, horn-colored with black tips, 10 to 12 mm. long; central spines 1 or 2, stouter than the radials, brownish, 25 mm. long; flowers about 6 cm. broad, straw-colored; perianth segments linear-oblong, obtuse.

11. *Coryphantha exsudans* (Zucc.) Lem.; Britt. & Rose, Cactaceae 4: 31. 1923.

Mammillaria exsudans Zucc.; Pfeiff. Enum. Cact. 15. 1837.

Mammillaria brevimamma Zucc.; Pfeiff. Enum. Cact. 34. 1837.

Mammillaria glanduligera Otto & Dietr. Allg. Gartenz. 16: 298. 1848.

Mammillaria asterias Cels; Salm-Dyck, Cact. Hort. Dyck. 1849. 129. 1850.

Mexico; type collected between Ixmiquilpan and Zimapán, Hidalgo.

Subcylindric, 4 cm. in diameter; tubercles dull green, thick, ovate; glands in the axils of the tubercles pale yellow; spine areoles somewhat tomentose, becoming naked; radial spines 6 or 7, 6 to 10 mm. long, slender, straight, spreading, yellow; central spines 1, erect, yellow, but brown at tip, perhaps hooked; flowers yellow.

12. *Coryphantha erecta* Lem. Cact. 34. 1868.

Mammillaria erecta Lem.; Pfeiff. Allg. Gartenz. 5: 370. 1837.

Mammillaria ceratocentra Berg, Allg. Gartenz. 8: 130. 1840.

Hidalgo.

Plant body cylindric, yellowish green; axils of young tubercles white-woolly; tubercles obliquely conic, somewhat rhombiform at base; radial spines 8 to 14, subulate, ascending, yellowish; central spines 2, the upper one short, the lower curved; flowers large, yellow; perianth segments very narrow.

13. *Coryphantha elephantidens* Lem. Cact. 35. 1868.

Mammillaria elephantidens Lem. Cact. Aliq. Nov. 1. 1838.

Central Mexico.

Simple, subglaucous, up to 14 cm. high and 19 cm. broad; tubercles very large, somewhat flattened, obtuse, 4 to 5 cm. long, densely woolly in their axils; areoles elliptic, when young woolly, in age naked; spines 8, all radial, somewhat unequal, subulate, the longest about 2 cm. long, spreading, when young brownish with yellowish bases, black at apex; flowers, rose-colored, 11 cm. broad; perianth segments numerous, narrowly oblong, apiculate.

14. *Coryphantha bumamma* (Ehrenb.) Britt. & Rose, Cactaceae 4: 33. 1923.

Mammillaria bumamma Ehrenb. Allg. Gartenz. 17: 243. 1849.

Morelos and Guerrero.

Globular or somewhat depressed; tubercles few, very large, rounded at apex, bluish green, very woolly in their axils when young but glabrate in age; spines 5 to 8, subulate, grayish brown, more or less recurved, 2 cm. long or more, all radial; flower yellow, 5 to 6 cm. broad; inner perianth segments narrowly oblong, obtuse or retuse.

15. *Coryphantha robustispina* (Schott) Britt. & Rose, Cactaceae 4: 33. 1923.

Mammillaria robustispina Schott; Engelm. Proc. Amer. Acad. 3: 265. 1856.

Mammillaria brownii Toumey, Bot. Gaz. 22: 253. 1896.

Sonora, the type from the south side of the Babuquibari Mountains. Arizona.

Stems simple or clustered, globular or a little longer than thick, broad, 5 to 15 cm. high, densely armed and almost hidden by the spines; tubercles 2.5 to 2.8 cm. long, arranged in 13 somewhat spiraled rows, fleshy, in age thickly set one against the other, becoming more or less dorsally flattened, pale grayish green, narrowly grooved; radial spines 12 to 15, the 3 lower ones very stout,

brownish, the upper generally weaker, the 2 or 3 uppermost much weaker, clustered closely together and very pale, some of them sometimes crowded toward the center; central spine solitary, very stout and erect or sometimes curved or even hooked, yellow, 3.5 cm. long; all the larger spines somewhat bulbous at the base; flowers 5 to 6 cm. long, salmon-colored; ovary 20 to 25 mm. long, bearing 4 to 7 minute caducous scales; fruit narrowly oblong, 6 cm. long; seeds 3 mm. long, brown, shining.

16. *Coryphantha connivens* Britt. & Rose, Cactaceae 4: 34. 1923.

Valley of Mexico, the type from Tlalpam.

Globular or somewhat depressed, 8 to 10 cm. broad, somewhat woolly at the crown at flowering time but becoming glabrate; spines all radial but of two kinds, one kind spreading or curved backward, subulate, horn-colored, 5 or 6, the others from the upper part of the spine areole, clustered, erect, or toward the top connivent, acicular, black at tip, 8 to 10; flowers yellow, 6 to 7 cm. broad; perianth segments narrowly oblong, acuminate; fruit greenish, oblong, 3 cm. long; seeds brown, 2 mm. long.

17. *Coryphantha pectinata* (Engelm.) Britt. & Rose, Cactaceae 4: 34. 1923.

Mammillaria pectinata Engelm. Proc. Amer. Acad. 3: 256. 1856.

Northern Mexico. Texas.

Usually simple, globose, 3 to 6 cm. in diameter; tubercles usually arranged in 13 spirals; upper tubercles 10 to 12 mm. long, about twice as long as the lower ones; areoles a little longer than broad; spines 16 to 24, all radial, those on the lower areoles appressed and often a little recurved, those from the upper part of the upper areoles 12 to 18 mm. long, connivent over the apex, yellowish white with black tips; flowers yellow, 5 cm. long; ovary 6 to 8 mm. long; fruit 12 mm. long.

18. *Coryphantha nickelsae* (K. Brandeg.) Britt. & Rose, Cactaceae 4: 35. 1923.

Mammillaria nickelsae K. Brandeg. Zoe 5: 31. 1900.

Nuevo León.

Described as globular, densely cespitose, often 7 cm. high, pale green and glaucous; older plants becoming purplish; tubercles almost hidden by the overlapping spines, rather broad at base, low, not densely arranged; spines 14 to 16, all radial (a few forming a small fascicle at the top of the groove), slender, at first simply spreading but afterward bent back and interlaced with those of the adjoining tubercles, 8 to 10 mm. long, at first yellowish at base with dark tips, but afterwards bleaching; flowers described as bright yellow, with a red center, 5 to 7 cm. broad; fruit nearly globular, 5 to 7 mm. long, green; seeds small, brown.

19. *Coryphantha compacta* (Engelm.) Britt. & Rose, Cactaceae 4: 36. 1923.

Mammillaria compacta Engelm. in Wislitz. Mem. North. Mex. 105. 1848.

Chihuahua, the type from Cosihuiriachi.

Plants solitary, somewhat depressed, 3 to 6 cm. high, 5 to 8 cm. broad; tubercles in 13 rows, much crowded, 8 mm. long, sulcate above; radial spines 13 to 16, rigid, appressed, interwoven with adjacent ones, whitish, 10 to 20 mm. long; central spines usually wanting; flowers 2 cm. long and broad, yellow; fruit oval; seeds smooth and yellow.

20. *Coryphantha radians* (DC.) Britt. & Rose, Cactaceae 4: 36. 1923.

Mammillaria radians DC. Mém. Mus. Hist. Nat. 17: 111. 1828.

Mammillaria impeiroma Lem. Cact. Aliq. Nov. 5. 1838.

Mammillaria daimonoceras Lem. Cact. Aliq. Nov. 5. 1838.

Central Mexico.

Simple, nearly globose, either obtuse or depressed at apex, 7.5 cm. in diameter; tubercles ovoid, large; axils of tubercles naked; areoles glabrate; spines all radial, 16 to 18, white or sometimes yellowish, 10 to 12 mm. long, rigid, tomentose when young; flowers lemon-yellow, with outer segments tinged with red, about 10 cm. broad, the segments narrowly oblong to spatulate, acute, somewhat toothed toward the apex. "Huevos de coyote" (*Patoni*).

21. *Coryphantha sulcolanata* Lem. Cact. 35. 1868.

Mammillaria sulcolanata Lem. Cact. Aliq. Nov. 2. 1838.

Mammillaria conimamma Linke, Allg. Gartenz. 25: 239. 1857.

Mammillaria cornimamma N. E. Brown, Gard. Chron. III. 2: 186. 1887.

Mexico, the range unknown; type said to have come from Mineral del Monte, Hidalgo.

Subglobose, somewhat depressed, cespitose, 5 cm. high, 6 cm. thick or more; tubercles somewhat 5-angled at base, subconic above, their axils very woolly when young; spines 9 or 10, all radial, unequal, 12 to 16 mm. long, the lower and upper weaker and shorter than the lateral ones, brownish with black tips but when young whitish yellow with purple tips; flowers 4 cm. long or more, widely spreading, 6 cm. broad or more; perianth segments oblong, acute.

22. *Coryphantha retusa* (Pfeiff.) Britt. & Rose, Cactaceae 4: 38. 1923.

Mammillaria retusa Pfeiff. Allg. Gartenz. 5: 369. 1837.

Oaxaca.

Plants depressed-globose, 5 to 10 cm. in diameter, the top very woolly; tubercles rather large; areoles elliptic; spines 6 to 12, all radial, appressed or even curved backward, yellowish to brownish, subulate except 2 or 3 aciculate ones at the upper part of areoles; flowers central, yellow, about 3 cm. long; inner perianth segments oblong, acute.

23. *Coryphantha palmeri* Britt. & Rose, Cactaceae 4: 39. 1923.

Durango, Coahuila, and Zacatecas; type from Durango.

Plant body globular; tubercles closely set in about 13 rows but not very regularly arranged, pale green, not very flaccid; radial spines 11 to 14, rather stout, spreading nearly at right angles to the central one, yellowish, the tips often blackish; central spine one, stout, terete, hooked at apex; young areoles very woolly; flowers central, pale yellow to nearly white, about 3 cm. long; outer perianth segments linear-oblong, acute, brownish on the broad midrib, entire, the inner yellow throughout, acuminate.

24. *Coryphantha cornifera* (DC.) Lem. Cact. 35. 1868.

Mammillaria cornifera DC. Mém. Mus. Hist. Nat. 17: 112. 1828.

Mammillaria pfeifferiana De Vriese, Tijdschr. Nat. Gesch. 6: 51. 1839.

Mammillaria scolymoides Scheidw. Allg. Gartenz. 9: 44. 1841.

Coahuila and Querétaro, and elsewhere in central Mexico.

Plant solitary, globose, pale green; tubercles short, broad, somewhat imbricate, 12 cm. high; radial spines 16 or 17, grayish, 10 to 12 mm. long; central spine 1, stout, erect or subincurved, generally dark-colored, 14 to 16 mm. long; flowers yellow, tinged with red, 7 cm. broad; inner perianth segments oblanceolate, acuminate.

25. *Coryphantha salm-dyckiana* (Scheer) Britt. & Rose, Cactaceae 4: 39. 1923.

Mammillaria salm-dyckiana Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 134. 1850.

Mammillaria delaetiana Quehl, Monatsschr. Kakteenk. 18: 59. 1908.

Chihuahua.

Plants either solitary or in clusters, nearly globular or sometimes club-shaped, 10 to 15 cm. in diameter, light green; tubercles rather short, closely set; radial spines about 15, spreading, slender, 10 to 15 mm. long, grayish or whitish; central spines 1 to 4, reddish to black, the 3 upper ones when present ascending and those near the top of the plant connivent, the lowest central stouter than the others, 2 to 2.5 cm. long, porrect or curved downward; flowers 4 cm. long; outer perianth segments greenish or tinged with red, the inner pale yellow.

26. *Coryphantha pallida* Britt. & Rose, Cactaceae 4: 40. 1923.

Puebla, the type from Tehuacán.

Plant body either solitary or in clusters of 10 or more, globular, 12 cm. in diameter or less, bluish green; tubercles in 13 rows, short and thick, closely set; radial spines 20 or more, white, appressed; centrals usually 3, but sometimes more, the upper more or less ascending, the lower porrect or curved downward, with the tips black, or sometimes black throughout; flowers often 7 cm. long and nearly as broad; outer perianth segments narrow, greenish yellow, with a reddish stripe on the back; inner perianth segments pale lemon-yellow, broader than the outermost, acuminate; ovary bearing a few narrow scales; fruit greenish brown, 2 cm. long; seeds brown, shining.

27. *Coryphantha pycnacantha* (Mart.) Lem. Cact. 35. 1868.

? *Mammillaria latimamma* DC. Mém. Mus. Hist. Nat. 17: 114. 1828.

Mammillaria pycnacantha Mart. Nov. Act. Nat. Cur. 16: 325. 1832.

? *Mammillaria acanthostephes* Lehm. Allg. Gartenz. 3: 228. 1835.

Mammillaria arietina Lem. Cact. Aliq. Nov. 10. 1838.

Mammillaria scepontocentra Lem. Cact. Hort. Monv. 43. 1839.

Mammillaria winkleri Först. Allg. Gartenz. 15: 50. 1847.

Oaxaca, the type from Oaxaca City.

Plant body solitary, globular to cylindric, about 8 cm. high; tubercles broad, grooved above, glaucous-green; radial spines 10 to 12, slender, 10 to 16 mm. long; central spines about 4, stouter than the radials, about 25 mm. long, more or less curved backward, usually black; flowers from near the center of the plant, 25 mm. in diameter, yellowish; perianth segments numerous, very narrow.

28. *Coryphantha durangensis* (Rünge) Britt. & Rose, Cactaceae 4: 42. 1923.

Mammillaria durangensis Rünge; Schum. Gesamtb. Kakt. 478. 1898.

Northern Mexico; type from Villa Lerdo, Durango.

Plants solitary or in small clusters, short-cylindric, 10 cm. long or less, somewhat glaucous; tubercles rather prominent, in 5 to 8 series, somewhat compressed dorsally, very woolly in the axils; radial spines 6 to 8, acicular, spreading, 1 cm. long or less; central spines solitary, often erect, those of the uppermost areoles connivent, black; flowers about 2 cm. long, when fully expanded 2.5 to 4 cm. broad; outer perianth segments dark purple or with only a purple stripe down the center; inner perianth segments cream-colored to pale lemon-yellow; fruit globular, 5 to 8 mm. in diameter, naked, greenish; seeds brown, about 1 mm. broad.

29. *Coryphantha neomexicana* (Engelm.) Britt. & Rose, Cactaceae 4: 45. 1923.

Mammillaria vivipara radiosa neomexicana Engelm. Proc. Amer. Acad. 3: 269. 1856.

Mammillaria neomexicana A. Nels; Coult. & Nels. Man. Rocky Mount. 237. 1909.

Chihuahua. Texas and New Mexico.

Plants usually solitary, globular to short-oblong, 8 to 12 cm. long, the whole body usually hidden under a mass of spines; radial spines numerous, acicular, usually white; central spines several, much stouter than the radials, pale below, brown or black toward the top; flowers 4 to 5 cm. broad when fully expanded; outer perianth segments greenish or the ones nearer the center purplish, ciliate; inner perianth segments broadly linear, acuminate and apiculate, more or less serrate above; fruit 2.5 cm. long, green, juicy, naked except a few hairy scales near the top, capped by the withered perianth, depressed at apex.

30. *Coryphantha aggregata* (Engelm.) Britt. & Rose, Cactaceae 4: 47. 1923.

Mammillaria aggregata Engelm. in Emory, Mil. Recon. 157. 1848.

Sonora. Arizona, the type from the headwaters of the Gila.

Plants solitary or cespitose, globular to short-oblong, very spiny; radial spines numerous, white, often with brown tips, appressed; central spines several, stout, all erect and appressed or one often porrect, those toward the top of the plant connivent; flowers very large and showy, purplish, 5 to 7 cm. broad; outer perianth segments ciliate, the inner narrowly oblanceolate, often 6 mm. broad, acuminate; fruit green, oblong, 2 to 2.5 cm. long, naked or occasionally bearing a small scale on the side, juicy; seeds dark brown, 2 mm. long.

DOUBTFUL SPECIES.

The following plants, described as species of *Mammillaria*, probably belong to this genus.

MAMMILLARIA CORDIGERA Hesse, Gartenflora 59: 445. 1910. Doubtless a native of Mexico.

MAMMILLARIA CORNUTA Hildmann; Schum. Gesamtb. Kakt. 496. 1898. Native of Mexico.

MAMMILLARIA POTOSIANA Jacobi, Allg. Gartenz. 24: 92. 1856. Type from San Luis Potosí.

MAMMILLARIA RECURVISPINATA De Vriese, Tijdschr. Nat. Gesch. 6: 53. 1839. Described from Mexico.

45. *ESCOBARIA* Britt. & Rose, Cactaceae 4: 53. 1923.

Globose or cylindric, usually cespitose cacti, never milky; tubercles grooved above, persisting as knobs at the base of old plants after the spines have fallen; spines both central and radial, never hooked; flowers small, regular, appearing from the top of the plant at the bottom of the groove of young tubercles; stamens and style included; fruit red, naked (or with one scale), indehiscent, globular to oblong, crowned by the withering perianth; seeds brown to black, the aril basal or subventral, oval.

Two other species occur in Texas.

Outer perianth segments not ciliate-----6. *E. lloydii*.

Outer perianth segments ciliate.

Flowers 2 to 2.5 cm. long.

Plants elongate; seeds small, brown-----1. *E. tuberculosa*.

Plants usually globose; seeds larger, black-----2. *E. dasyacantha*.

Flowers 1.5 cm. long.

Inner perianth segments pointed.

Inner perianth segments broad-----3. *E. chihuahuensis*.

Inner perianth segments narrow-----4. *E. runyonii*.

Inner perianth segments obtuse-----5. *E. chaffeyi*.

1. *Escobaria tuberculosa* (Engelm.) Britt. & Rose, Cactaceae 4: 54. 1923.
Mammillaria strobiliformis Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849.
 104. 1850. Not *M. strobiliformis* Engelm. 1848.

Mammillaria tuberculosa Engelm. Proc. Amer. Acad. 3: 268. 1856.

Northern Mexico. Southwestern United States.

Usually growing in clumps, cylindric, or becoming so, 5 to 18 cm. high, 2 to 6 cm. in diameter; tubercles more or less regularly arranged in spirals, 6 mm. long; radial spines numerous, white, sometimes as many as 30, acicular, 4 to 15 mm. long; central spines several, stouter than the radials, brown to blackish or colored only at the tips, one of them usually porrect; flowers 2.5 cm. in diameter when fully expanded, light pink; outer perianth segments acute, ciliate, the inner narrowly pointed; fruit oblong, up to 20 mm. long, red; seeds brownish, pitted, with a small ventral hilum.

2. *Escobaria dasyacantha* (Engelm.) Britt. & Rose, Cactaceae 4: 55. 1923.
Mammillaria dasyacantha Engelm. Proc. Amer. Acad. 3: 268. 1856.

Northern Chihuahua. Texas and New Mexico, the type from El Paso.

Globose to short-oblong, usually 4 to 7 cm. in diameter but sometimes 20 cm. long; radial spines 20 or more, white, bristle-like; central spines about 9, stouter and longer than the radials, the upper half usually reddish or brownish, often 2 cm. long; flowers pinkish; perianth segments narrowly oblong, apiculate; fruit clavate, scarlet, 15 to 20 mm. long; seeds black, 1 mm. in diameter, slightly flattened, pitted, with a narrow white subbasal hilum.

3. *Escobaria chihuahuensis* Britt. & Rose, Cactaceae 4: 55. 1923.

Chihuahua.

Plants often solitary, perhaps also cespitose, globose to short-cylindric, very spiny; tubercles short, usually hidden by the spines; radial spines numerous, spreading; central spines several, longer than the radials, usually brown or black in the upper part; flowers 1 to 1.5 cm. long, purple; outer perianth segments broad, often rounded at apex, with ciliate margins; inner perianth segments pointed.

4. *Escobaria runyonii* Britt. & Rose, Cactaceae 4: 55. 1923.

Type from Reynosa, Tamaulipas. Texas.

Cespitose, with numerous (sometimes 100) globose to short-oblong heads, gray-green, 3 to 5 cm. long; tubercles 5 mm. long, terete in section, with very narrow groove above; groove at first white-woolly, not glandular; radial spines numerous, acicular, white, 4 to 5 mm. long; central spines stouter than the radials, 5 to 7, slightly spreading, with brown or black tips, 6 to 8 mm. long; flowers 1.5 cm. long, pale purple, the segments with a dark purple stripe down the middle, with pale margins; outer perianth segments narrow-oblong, with thin ciliate margins, the inner narrower than the outer, with margins entire, acute; fruit scarlet, globose to short-oblong, 6 to 9 mm. long, juicy.

5. *Escobaria chaffeyi* Britt. & Rose, Cactaceae 4: 56. 1923.

Zacatecas, the type from Cedros.

Short-cylindric, 6 to 12 cm. long, 5 to 6 cm. in diameter, almost covered by the numerous white spines; tubercles rather short, light green, with a narrow groove above; radial spines numerous, spreading, bristly; central spines several, a little shorter than the radials and brown or black-tipped; flowers 15 mm. long, cream-colored or sometimes purplish; outer perianth segments ciliate, the inner oblong, obtuse, entire; fruit crimson, 2 cm. long.

6. Escobaria lloydii Britt. & Rose, Cactaceae 4: 57. 1923.

Zacatecas, the type from the Sierra Zuluaga.

Plants growing in clumps and resembling a small species of *Echinocereus*; old plants bearing naked corky tubercles; radial spines about 20, spreading, slender, white; central spines several, stout, with black or brownish tips, 2 cm. long; flowers greenish, with a central stripe on the outside, 2.5 cm. long; fruit red, globose to short-oblong, 6 to 12 mm. long; seeds black, pitted, globose, 1 mm. in diameter.

DOUBTFUL SPECIES.

MAMMILLARIA EMSKOETTERIANA Quehl, Monatsschr. Kakteenk. 20: 139. 1910. Perhaps a species of *Escobaria*. Type supposed to have come from San Luis Potosí.

46. BARTSCHELLA Britt. & Rose, Cactaceae 4: 57. 1923.

A single species is known.

1. Bartschella schumannii (Hildm.) Britt. & Rose, Cactaceae 4: 58. 1923.

Mammillaria schumannii Hildm. Monatsschr. Kakteenk. 1: 125. 1891.

Mammillaria venusta K. Brandeg. Zoe 5: 8. 1900.

Southern Baja California.

More or less cespitose (as many as 40 stems have been reported in a single cluster), 6 cm. high or less; axils slightly woolly, without bristles; radial spines 9 to 15, stout, 6 to 12 mm. long, brownish above, glabrous; central spines usually 1, sometimes 2 or 3, one of these usually hooked; in seedlings 10 or 11 radial spines developing, these spreading, feather-like, with long spreading hairs; in plant one year old the spines simply puberulent, all white with brown tips and one central much longer than the others and strongly hooked; flowers 3 to 4 cm. in diameter, the segments about 10, lance-acuminate; stamens numerous, erect, shorter than the style; style slender, erect, pale; stigma lobes 6, linear, green; fruit short, dull; seeds usually found in a cup in between the tubercles, less than 1 mm. long.

47. PELECYPHORA Ehrenb. Bot. Zeit. 1: 737. 1843.

A single species is known.

1. Pelecyphora aselliformis Ehrenb. Bot. Zeit. 1: 737. 1843.

San Luis Potosí.

Tufted, cylindric, 5 to 10 cm. high, 2.5 to 5 cm. in diameter, covered with tubercles arranged in spirals; tubercles strongly flattened laterally, somewhat stalked at base; areoles at top of the tubercles very long and narrow, crowned by an elongate scale-like spine with numerous lateral ridges usually free at tip, giving a peculiar pectinate appearance; flowers 3 cm. broad or more, campanulate; perianth segments in 4 rows, the outer ones sometimes white, oblong, acute; flower tube proper very short; stamens borne at the top of the flower tube, much shorter than the perianth segments; stigma lobes 4, erect; seeds 1 mm. broad, kidney-shaped. "Peyote," "peyotillo."

The plant is employed locally as a remedy for fevers.

48. DOLICHOTHELE Britt. & Rose, Cactaceae 4: 61. 1923.

Plant body globose, more or less cespitose, soft in texture, never milky; tubercles elongate, not grooved above; flowers borne in the axils of old tubercles, very large, with a definite funnel-shaped tube; inner perianth segments yellow, spatulate, tapering into a claw and borne on the top of the tube; stamens forming a spiral about the style and borne on the whole face of the throat

but forming a definite ring at the top of the throat; style slender; stigma lobes linear; ovary exserted, naked; fruit smooth, greenish, purplish, or red, globose, ellipsoid or short-oblong; seeds black.

Only three species are known.

Spines glabrous, even when very young-----1. *D. sphaerica*.
Spines puberulent.

Tubercles very long (up to 5 cm.), pale green, glaucous; radial spines 6 to 12; central spines usually present-----2. *D. longimamma*.

Tubercles much shorter, bright green; radial spines 3 or 4; central spines none-----3. *D. uberiformis*.

1. *Dolichothele sphaerica* (Dietr.) Britt. & Rose, Cactaceae 4: 61. 1923.

Mammillaria sphaerica Dietr.; Poselg. Allg. Gartenz. 21: 94. 1853.

Northern Mexico. Texas, the type from Corpus Christi.

Low and depressed, often growing in large cespitose masses 20 cm. in diameter, with a large thickened root; tubercles soft and turgid, resembling those of the following species but shorter, 12 to 16 mm. long; areoles small, circular, at first short-lanate; spines 12 to 15, glabrous, generally pale yellow, a little darker at base at first, in age darker, often reddish, 7 to 9 mm. long, spreading or a little curved backward; central spine 1, straight; flowers appearing toward the top of the plant but not from the axils of the younger tubercles, with a rotate limb 6 to 7 (?) cm. broad; inner perianth segments widely spreading, oblanceolate, acute to apiculate, tapering at base into a slender claw; fruit greenish white to purplish, short-oblong, 10 to 15 mm. long, juicy, very fragrant; seeds black.

2. *Dolichothele longimamma* (DC.) Britt. & Rose, Cactaceae 4: 62. 1923.

Mammillaria longimamma DC. Mém. Mus. Hist. Nat. 17: 113. 1828.

Mammillaria melaleuca Karw.; Salm-Dyck, Cact. Hort. Dyck. 1849. 108. 1850.

Mammillaria globosa Link, Allg. Gartenz. 25: 240. 1857.

Tamaulipas and central Mexico.

Solitary or cespitose, about 10 cm. high; tubercles elongated, 5 cm. long, somewhat glaucous, their axils hairy or naked; spine areoles with white hairs when young, in age naked; radial spines 5 to 12, widely spreading, acicular, 2.5 mm. long, white to pale yellow, swollen and darker at base, puberulent; central spines 1 to 3, usually solitary, porrect, similar to the radials but usually darker with a blackish tip; flowers citron-yellow, 4 to 6 cm. long.

3. *Dolichothele uberiformis* (Zucc.) Britt. & Rose, Cactaceae 4: 63. 1923.

Mammillaria uberiformis Zucc.; Pfeiff. Enum. Cact. 23. 1837.

Mammillaria laeta Rümpler; Först. Handb. Cact. ed. 2. 247. 1885.

Central Mexico, the type from Pachuca, Hidalgo.

Globose, about 7.5 cm. high and 10 cm. in diameter; tubercles elongate, 2.5 to 3 cm. long, 12 to 15 mm. in diameter, dull green, shining, their axils naked; spine areoles nearly naked; spines 3 or 4, all radial, puberulent, horn-colored to reddish, nearly equal; flowers yellow, 3 cm. broad; outer perianth segments reddish, the inner in 2 series, oblong, acute.

49. *SOLISIA* Britt. & Rose, Cactaceae 4: 64. 1923.

The genus consists of a single species. It was named for Don Octavio Solís, of Mexico City.

1. *Solisia pectinata* (Stein) Britt. & Rose, Cactaceae 4: 64. 1923.

Pelecyphora pectinata Stein, Gartenflora 34: 25. 1885.

Mammillaria pectinifera Weber, Dict. Hort. Bois 804. 1898.

Puebla.

Plants 1 to 3 cm. in diameter, fibrous-rooted, entirely hidden by the large overlapping spine clusters; areoles narrow and long; spines 20 to 40, all radial, 1.5 to 2 mm. long, white, appressed; flowers small, lateral, yellow, borne in the axils of old tubercles; fruit small, naked, oblong; seeds 1 mm. long, black, smooth.

50. NEOMAMMILLARIA Britt. & Rose, *Cactaceae* 4: 65. 1923.

Plants globose, depressed-globose, or short-cylindric, occasionally much elongate, some with milky, others with watery juice; tubercles arranged in more or less spiraled rows, never on vertical ribs, terete, angled, or sometimes flattened, never grooved on the upper surface, usually bearing wool or hairs and sometimes bristles but without glands in their axils and crowned by the spine areoles; spines in clusters on the top of the tubercle, sometimes all alike, sometimes with central ones very different from the radial, all straight or sometimes one or more of the central spines hooked; flowers, so far as known, diurnal, from axils of the old tubercles, much alike as to size and shape, more or less campanulate, comparatively small, variously colored, commonly red, yellowish, or white to pinkish; perianth segments rather narrow, spreading; stamens numerous, borne on the base of the perianth tube, short, included; style about the length of the stamens; stigma lobes linear; fruit usually clavate, rarely if ever globose, usually ripening rapidly, naked, scarlet; seeds brown in some species, black in others.

Besides the species here listed about 20 others are found in the southwestern United States, West Indies, Central America, and Venezuela.

The names "biznaguita," "huevos de coyote," and "chillitos" (fruits) are reported from Mexico for species of uncertain determination. According to Hernández, the milky sap of some species was employed to remove warts. The Tewa Indians of New Mexico are reported to eat the plants raw.

A. Plants with none of the spines hooked.

B. Seeds brown.

C. Tubercles giving off milk freely when cut.

D. Axils of tubercles without bristles.

E. Tubercles more or less elongate.

Tubercles terete throughout.

Central spines 1 or 2.

Central spines about as long as the radials----1. *N. gaumeri*.

Central spines much longer than the radials---2. *N. petrophila*.

Central spines 4 to 7.

Outer perianth segments entire; central spines long and slender-----3. *N. arida*.

Outer perianth segments erose; central spines not elongate, stouter-----4. *N. brandegeei*.

Tubercles more or less angled.

Tubercles nearly terete toward apex.

Outer perianth segments and scales more or less fimbriate.

5. *N. gummifera*.

Outer perianth segments and scales entire.

Radial spines white; flowers pinkish-----6. *N. heyderi*.

Radial spines brownish; flowers white to cream-colored.

7. *N. hemisphaerica*.

Tubercles angled to the tip.

Spines very unequal, some much elongate.

Spines whitish-----8. *N. phymatothele*.

Spines horn-colored, reddish, or black.

Plants without definite central spine.

Spines horn-colored, short, curved--9. *N. magnimamma*.

Spines reddish, long-----10. *N. macracantha*.

Plants with definite central spines.

Central spines 2-----11. *N. johnstonii*.

Central spines solitary.

Central spine 2 to 3 cm. long; perianth segments linear-----12. *N. melanocentra*.

Central spine 1 cm. long; perianth segments oblong-----13. *N. runyonii*.

Spines nearly equal, at least none of them much elongate.

Flowers red to pinkish.

Outer perianth segments ciliate-----14. *N. sartorii*.

Outer perianth segments not ciliate (so far as known).

Central spines none.

Spines pinkish, with black tips-----15. *N. seitziana*.

Spines straw-colored throughout-----16. *N. ortegae*.

Central spines 1 or 2.

Central spine solitary; radial spines nearly equal.

17. *N. melacantha*.

Central spines 2; some of the radials very short.

18. *N. scrippsiana*.

Flowers yellowish.

Central spines 4 to 6-----19. *N. gigantea*.

Central spines wanting-----20. *N. peninsularis*.

EE. Tubercles very short, symmetric.

Plants globose or depressed.

Axils of tubercles naked-----21. *N. flavovirens*.

Axils of tubercles woolly.

Spines partly deciduous-----22. *N. sempervivi*.

Spines not deciduous.

Central spines present-----23. *N. obscura*.

Central spines wanting-----24. *N. crocidata*.

Plants cylindric or ovoid.

Central spines wanting.

Tubercles nearly terete-----25. *N. polythele*.

Tubercles 4-angled.

Tubercles pointed; axils very woolly-----26. *N. carnea*.

Tubercles not pointed; axils not very woolly--27. *N. lloydii*.

Central spines several.

Radial spines reduced to short bristles---28. *N. zuccariniana*.

Radial spines more elongate-----29. *N. formosa*.

DD. Axils of tubercles with bristles as well as wool.

Spines partly elongate, curved, and flexuous.

Plants without definite central spines-----30. *N. compressa*.

Plants with central spines.

Central spines weak-----31. *N. mystax*.

Central spines stiff-----32. *N. petterssonii*.

Spines not elongate or, if so, not flexuous.

Tubercles terete or nearly so.

Spines all radial.....33. *N. karwinskiana*.

Spines both radial and central.

Radial spines numerous, 12 or more.

Central spines reddish, not much longer than the radials.

Outer perianth segments ciliate.....34. *N. standleyi*.

Outer perianth segments setose.....35. *N. evermanniana*.

Central spines usually white except at tip, much elongate.

Flowers yellow.....36. *N. parkinsonii*.

Flowers dark red.....37. *N. geminispina*.

Radial spines few, 5 to 9.

Spines black when young.....38. *N. pyrrhocephala*.

Spines brownish or lighter.....39. *N. collinsii*.

Tubercles strongly angled.

Spines both radial and central.

Radial spines numerous.....40. *N. chinocephala*.

Radial spines few, bristle-like.

Central spines 4 to 641. *N. tenampensis*.

Central spines 2.....42. *N. polygona*.

Spines all of one kind, few.

Flowers yellow.....43. *N. confusa*.

Flowers rose-colored or white.

Flowers rose-colored.

Plants globose; stigma lobes 4 or 5.....44. *N. villifera*.

Plants cylindric; stigma lobes 8.....45. *N. polyedra*.

Flowers white.....46. *N. konzattii*.

CC. Tubercles not giving off milk when cut, the milk tubes developed, if at all, only in the stem proper.

Central spines wanting.

Spines subulate; areoles elliptic.....47. *N. napina*.

Spines acicular; areoles circular.

Spines numerous.....48. *N. lanata*.

Spines few (4 to 6).

Spines 5 or 6, short, straight.....49. *N. kewensis*.

Spines 4, elongate, curved.

Flowers large (2.5 cm. broad).....50. *N. subpolyedra*.

Flowers small.

Spines long and weak.....51. *N. galeottii*.

Spines subulate.....52. *N. tetracantha*.

Central spines present.

Central spines usually 2, sometimes solitary.

Radial spines 20 or more.

Central spines stout and not very long.

Plant round or nearly so at apex; central spines often 1.

53. *N. elegans*.

Plant strongly umbilicate; central spines always 2.

54. *N. pseudoperbella*.

Central spines long.....55. *N. dealbata*.

Radial spines 20 or fewer.

Radial spines white, bristle-like.

- Stigma lobes red.
 Plants globose or somewhat elongate-----56. *N. haageana*.
 Plants depressed-globose-----57. *N. perbella*.
 Stigma lobes white.
 Radial spines appressed-----58. *N. collina*.
 Radial spines not appressed-----59. *N. donatii*.
 Radial spines brownish when young, stouter-----60. *N. mundtii*.
 Central spines usually 4, sometimes more.
 Central spines white or yellow.
 Radial spines white.
 Plants globose.
 Axils of tubercles not setose; central spines usually 4, rarely
 as many as 7-----61. *N. celsiana*.
 Axils of tubercles setose; central spines usually 9.
 62. *N. aureiceps*.
 Plants cylindric-----63. *N. yucatanensis*.
 Radial spines yellow.
 Plants globular-----64. *N. pringlei*.
 Plants slender-cylindric-----65. *N. cerralboa*.
 Central spines brown or black.
 Central spines black-----66. *N. phaeacantha*.
 Central spines brown.
 Axils of tubercles not setose-----67. *N. graessneriana*.
 Axils of tubercles setose.
 Tubercles closely set.
 Central spines not very different from the radial.
 Plant body more or less elongate; spines brownish or
 reddish-----68. *N. spinosissima*.
 Plant body globose; radial spines whitish.
 69. *N. densispina*.
 Central spines very different from the radial.
 70. *N. nunezii*.
 Tubercles spreading.
 Central spines unequal; stigma lobes green.
 71. *N. amoena*.
 Central spines nearly equal; stigma lobes rose-colored.
 72. *N. rhodantha*.
 B. Seeds black. Neither tubercles nor stems milky.
 Spines plumose-----73. *N. plumosa*.
 Spines not plumose.
 Radial spines weak and hairlike-----74. *N. multiceps*.
 Radial spines not hairlike.
 Spines yellow.
 Spines 2 to 8, glabrous, more or less twisted or bent.
 75. *N. camptotricha*.
 Spines about 20, pubescent, straight-----76. *N. eriacantha*.
 Spines not yellow.
 Spines 25 to 80.
 Spines pubescent or lanate.
 Spines lanate, 25 to 30-----77. *N. schiedeana*.
 Spines pubescent or puberulent-----78. *N. lasiacantha*.
 Spines not pubescent.

- Spines all very much alike.
- Perianth segments obtuse-----79. *N. denudata*.
- Perianth segments pointed.
- Flowers about 7 mm. long-----80. *N. lenta*.
- Flowers about 20 mm. long-----81. *N. candida*.
- Spines unlike, the centrals unlike the others---82. *N. vetula*.
- Spines 20 or fewer.
- Plants globose.
- Flowers red-----83. *N. fertilis*.
- Flowers white.
- Central spines solitary; radials 7 to 9-----84. *N. decipiens*.
- Central spines 5 to 8; radials 16 to 20-----85. *N. discolor*.
- Plants cylindric.
- Joints very fragile, breaking loose when touched or jarred.
86. *N. fragilis*.
- Joints not fragile.
- Spines all radial and recurved-----87. *N. elongata*.
- Spines both radial and central.
- Axils of tubercles not bristly.
- Spines all yellow-----88. *N. echinaria*.
- Spines not yellow.
- Upper central spines more or less connivent over the top of plant-----89. *N. pottsi*.
- Upper central spines not connivent over the top of plant-----90. *N. mazatlanensis*.
- Axils of tubercles bristly.
- Stems slender-cylindric or globose; species of central Mexico-----91. *N. sphacelata*.
- Stems short-cylindric or globose; species of Baja California.
- Spines nearly white or at least becoming so; seeds minute.
- Spines all white or nearly so; spine areoles at first lanate-----92. *N. albicans*.
- Spines tan-colored with dark tips; spine areoles not lanate-----93. *N. slevinii*.
- Spines not white; seeds 3 mm. long---94. *N. palmeri*.
- AA. Plants with some of the central spines hooked.
- Tubercles milky; seeds brown.
- Plants globose-----95. *N. uncinata*.
- Plants cylindric-----96. *N. hamata*.
- Tubercles never milky; seeds black (except in Nos. 97 and 98).
- Seeds brown.
- Fruit red; flowers from side of plant-----97. *N. rekol*.
- Fruit green; flowers from near base of plant-----98. *N. solisii*.
- Seeds black.
- Fruit depressed, long-persisting-----131. *N. longiflora*.
- Fruit elongate, clavate, ripening quickly.
- Seeds rugose-----130. *N. nelsonii*.
- Seeds not rugose.
- F. Plants usually small; spines setaceous to delicately acicular.

- Central spines yellow.
- Central spines glabrous-----99. *N. pygmaea*.
- Central spines pubescent.
- Flowers white-----100. *N. wildii*.
- Flowers yellowish-----101. *N. seideliana*.
- Central spines red to brown.
- Outer perianth segments ciliate.
- Central spines shorter than the flower; perianth segments acute-----102. *N. barbata*.
- Central spines longer than the flower; perianth segments obtuse-----103. *N. mercadensis*.
- Outer perianth segments entire.
- Axils of tubercles setose.
- Inner perianth segments white to yellowish.
- Central spines 3 or 4.
- Radial spines about 25; flowers 2 cm. long.
104. *N. kunzeana*.
- Radial spines about 20; flowers 1 cm. long.
105. *N. hirsuta*.
- Central spines 7 to 9-----106. *N. multihamata*.
- Inner perianth segments red or reddish.
- Radial spines weak and hairlike.
- Central spines several-----107. *N. longicoma*.
- Central spines solitary-----108. *N. bocasana*.
- Radial spines stiff.
- Radial spines glabrous-----109. *N. multiformis*.
- Radial spines pubescent-----110. *N. scheidweilleriana*.
- Axils of tubercles not setose.
- Flowers 2.2 cm. long or more.
- Central spines solitary-----111. *N. saffordii*.
- Central spines 3-----112. *N. schelhasei*.
- Flowers 1 to 1.5 cm. long.
- Plants cespitose-----113. *N. glochidiata*.
- Plants solitary.
- Inner perianth segments acuminate.
114. *N. trichacantha*.
- Inner perianth segments merely acute.
115. *N. painteri*.
- FF. Plants stout; at least the central spines stout-acicular to subulate.
- Outer perianth segments ciliate.
- Perianth rotate; stigma lobes red-----116. *N. mainae*.
- Perianth campanulate; stigma lobes green.
- Flowers white-----117. *N. boedekeriana*.
- Flowers purple to pinkish.
- Radial spines often as many as 30-----118. *N. microcarpa*.
- Radial spines often as few as 12-----119. *N. sheldonii*.
- Outer perianth segments not ciliate.
- Bristles (sometimes only one, sometimes many) present in axils of the tubercles.

Seeds constricted above the base.

Flowers greenish or pink.

Flowers greenish, 10 to 12 mm. long; central spines yellowish to reddish-----120. *N. armillata*.

Flowers pink, 20 mm. long; central spines dark brown.
121. *N. fraileana*.

Flowers nearly white-----122. *N. swinglei*.

Seeds not constricted above the base.

Central spines several; flowers yellowish---123. *N. dioica*.

Central spines usually solitary; flowers rose-colored.
124. *N. goodridgei*.

Bristles none in the axils of the tubercles.

Flowers rotate-----125. *N. zephyranthoides*.

Flowers campanulate.

Plants globose.

Flowers white-----126. *N. carretii*.

Flowers pink to purplish.

Inner perianth segments obtuse-----127. *N. jaliscana*.

Inner perianth segments acute to acuminate.

128. *N. bombycina*.

Plants slender, elongate, and cylindric.

129. *N. occidentalis*.

1. *Neomammillaria gaumeri* Britt. & Rose, *Cactaceae* 4: 72. 1923.

Yucatán; type from sand dunes of Progreso.

Cespitose, the branches short, globose to short-cylindric, up to 15 cm. long; tubercles dark green, short, nearly terete, obtuse, the axils naked even when young, 5 to 7 mm. long, very milky; spine areoles conspicuously white-woolly at first, soon naked; radial spines 10 to 12, spreading, acicular, white with brown tips, or the lower ones in the cluster darker, 5 to 7 mm. long; central spine solitary, porrect, usually brown; flowers very abundant from near the top of the plant but not from the axils of young areoles, creamy white, 10 to 14 mm. long; outer perianth segments greenish, brown-tipped; scales on flower tube broadly ovate, scarious; fruit crimson, clavate, 18 to 20 mm. long, naked.

2. *Neomammillaria petrophila* (T. S. Brandeg.) Britt. & Rose, *Cactaceae* 4: 73. 1923.

Mammillaria petrophila T. S. Brandeg. *Zoe* 5: 193. 1904.

Mountains of southern Baja California; type from Sierra de la Laguna.

Sometimes cespitose, milky, globular, 15 cm. in diameter or less; tubercles short, broad at base; spines at first chestnut-colored, becoming pale in age; radial spines 10, about 1 cm. long, a little spreading; central spine 1 (rarely 2). 2 cm. long, darker and stouter than the radials; flowers bright greenish yellow, 18 to 20 mm. long; perianth segments hardly acute, sometimes slightly erose; fruit small, roundish; seeds reddish, smooth, less than 1 mm. long.

3. *Neomammillaria arida* (Rose) Britt. & Rose, *Cactaceae* 4: 73. 1923.

Mammillaria arida Rose; Quehl, *Monatsschr. Kakteenk.* 23: 181. 1913.

Southern Baja California; type from hills near Pichilique Island, near La Paz.

Plants usually single, globular, 3 to 6 cm. in diameter, containing much milk and giving it off freely when injured; tubercles nearly terete; radial spines about 15, pale, ascending, the bases sometimes yellowish and the tip dark; central spines 4 to 7, 12 to 16 mm. long, much longer than the radials,

dark brown, erect; flowers 1 cm. long; outer perianth segments dark purple with lighter margins, entire, the inner cream-colored to almost pale yellow; fruit clavate, red, 15 cm. long; seeds brown.

4. *Neomammillaria brandegeei* (Coulter) Britt. & Rose, Cactaceae 4: 73. 1923.
Cactus brandegeei Coulter, Contr. U. S. Nat. Herb. 3: 96. 1894.

Cactus gabbii Coulter, Contr. U. S. Nat. Herb. 3: 109. 1894.

Mammillaria gabbii Engelm.; K. Brandeg. Erythea 5: 116. 1897.

Mammillaria brandegeei K. Brandeg. Erythea 5: 116. 1897.

Baja California; type from San Jorge.

Cylindric to globular, flattened, solitary or in clusters of 2 to 8; tubercles angled; axils woolly; radial spines 9 to 16, 8 to 10 mm. long, yellowish brown; central spines 3 to 6, a little longer and darker than the radials; flowers 15 mm. long; outer perianth segments ovate, striate, ciliate, the inner greenish yellow, narrower, entire; fruit white (according to Schumann), bearing a few narrow scales.

5. *Neomammillaria gummifera* (Engelm.) Britt. & Rose, Cactaceae 4: 74. 1923.

Mammillaria gummifera Engelm. in Wislitz. Mem. North. Mex. 105. 1848.

Chihuahua; type from Cosihuiriachi.

Depressed-globose, 8 to 12 cm. in diameter; tubercles light green, milky, somewhat 4-angled; axils of tubercles and spine areoles somewhat white-tomentose when young; radial spines 10 to 12, ascending, white with brownish or even blackish tips, the lower ones stouter and longer than the others, often 2 to 2.5 cm. long and somewhat recurved; central spines 1 or 2, sometimes 4; flowers 3 cm. long, brownish red outside; inner perianth segments reddish white with dark red band in middle.

6. *Neomammillaria heyderi* (Mühlentpf.) Britt. & Rose, Cactaceae 4: 75. 1923.

Mammillaria heyderi Mühlentpf. Allg. Gartenz. 16: 20. 1848.

Northern Mexico. Texas.

Plant globose or somewhat flattened at apex; tubercles conic, 12 mm. long, when young bearing wool in their axils; young spine areoles white-woolly; radial spines 20 to 22, white, setaceous, the lower ones stouter and longer; central spine solitary, brown at base and apex, 5 to 6 mm. long; flowers pinkish, the segments linear-oblong; fruit oblong, red. "Biznaga de chilillos" (*Paton*).

7. *Neomammillaria hemisphaerica* (Engelm.) Britt. & Rose, Cactaceae 4: 75. 1923.

Mammillaria hemisphaerica Engelm. in Wislitz. Mem. North. Mex. 105. 1848.

Northeastern Mexico; type from Matamoros, Tamaulipas. Western Texas.

Deep-seated in the soil, hemispheric, 8 to 12 cm. broad, dark green; tubercles only slightly angled, not very closely set, 1 to 1.5 cm. long, somewhat pointed, their axils nearly naked in the dormant stages; spine areoles woolly when young, becoming glabrate in age; radial spines 9 to 12, widely spreading, acicular, the upper ones more delicate, 4 to 8 mm. long, brownish or smoky, often with black tips; central spine solitary, porrect, brown; flowers cream-colored, 1 to 1.5 cm. long; inner perianth segments acute; fruit slender, clavate, red, 1 to 1.5 cm. long.

8. *Neomammillaria phymatothele* (Berg) Britt. & Rose, Cactaceae 4: 76. 1923.

Mammillaria phymatothele Berg, Allg. Gartenz. 8: 129. 1840.

Mammillaria ludwigii Ehrenb. Linnaea 14: 376. 1840.

Central Mexico.

Simple, subglobose, glaucous-green; axils of young tubercles bearing white wool, becoming naked; tubercles large, 4-sided; areoles when young white-woolly, in age naked; radial spines 7 to 10, grayish white, the three upper smaller, the central recurved; flowers described by Schumann as carmine-colored.

9. *Neomammillaria magnimamma* (Haw.) Britt. & Rose, Cactaceae 4: 77. 1923.

Mammillaria magnimamma Haw. Phil. Mag. 63: 41. 1824.

Mammillaria divergens DC. Mém. Mus. Hist. Nat. 17: 113. 1828.

Mammillaria gladiata Mart. Nov. Act. Nat. Cur. 16: 336. 1832.

Mammillaria ceratophora Lehm. Allg. Gartenz. 3: 228. 1835.

Mammillaria recurva Lehm.; Pfeiff. Enum. Cact. 15. 1837.

Mammillaria hystrix Mart.; Pfeiff. Enum. Cact. 21. 1837.

Mammillaria ehrenbergii Pfeiff. Allg. Gartenz. 6: 274. 1838.

Mammillaria microceras Lem. Cact. Aliq. Nov. 6. 1838.

Mammillaria deflexispina Lem. Cact. Aliq. Nov. 6. 1838.

Mammillaria versicolor Scheidw. Bull. Acad. Brux. 5: 494. 1838.

?*Mammillaria conopsea* Scheidw. Bull. Acad. Brux. 5: 496. 1838.

Mammillaria centricirrha Lem. Cact. Gen. Nov. Sp. 42. 1839.

Mammillaria neumanniana Lem. Cact. Gen. Nov. Sp. 53. 1839.

Mammillaria pentacantha Pfeiff. Allg. Gartenz. 8: 406. 1840.

Mammillaria subcurvata Dietr. Allg. Gartenz. 12: 232. 1844.

Mammillaria diadema Mühlenpf. Allg. Gartenz. 13: 346. 1845.

Mammillaria krameri Mühlenpf. Allg. Gartenz. 13: 347. 1845.

Mammillaria foersteri Mühlenpf. Allg. Gartenz. 14: 371. 1846.

?*Mammillaria tetracentra* Otto; Först. Handb. Cact. 214. 1846.

Mammillaria bockii Först. Allg. Gartenz. 15: 50. 1847.

Mammillaria pazzanii Stieber, Bot. Zeit. 5: 491. 1847.

Mammillaria divaricata Dietr. Allg. Gartenz. 16: 210. 1848.

Mammillaria hopferiana Linke, Allg. Gartenz. 16: 329. 1848.

Mammillaria glauca Dietr.; Linke, Allg. Gartenz. 16: 330. 1848.

Mammillaria megacantha Salm-Dyck, Cact. Hort. Dyck. 1849. 123. 1850.

Mammillaria uberimamma Monville; Labour. Monogr. Cact. 120. 1853.

?*Mammillaria cirrosa* Poselger, Allg. Gartenz. 21: 94. 1853.

Mammillaria pachytele Poselger, Allg. Gartenz. 23: 17. 1855.

Mammillaria lactescens Meinsh. Wochenschr. Gärt. Pflanz. 2: 117. 1859.

Mammillaria geberweilleriana Haage; Först. Handb. Cact. ed. 2. 358. 1885.

Mammillaria schmidtii Sencke; Först. Handb. Cact. ed. 2. 376. 1885.

Valley of Mexico, and elsewhere in central Mexico.

Globose, the larger plants 10 cm. in diameter, sometimes solitary but oftener cespitose with 25 in a cluster or more, very milky throughout; tubercles conic or somewhat flattened or faintly 4-angled, 1 cm. long, the axils when young densely woolly; spines 3 to 5, very unequal, the upper ones short and straight, the lower one or two 1.5 to 2.5 cm. long, recurved or incurved, all horn-colored, with black tips; flowers cream-colored; fruit clavate, 2 cm. long, crimson; seeds brownish.

10. *Neomammillaria macracantha* (DC.) Britt. & Rose, Cactaceae 4: 79. 1923.

Mammillaria macracantha DC. Mém. Mus. Hist. Nat. 17: 113. 1828.

Cactus alternatus Coulter, Contr. U. S. Nat. Herb. 3: 95. 1894.

San Luis Potosí.

Depressed-globose, 2 to 3 cm. high, 6 to 15 cm. in diameter; axils of old tubercles naked, of young ones densely lanate; tubercles ovoid, somewhat 4-sided; young spine areoles somewhat tomentose; spines 1 or 2, somewhat angled, elongate, the longest 5 cm. long, porrect or more or less reflexed, white or yellowish; flowers dark pink, a little longer than the tubercles; perianth segments linear, spreading.

11. *Neomammillaria johnstonii* Britt. & Rose, Cactaceae 4: 80. 1923.

Type from San Carlos Bay, Sonora.

Plants large for the genus, globular to short-oblong, 15 to 20 cm. high, slightly depressed at apex; tubercles 1 to 1.3 cm. long, 4-angled throughout, somewhat bluish, naked in the axils, milky; spine areoles when young short-floccose, in age glabrate, terete; radial spines 10 to 14, white but with brown tips, somewhat spreading, stiff-acicular; central spines 2, much longer and stouter than the radials, slightly diverging, bluish brown; flowers from near the top of the plant but from the axils of old tubercles, campanulate, 2 cm. long; outer perianth segments ovate-lanceolate, greenish white with a reddish brown midrib; inner perianth segments narrow, acuminate, white.

12. *Neomammillaria melanocentra* (Poselg.) Britt. & Rose, Cactaceae 4: 81. 1923.

Mammillaria melanocentra Poselg. Allg. Gartenz. 23: 17. 1855.

Mammillaria erinacea Poselger, Allg. Gartenz. 23: 18. 1855.

Mammillaria valida Weber, Dict. Hort. Bois 806. 1898.

Mexico; type from Monterrey, Nuevo León.

Short-cylindric, glaucous-green; tubercles in 8 and 13 spirals, strongly angled; radial spines 6, stout-subulate, 1.5 to 2 cm. long, brownish; central spines solitary, black, 2 to 3 cm. long, greatly overtopping the stem; flowers pinkish red, the segments linear, acute.

13. *Neomammillaria runyonii* Britt. & Rose, Cactaceae 4: 81. 1923.

Type from El Mirador, near Monterrey, Nuevo León.

Plants deep-seated, depressed; tubercles milky, elongate, 1.5 cm. long, strongly 4-angled, their tips widely separated, the axils long-woolly (never setose), especially when young, sometimes permanently so; young spine areoles long-woolly, in age glabrate; radial spines 6 to 8, slightly ascending, the outer ones stouter and often dark brown, the inner ones about half the length of the outer and nearly white; central spine solitary, brown to black, erect, 10 to 14 mm. long; flowers about 2 cm. long, purple; perianth segments oblong; fruit red, clavate, 12 to 16 mm. long; seeds brown.

14. *Neomammillaria sartorii* (Purpus) Britt. & Rose, Cactaceae 4: 82. 1923.

Mammillaria sartorii Purpus, Monatsschr. Kakteenk. 21: 50. 1911.

Veracruz, the type from Barranca de Pancaya.

Globose to short-cylindric, 5 to 13 cm. in diameter, cespitose, very milky, bluish green; tubercles strongly 4-angled, pointed, 8 to 12 mm. long, their axils without bristles and in time without wool; spine areoles circular when young, densely white-woolly but in age glabrate; spines 4 to 6, very unequal, 5 to 8 mm. long, whitish or sometimes brownish, the central spine solitary; flowers 1.5 to 2 cm. long, deep carmine; perianth segments oblong, apiculate, the tip dry, the outer ones ciliate, the inner serrulate; fruit carmine; seeds brown.

15. *Neomammillaria seitziana* (Mart.) Britt. & Rose, Cactaceae 4: 83. 1923.

Mammillaria seitziana Mart.; Pfeiff. Enum. Cact. 18. 1837.

Mammillaria foveolata Mühlenpf. Allg. Gartenz. 14: 372. 1846.

Hidalgo, the type from Ixmiquilpan.

Solitary or somewhat proliferous at base, cylindric, 12 cm. high; tubercles green, conic, somewhat angled; axils of tubercles woolly; areoles at first white-woolly, becoming glabrate; spines 4, the upper and lower longer than the lateral; flower rose-colored, about 25 mm. long; outer perianth segments olive-colored, the inner linear-lanceolate, white, nerved with red.

16. *Neomammillaria ortegae* Britt. & Rose, *Cactaceae* 4: 83. 1923.

Sinaloa.

Simple, short-clavate, 5 to 8 cm. in diameter, light green, lactiferous; tubercles rather short (8 to 10 mm. long), broader at base, obscurely 4-angled, somewhat pointed, very woolly but not setose in the axils; spines all radial, 3 or 4, more commonly 4 (sometimes with 1 or 2 small additional spines or bristles, perhaps deciduous), spreading, straw-colored, 6 to 10 mm. long; flowers small; fruit clavate, 1 cm. long; seeds numerous, small, angled, brown.

17. *Neomammillaria meiacantha* (Engelm.) Britt. & Rose, *Cactaceae* 4: 83. 1923.

Mammillaria meiacantha Engelm. *Proc. Amer. Acad.* 3: 263. 1856.

Northern Mexico. Texas and New Mexico.

Somewhat depressed, 12 cm. broad or more; tubercles milky, bluish green, more or less angled, somewhat flattened dorsally, the axils naked; spines 5 to 9, ascending, pale flesh-colored, the tips darker, the lower a little stouter than the upper; central spines porrect, similar to but a little stouter than the radials and often subradial; spine areoles short-woolly at first; inner perianth segments white with a pink stripe along the inside of the midrib one-fourth its width, greenish brown outside; fruit scarlet, 22 mm. long; seeds brownish.

18. *Neomammillaria scrippsiana* Britt. & Rose, *Cactaceae* 4: 84. 1923.

Type from Guadalajara, Jalisco.

Globose or becoming short-cylindric, 6 cm. high; tubercles milky, in 26 rows, bluish green, very woolly in the axils when young; spine areoles very woolly at first; radial spines 8 to 10, slender, pale with reddish tips; central spines generally 2, a little longer than the radials, brown throughout, slightly divergent; flowers borne near the top of the plant but not in the axils of the youngest tubercles, about 1 cm. long, pinkish, with the margins of the perianth segments paler.

19. *Neomammillaria gigantea* (Hildm.) Britt. & Rose, *Cactaceae* 4: 85. 1923.

Mammillaria gigantea Hildm.; Schum. *Gesamtb. Kakt.* 578. 1898.

Guanajuato.

Solitary or cespitose, depressed-globose, 10 cm. high, 15 to 17 cm. in diameter; axils of tubercles lanate; radial spines 12, subulate, white, 3 mm. long; central spines 4 to 6, stout, 2 cm. long, curved, yellowish brown; flowers yellowish green.

20. *Neomammillaria peninsularis* Britt. & Rose, *Cactaceae* 4: 85. 1923.

Baja California; type from Cape San Lucas.

Plants solitary or in clusters, deeply seated in the ground, more or less flat-topped, bluish green, the stems and tubercles very milky; tubercles erect, pointed, 4-angled, pale green; radial spines 4 to 8, nearly erect, short and pale with brown tips, one sometimes nearly central; axils of tubercles bearing long wool but in age naked; flowers 1.5 cm. long, arising from old tubercles but near the center; outer perianth segments narrow, reddish, the inner narrow, acuminate, green or light yellow, with erose margins.

21. *Neomammillaria flavovirens* (Salm-Dyck) Britt. & Rose, Cactaceae 4: 85. 1923.

Mammillaria flavovirens Salm-Dyck, Cact. Hort. Dyck. 1849. 117. 1850.
Mexico.

Either solitary or somewhat cespitose, globose or short-cylindric, 6 to 8 cm. high, light or yellowish green; tubercles somewhat 4-angled; axils naked; radial spines 5, slender, subulate; central spines solitary, porrect; flowers white, streaked with rose.

22. *Neomammillaria sempervivi* (DC.) Britt. & Rose, Cactaceae 4: 86. 1923.

Mammillaria sempervivi DC. Mém. Mus. Hist. Nat. 17: 114. 1828.

Mammillaria caput-medusae Otto; Pfeiff. Enum. Cact. 22. 1837.

Mammillaria diacantha Lem. Cact. Aliq. Nov. 2. 1838.

Hidalgo and elsewhere in central Mexico.

Solitary or somewhat cespitose, flattened above, narrowed below; axils of tubercles very woolly, milky; tubercles short, angled; spine areoles very woolly when young but glabrate in age; radial spines 3 to 7, short, white, caducous; central spines 2, ascending, brownish, stoutish; flowers dull white, with reddish lines; inner perianth segments acute, spreading.

23. *Neomammillaria obscura* (Hildm.) Britt. & Rose, Cactaceae 4: 87. 1923.

Mammillaria obscura Hildm. Monatsschr. Kakteenk. 1: 52. 1891.

Mexico, the range not known.

Solitary, depressed-globose, blackish green; axils woolly; tubercles arranged in 13 and 21 spirals, angled, stout, woolly in the axils but not setose; radial spines 6 to 8, subulate, white, unequal, the upper ones shorter than the lower; central spines 2 to 4, the lower one slightly curved, black; flowers small.

24. *Neomammillaria crocidata* (Lem.) Britt. & Rose, Cactaceae 4: 87. 1923.

Mammillaria crocidata Lem. Cact. Aliq. Nov. 9. 1838.

Mammillaria webbiana Lem. Cact. Hort. Monv. 45. 1839.

Querétaro and elsewhere in central Mexico.

Plant globose or a little depressed, 5 to 6 cm. in diameter; radial spines 6 or 7, dark brown or nearly black; central spines none; axils of tubercles in young plant densely woolly; flowers from axils of old tubercles near top of plant, reddish purple, 12 to 14 cm. long; outer perianth segments ciliate, the inner acuminate.

25. *Neomammillaria polythele* (Mart.) Britt. & Rose, Cactaceae 4: 88. 1923.

Mammillaria polythele Mart. Nov. Act. Nat. Cur. 16: 328. 1832.

Mammillaria quadrispina Mart. Nov. Act. Nat. Cur. 16: 329. 1832.

Mammillaria columnaris Mart. Nov. Act. Nat. Cur. 16: 330. 1832.

Mammillaria affinis DC. Mém. Cact. 11. 1834.

Mammillaria setosa Pfeiff. Allg. Gartenz. 3: 379. 1835.

?*Mammillaria hidalgensis* Purpus, Monatsschr. Kakteenk. 17: 118. 1907.

Hidalgo.

Elongate, cylindric, often 30 to 50 cm. high, 7 to 10 cm. in diameter; tubercles milky, in about 21 spirals, 10 to 12 mm. long, nearly terete, somewhat narrowed toward apex, dull green; axils of young tubercles densely long-woolly and often nearly covering the top of plant, in age becoming naked; spines 2 to 4, perhaps sometimes 6, all radial, somewhat spreading, 1 to 2.5 cm. long, reddish, straight or a little curved; flowers from near the top of the plant, reddish, 8 to 10 mm. long; perianth segments narrow, acuminate; fruit red, clavate; seeds small, brownish.

26. *Neomammillaria carnea* (Zucc.) Britt. & Rose, Cactaceae 4: 88. 1923.*Mammillaria carnea* Zucc.; Pfeiff. Enum. Cact. 19. 1837.*Mammillaria subtetragona* Dietr. Allg. Gartenz. 8: 169. 1840.*Mammillaria aeruginosa* Scheidw. Allg. Gartenz. 8: 338. 1840.*Mammillaria pallescens* Scheidw. Allg. Gartenz. 9: 42. 1841.

Central and southern Mexico, the type from Ixmiquilpan, Hidalgo.

Plants solitary, cylindric, 8 to 9 cm. high; tubercles strongly 4-angled, the axils woolly, the upper ones erect; radial spines none; central spines 4, straight, reddish, the lower one 10 mm. long, twice as long as the other 3; flowers borne in the old axils; outer perianth segments nearly 2 cm. long, nearly erect, flesh-colored; fruit pear-shaped, obtuse, bright red.

27. *Neomammillaria lloydii* Britt. & Rose, Cactaceae 4: 89. 1923.

Zacatecas.

Plant body at first flattened but in cultivation becoming elongate, sometimes 10 cm. long, 6 to 7 cm. in diameter; axils of young tubercles only slightly woolly; tubercles milky, small, numerous, 4-angled, woolly when quite young; radial spines 3 or 4, ascending, glabrous, the uppermost one red or dark brown, the others whitish, 2 to 5 mm. long; central spines none; flowers in a ring near the center of plant; outer perianth segments dark red with light or colored margins, the inner white with a tinge of red and dark red central stripes, not ciliate, apiculate, spreading above.

28. *Neomammillaria zuccariniana* (Mart.) Britt. & Rose, Cactaceae 4: 89. 1923.*Mammillaria zuccariniana* Mart. Nov. Act. Nat. Cur. 16: 331. 1832.

San Luis Potosí.

Globose to elongate-cylindric, 8 to 20 cm. long, bluish green, milky; areoles and axils of young tubercles filled with white wool; radial spines wanting or represented by very stout bristles; central spines 2 to 4, black, unequal, 2 to 12 mm. long, spreading; flowers about 1 cm. long, with a broad open throat; outer perianth segments brownish, acute, the inner lanceolate, acute, entire, magenta; fruit red, 10 mm. long; seeds brownish.

29. *Neomammillaria formosa* (Galeotti) Britt. & Rose, Cactaceae 4: 99. 1923.*Mammillaria formosa* Galeotti; Scheidw. Bull. Acad. Brux. 5: 497. 1838.

San Luis Potosí; type from San Felipe.

Somewhat clavate, sunken at apex; axils lanate; tubercles spirally arranged, obtusely 4-angled, light green; areoles naked; radial spines 20 to 22, white, rigid, radiating; central spines 6, spreading, thickened at base, at first flesh-colored at base, black at tip, becoming black throughout or grayish; flowers red.

30. *Neomammillaria compressa* (DC.) Britt. & Rose, Cactaceae 4: 90. 1923.*Mammillaria compressa* DC. Mém. Mus. Hist. Nat. 17: 112. 1828.*Mammillaria subangularis* DC. Mém. Mus. Hist. Nat. 17: 112. 1828.*Mammillaria triacantha* DC. Mém. Mus. Hist. Nat. 17: 113. 1828.*Mammillaria cirrhifera* Mart. Nov. Act. Nat. Cur. 16: 334. 1832.*Mammillaria angularis* Link & Otto; Pfeiff. Enum. Cact. 12. 1837.*Mammillaria squarrosa* Meinsh. Wochenschr. Gärt. Pflanz. 2: 116. 1850.*Mammillaria oettingenii* Zeissold, Monatsschr. Kakteenk. 8: 10. 1898.*Mammillaria kleinschmidtiana* Zeissold, Monatsschr. Kakteenk. 8: 21. 1898.

Querétaro, San Luis Potosí, and elsewhere in central Mexico.

Growing in large clumps, cylindric, pale bluish green; axils of tubercles white-woolly, setose; tubercles short, compressed laterally, keeled below, more rounded above; young spine areoles white-woolly; principal spines 4, some-

times with 1 to 3 very short accessory ones from the lower part of the areole; lower spine much longer, spreading or recurved, 5 to 6 cm. long, somewhat angled; all spines pale, more or less tinged with brown, with dark tips; flower pinkish, 10 to 12 mm. long; outer perianth segments acute, somewhat ciliate, the inner narrow, acuminate, with spreading tips; fruit clavate, red; seeds brown.

31. *Neomammillaria mystax* (Mart.) Britt. & Rose, Cactaceae 4: 92. 1923.

Mammillaria mystax Mart. Nov. Act. Nat. Cur. 16: 332. 1832.

Mammillaria leucotricha Scheidw. Allg. Gartenz. 8: 338. 1840.

Mammillaria zanthotricha Scheidw. Allg. Gartenz. 8: 338. 1840.

Mammillaria mutabilis Scheidw. Allg. Gartenz. 9: 43. 1841.

Mammillaria funkii Scheidw. Allg. Gartenz. 9: 43. 1841.

Mammillaria autumnalis Dietr. Allg. Gartenz. 16: 297. 1848.

Mammillaria maschalacantha Monville; Labour. Monogr. Cact. 106. 1853.

Mountains of Puebla and Oaxaca, and perhaps elsewhere in southern Mexico.

Globose to short-cylindric, 7 to 15 cm. high, flat-topped; tubercles in as many as 34 rows, thickly set, milky; radial spines 8 to 10, small, white; central spines 4, 3 about twice as long as the radial ones, the other much elongate, 6 to 7 cm. long; flowers 1.5 to 2 cm. long, appearing in 2 or 3 rows, very abundant; inner perianth segments dark red, 12 mm. long; fruit red, 2 to 2.5 cm. long.

32. *Neomammillaria petterssonii* (Hildm.) Britt. & Rose, Cactaceae 4: 94. 1923.

Mammillaria petterssonii Hildm. Deutsch. Gartenz. 1886: 185. 1886.

Mammillaria heeseana McDowell, Monatsschr. Kakteenk. 6: 125. 1896.

Guanajuato.

Plants rather large for the genus, cylindric, 20 cm. high or more, very spiny; tubercles arranged in 13 or 21 spirals, terete, setose in their axils; radial spines 10 to 12, white, with black tips; central spines 4, the longest ones 4.5 cm. long; fruit small, naked, oblong.

33. *Neomammillaria karwinskiana* (Mart.) Britt. & Rose, Cactaceae 4: 95. 1923.

Mammillaria karwinskiana Mart. Nov. Act. Nat. Cur. 16: 335. 1832.

? *Mammillaria fischeri* Pfeiff. Allg. Gartenz. 4: 257. 1836.

Mammillaria centrispina Pfeiff. Allg. Gartenz. 4: 258. 1836.

? *Mammillaria virens* Scheidw. Allg. Gartenz. 9: 43. 1841.

Oaxaca.

Globose to cylindric, somewhat flattened above; tubercles terete, milky; spines 4 to 6, all radial, sometimes one more near the center than the others, nearly equal, short, brown or blackish at the tips or throughout; axils very woolly and with long, conspicuous, white or brown-tipped bristles much longer than the tubercles; flowers nearly 2 cm. long, the scales and outer perianth segments narrow, reddish except at the margins, ciliate; inner perianth segments broader, cream-colored, not ciliate, mucronate-tipped; fruit 15 mm. long, red; seeds brown.

Related to this species is *Mammillaria knippeliana* Quehl (Monatsschr. Kakteenk. 17: 59. 1907). It was described from cultivated plants.

34. *Neomammillaria standleyi* Britt. & Rose, Cactaceae 4: 97. 1923.

Sonora; type from Sierra de Alamos.

Plants usually solitary, nearly globose, often 10 cm. in diameter, pale green, densely covered with spines; axils of tubercles containing white bristles, the flowering and fruiting ones filled with dense white wool; radial spines about

16, slightly spreading, white except the dark tips; central spines 4, longer and stouter than the radials, porrect, reddish brown; flowers about 12 mm. long, purplish; inner perianth segments oblong, entire; fruit scarlet, 12 to 16 mm. long; seeds brownish.

35. *Neomammillaria evermanniana* Britt. & Rose, Cactaceae 4: 97. 1923.

Type from Cerralbo Island, Baja California.

Globose to elongate-turbinate, 5 to 7 cm. in diameter, lactiferous; tubercles closely set, terete, nearly hidden under the numerous slender spines; axils of tubercles at first very woolly and setose; spines white except at tip, there brown; radial spines 12 to 15; central spines 3, erect or nearly so; fruit red, about 1 cm. long; seeds brown.

36. *Neomammillaria parkinsonii* (Ehrenb.) Britt. & Rose, Cactaceae 4: 98. 1923.

Mammillaria parkinsonii Ehrenb. Linnaea 14: 375. 1840.

Central Mexico; type from San Onofre in the Mineral del Doctor.

Cespitose, somewhat depressed to cylindric, 15 cm. high, 7.5 cm. in diameter, globose, glaucous-green; axils of tubercles lanate and setose; tubercles milky, short, conic; radial spines numerous, setaceous, short, white; central spines 2 or sometimes 4 or 5, brownish at tip; flowers surrounded by a mass of wool, small, yellowish; inner perianth segments apiculate; fruit clavate, scarlet, 1 cm. long; seeds brown.

37. *Neomammillaria geminispina* (Haw.) Britt. & Rose, Cactaceae 4: 98. 1923.

Mammillaria geminispina Haw. Phil. Mag. 63: 42. 1824.

Mammillaria bicolor Lehm. Sam. Cact. Hamb. Gart. 7. 1830.

Mammillaria nivea Wendl.; Pfeiff. Enum. Cact. 27. 1837.

Mammillaria daedala Scheidw. Hort. Belg. 4: 16. 1837.

Mammillaria toaldoae Lehm. Linnaea 12: 13. 1838

Mammillaria eburnea Miquel, Linnaea 12: 14. 1838.

Mammillaria nobilis Pfeiff. Allg. Gartenz. 8: 282. 1840.

North-central Mexico.

Cespitose or single in cultivation, cylindric, somewhat glaucous; axils woolly; tubercles terete, conic; radial spines 16 to 20, very short, setaceous, white; central spines 2 to 4, stouter and longer than the radials, about 25 mm. long, black-tipped; flowers dark red; inner perianth segments oblong, obtuse, serrate.

38. *Neomammillaria pyrrhocephala* (Scheidw.) Britt. & Rose, Cactaceae 4: 99. 1923.

Mammillaria pyrrhocephala Scheidw. Allg. Gartenz. 9: 42. 1841.

Mammillaria senkei Först. Handb. Cact. 227. 1846.

Hidalgo and perhaps Oaxaca; type from Real del Monte, Hidalgo.

Cylindric; axils lanate and setose; tubercles angled, green or subglaucous; areole bearing yellowish wool; spines all black when young, when old becoming gray below; radial spines 6, spreading, the upper ones a little longer; central spines single, erect; flowers red.

39. *Neomammillaria collinsii* Britt. & Rose, Cactaceae 4: 101. 1923.

Type from San Gerónimo, Oaxaca.

Plants forming large clumps, the individuals globose, 4 cm. in diameter; tubercles terete, green but becoming bronzed or even deep purple; axils of tubercles both lanate and setose; radial spines usually 7, pale yellowish below, with dark brown or blackish tips, subequal, 5 to 7 mm. long; central

spine 1, similar to or a little longer and usually darker than the radials; flowers 12 to 15 mm. long; outer perianth segments reddish with yellowish margin, ciliate; inner perianth segments lighter, entire, acuminate; fruit clavate, 15 cm. long, deep red; seeds brownish.

40. *Neomammillaria chinocephala* (Purpus) Britt. & Rose, *Cactaceae* 4: 101. 1923.

Mammillaria chinocephala Purpus, *Monatsschr. Kakteenk.* 16: 41. 1906.

Highlands of central Mexico; type from Sierra de Parras, Coahuila.

Plants globose, sometimes 8 cm. in diameter, almost hidden by the white spines; tubercles low, very milky; axils of tubercles densely filled with white wool and numerous hairlike bristles; radial spines 35 to 40, somewhat pectinate, spreading; central spines 2 to 7, more or less divergent, much stouter than the radials, rigid, white, with brownish tips; flowers 1 cm. long, rose-red; fruit clavate, red; seeds small, brown.

41. *Neomammillaria tenampensis* Britt. & Rose, *Cactaceae* 4: 101. 1923.

Type from Barranca de Tenampa.

Globose, light green, 5 to 6 cm. in diameter; tubercles 6 to 7 mm. long, 4-sided, pointed; axils of upper tubercles naked, but those producing flowers filled with yellow wool and numerous yellow bristles; spines 4 to 6, brownish with dark tips, ascending, surrounded at base by 8 to 10 small white bristles; outermost perianth segments small, brownish, the outer ones lanceolate, acuminate, similar to the inner ones, all ciliate; inner perianth segments reddish purple, 8 to 10 mm. long, lanceolate, apiculate, denticulate.

42. *Neomammillaria polygona* (Salm-Dyck) Britt. & Rose, *Cactaceae* 4: 101. 1923.

Mammillaria polygona Salm-Dyck, *Cact. Hort. Dyck.* 1849. 120. 1850.

Mexico, the range not known.

Subclavate, 10 cm. high, simple; axils of tubercles lanate and setose; tubercles 4-angled; radial spines about 8, 2 or 3 upper ones minute, the 4 lateral ones and the lowermost one longer; central spines 2, stout, brownish at tip, often long and recurved; flowers pale rose-colored.

Related to this species is *Mammillaria echinops* Scheidw. (*Hort. Belg.* 5: 95. 1838), which was described from Mexico.

43. *Neomammillaria confusa* Britt. & Rose, *Cactaceae* 4: 102. 1923.

Mexico, but range not known.

At first solitary, becoming cespitose, globose to short-cylindric, deep green; axils densely white-woolly and setose; tubercles short, a little flattened, 4-angled, pointed; spines 4 to 6, all radial, ascending, at first yellowish with brown tips, in age white below, 2 to 3 mm. long; flowers yellow, about 8 mm. long; outer perianth segments ovate, ciliate, with a black mucro-tip; inner perianth segments spreading, acute.

44. *Neomammillaria villifera* (Otto) Britt. & Rose, *Cactaceae* 4: 102. 1923.

Mammillaria villifera Otto; Pfeiff. *Enum. Cact.* 18. 1837.

Mexico, but range not known.

Subglobose, proliferous; axils lanate and setose; tubercles angled; areoles at first lanate, in age naked; spines 4, rigid, straight, the lowest one longer (8 mm. long), at first purplish, in age black; flowers pale rose-colored; inner perianth segments 14, acute.

45. *Neomammillaria polyedra* (Mart.) Britt. & Rose, *Cactaceae* 4: 102. 1923.

Mammillaria polyedra Mart. *Nov. Act. Nat. Cur.* 16: 326. 1832.

Mammillaria polytricha Salm-Dyck, *Allg. Gartenz.* 10: 289. 1842.

Southern Mexico; type from Oaxaca.

Simple, cylindric or somewhat broader above; axils of tubercles setose; tubercles 12 mm. long, flattened dorsally, angled, pointed; spines 4, ascending, short, grayish with purplish tips; flowers inconspicuous, reddish; inner perianth segments short-acuminate.

46. *Neomammillaria konzattii* Britt. & Rose, Cactaceae 4: 103. 1923.

Type from Cerro San Felipe, Oaxaca.

Short-cylindric, 8 cm. high, sometimes branched at apex, dark green, very milky; axils of young tubercles bearing an abundance of white wool and conspicuous white bristles; tubercles 4 to 5 mm. long, somewhat angled; young spine areoles woolly; spines 4 or 5, all radial, somewhat spreading, brownish, the tips usually darker than the bases; flowers white, campanulate, sometimes tinged with red, about 2 cm. long, the segments somewhat spreading, narrowly oblong, the outer ones serrulate, apiculate.

47. *Neomammillaria napina* (Purpus) Britt. & Rose, Cactaceae 4: 104. 1923.

Mammillaria napina Purpus, Monatsschr. Kakteenk. 22: 161. 1912.

Southern Mexico; type from mountains west of Tehuacán, Puebla.

Roots thick, elongate when small, single, but when in a cluster of 3 or 4, somewhat spindle-shaped; plants globose, 4 to 6 cm. in diameter; tubercles low, terete in section, not at all milky; spines all radial, 10 to 12, pectinate, white or yellowish, spreading and interlacing.

48. *Neomammillaria lanata* Britt. & Rose, Cactaceae 4: 104. 1923.

Type from Río de Santa Luisa.

Small, short-cylindric; tubercles 2 to 4 mm. long; spine areoles short-elliptic; spines 12 to 14, all radial, widely spreading, white except the brown bases; flowering areoles very woolly, the young flowers surrounded by a mass of long white hairs; flowers 6 to 7 mm. long, red; inner perianth segments about 15, oblong, obtuse or acutish, spreading above.

49. *Neomammillaria kewensis* (Salm-Dyck) Britt. & Rose, Cactaceae 4: 104. 1923.

Mammillaria kewensis Salm-Dyck, Cact. Hort. Dyck. 1849. 112. 1850.

Mexico, but range not known.

Globose to cylindric, 3 to 4 cm. in diameter; tubercles short, terete, when young short-woolly in the axils and at the areoles; spines 5 or 6, all radial, 4 to 5 mm. long, brown with dark tips; axils of tubercles bearing crisp hairs; flowers about 15 mm. long, reddish purple; perianth segments lanceolate, acute.

50. *Neomammillaria subpolyedra* (Salm-Dyck) Britt. & Rose, Cactaceae 4: 105. 1923.

Mammillaria subpolyedra Salm-Dyck, Hort. Dyck. 343. 1834.

Hidalgo.

Solitary, subcylindric, 10 cm. high, 6 cm. in diameter; tubercles pointed, strongly angled; axils and spine areoles white-woolly; spines 4, at first blackish purple, becoming paler but the tips remaining purplish, the lowest one largest; flowers 2.5 cm. broad; perianth segments obtuse, erose, with darker midrib; fruit red, 2.5 cm. long, pyriform, 12 mm. in diameter at apex.

51. *Neomammillaria galeottii* (Scheidw.) Britt. & Rose, Cactaceae 4: 105. 1923.

Mammillaria galeottii Scheidw. Hort. Belg. 4: 93. 1837.

Mexico, the range not known.

Simple or cespitose, the joints globose; tubercles pointed; spines 4, elongate, the upper ones erect and connivent over the apex of the plant, on the older tubercles weak and spreading, 2.5 cm. long.

52. *Neomammillaria tetracantha* (Salm-Dyck) Britt. & Rose, *Cactaceae* 4: 106. 1923.

Mammillaria tetracantha Salm-Dyck; Pfeiff. Enum. Cact. 18. 1837.

Mammillaria obconella Scheidw. Hort. Belg. 4: 93. 1837.

Mammillaria dolichocentra Lem. Cact. Aliq. Nov. 3. 1838.

Mammillaria rigidispina Hildmann, Monatsschr. Kakteenk. 3: 112. 1893.

Mexico, the range not known.

Nearly globose, 6 to 8 cm. in diameter; axils of tubercles with scant persistent wool; tubercles 8 to 10 mm. long, obscurely 4-angled; areoles small, at first lanate, somewhat 4-angled; spines 4, all radial, slender, the 3 lower equal, the upper one incurved, longer, 25 mm. long, when young all yellowish white, in age grayish yellow or brown; flowers numerous from near the top of the plant, small, pinkish to rose-colored; inner perianth segments narrowly lanceolate, acuminate.

53. *Neomammillaria elegans* (DC.) Britt. & Rose, *Cactaceae* 4: 107. 1923.

Mammillaria geminispina DC. Mém. Mus. Hist. Nat. 17: 30. 1828. Not *M. geminispina* Haw. 1824.

Mammillaria elegans DC. Mém. Mus. Hist. Nat. 17: 11. 1828.

Mammillaria acanthophlegma Lehm. Delect. Sem. Hort. Hamb. 1832.

Mammillaria supertexta Mart.; Pfeiff. Enum. Cact. 25. 1837.

Mammillaria dyckiana Zucc.; Pfeiff. Enum. Cact. 26. 1837.

Mammillaria klugii Ehrenb. Bot. Zeit. 2: 834. 1844.

Mammillaria meisneri Ehrenb. Bot. Zeit. 2: 834. 1844.

Mammillaria kunthii Ehrenb. Bot. Zeit. 2: 835. 1844.

Mammillaria splendens Ehrenb. Allg. Gartenz. 17: 242. 1849.

Central Mexico.

Simple, obovate to globose, 5 cm. in diameter, somewhat umbilicate at apex; tubercles ovate, naked in their axils, not lactiferous; spine areoles tomentose when young; radial spines stiff, bristle-like, 25 to 30, white, spreading; central spine 1 (sometimes 2 or 3), rigid.

Related to this species are *Mammillaria conspicua* Purpus (Monatsschr. Kakteenk. 22: 163. 1912) and *M. microthele* Mühlenpf. (Allg. Gartenz. 16: 11. 1848; *Cactus bispinus* Coulter, Contr. U. S. Nat. Herb. 3: 101. 1894).

54. *Neomammillaria pseudoperbella* (Quehl) Britt. & Rose, *Cactaceae* 4: 109. 1923.

Mammillaria pseudoperbella Quehl, Monatsschr. Kakteenk. 19: 188. 1909. Oaxaca and elsewhere.

Simple or with few branches, globose to short-cylindric, very spiny, depressed at apex; tubercles short-cylindric; radial spines 20 to 30, setaceous, white, short; central spines 2, one erect, the other turned backward.

55. *Neomammillaria dealbata* (Dietr.) Britt. & Rose, *Cactaceae* 4: 110. 1923.

Mammillaria dealbata Dietr. Allg. Gartenz. 14: 309. 1845.

Valley of Mexico and elsewhere in Central Mexico.

Globose, to short-cylindric, glaucous, more or less depressed at apex but almost hidden by the many closely appressed spine clusters; axils of tubercles and young spine areoles densely lanate but in age glabrate; radial spines about 20, white, short, appressed; central spines 2, much stouter and longer than the radials, sometimes 1 cm. long, the upper ones often erect, white below, brown or black at tip; flowers small, carmine; fruit clavate, red; seeds brown.

56. *Neomammillaria haageana* (Pfeiff.) Britt. & Rose, Cactaceae 4: 110. 1923

Mammillaria haageana Pfeiff. Allg. Gartenz. 4: 257. 1836.

Mexico, the range not known.

Somewhat cespitose, the individual plants globose or somewhat elongate in age; axils slightly woolly; radial spines about 20, radiating, white, central spines 2, a little longer than the radials, black; flowers small, carmine-rose.

57. *Neomammillaria perbella* (Hildm.) Britt. & Rose, Cactaceae 4: 111. 1923.

Mammillaria perbella Hildm.; Schum. Gesamtb. Kakt. 567. 1898.

Mexico, the range not known.

Solitary or somewhat cespitose, depressed-globose, glaucous-green; tubercles short-conic, their axils lanate; radial spines 14 to 18, 1 to 1.5 mm. long, setaceous, white; central spines 2, very short (4 to 6 mm. long); flowers 9 to 10 mm. long, reddish.

58. *Neomammillaria collina* (Purpus) Britt. & Rose, Cactaceae 4: 111. 1923.

Mammillaria collina Purpus, Monatsschr. Kakteenk. 22: 162. 1912.

Puebla, the type from Esperanza.

Simple, globose, 12 to 13 cm. in diameter, somewhat depressed at apex; tubercles cylindric, 1 cm. long or less, woolly in their axils; radial spines 16 to 18, white, 4 mm. long; central spines 1 to 2, longer than the radials; flowers rose-colored, 1.5 to 2 cm. long; fruit 2 cm. long, red.

59. *Neomammillaria donatii* (Berge) Britt. & Rose, Cactaceae 4: 111. 1923.

Mammillaria donatii Berge; Schum. Gesamtb. Kakt. Nachtr. 135. 1903.

Mexico, the range not known.

Usually simple, stout and globose but sometimes branching, glaucous-green; tubercles small, conic, naked in their axils; radial spines 16 to 18, 8 mm. long, glossy; central spines 2, yellowish black, 10 mm. long; flowers reddish, 15 mm. long.

60. *Neomammillaria mundtii* (Schum.) Britt. & Rose, Cactaceae 4: 112. 1923.

Mammillaria mundtii Schum. Monatsschr. Kakteenk. 13: 141. 1903.

Mexico, the range not known.

Solitary, so far as known, globose, 6 to 7 cm. in diameter; tubercles not milky, nearly terete, dark green, rather short and stubby, naked in their axils; spine areoles circular, somewhat lanate when young; radial spines 8 to 19, swollen at base, spreading or somewhat curved backward, 6 to 8 mm. long, brownish when young, the tips usually darker; central spines 2, a little stouter and longer than the radials, porrect; flower from near the center of the plant, 2 cm. long.

61. *Neomammillaria celsiana* (Lem.) Britt. & Rose, Cactaceae 4: 112. 1923.

Mammillaria celsiana Lem. Cact. Hort. Monv. 41. 1839.

Mammillaria muehlenpfordtii Först. Allg. Gartenz. 15: 49. 1847.

Mammillaria schaeferi Fennel, Allg. Gartenz. 15: 66. 1847.

?*Mammillaria perringii* Hildmann, Gartenwelt 10: 250. 1906.

Oaxaca and elsewhere in southern Mexico.

Plant body subglobose, becoming columnar, 10 to 12.5 cm. high, 7.5 cm. in diameter, deep green; axils of tubercles woolly; tubercles conic, compact; spine areoles small, round, woolly when young; radial spines 24 to 26, about equal, white, setaceous; central spines 4 to 6, rarely 7, somewhat longer than the radials, terete, rigid, pale yellow, more or less recurved and unequal, 8 to 16 mm. long; flowers red; fruit described as green.

62. *Neomammillaria aureiceps* (Lem.) Britt. & Rose, *Cactaceae* 4: 114. 1923.
Mammillaria aureiceps Lem. *Cact. Aliq.* Nov. 8. 1838.

Valley of Mexico.

Globose to short-oblong, 8 to 10 cm. in diameter; tubercles short, terete, woolly and setose in their axils; radial spines about 20, bristle-like, white, 5 to 8 mm. long, spreading; central spines several, sometimes as many as 9, yellow, stouter and longer than the radials, 10 to 14 mm. long, somewhat spreading and a little curved inward; flowers small, dark red.

63. *Neomammillaria yucatanensis* Britt. & Rose, *Cactaceae* 4: 114. 1923.

Yucatán; type from Progreso.

Plants in clumps of 4, erect, cylindric, not milky, 10 to 15 cm. long, 3 to 6 cm. in diameter, very spiny; tubercles conic, woolly in their axils but not setose; radial spines about 20, white, spreading, acicular; central spines 4 or rarely 5, much stouter than the radials, 6 to 8 mm. long, slightly spreading above, yellowish brown; flowers very small, rose; fruit oblong, bright red.

64. *Neomammillaria pringlei* (Coulter) Britt. & Rose, *Cactaceae* 4: 115. 1923.

Cactus pringlei Coulter, *Contr. U. S. Nat. Herb.* 3: 109. 1894.

Mammillaria pringlei K. Brandeg. *Zoe* 5: 7. 1900.

State of Mexico; type from Tultenango Canyon.

Solitary, with long fibrous roots, usually globose but sometimes depressed or short-cylindric, 6 to 16 cm. high, 6 to 7 cm. in diameter; tubercles dull green, terete, conic, 6 to 10 mm. long; axils of tubercles woolly and setose; spines all yellow; radial spines 18 to 20, setaceous, spreading, 5 to 8 mm. long; central spines 5 to 7, much stouter and longer than the radials, more or less recurved, 2 to 2.5 cm. long, those from the upper areoles curved over the apex of the plant; flowers deep red, 8 to 10 mm. long; fruits borne in a circle near the middle of the plant, oblong, 12 to 15 mm. long; seeds small, brown.

65. *Neomammillaria cerralboa* Britt. & Rose, *Cactaceae* 4: 116. 1923.

Type from Cerralbo Island, Baja California.

Cylindric, solitary, 10 to 15 cm. high, 5 to 6 cm. in diameter; tubercles not milky, yellowish, terete, obtuse, closely set; spines all yellow, very much alike, about 11, one usually more central, the longer ones nearly 2 cm. long; flowers 1 cm. long or less.

66. *Neomammillaria phaeacantha* (Lem.) Britt. & Rose, *Cactaceae* 4: 116. 1923.

Mammillaria phaeacantha Lem. *Cact. Hort. Monv.* 47. 1839.

Mammillaria nigricans Fennel, *Allg. Gartenz.* 15: 66. 1847.

Mexico, the range not known.

Globose or somewhat depressed, green; axils of tubercles woolly; tubercles conic, hardly if at all angled; spine areoles small, yellowish-tomentose (probably so only when young); radial spines 16 to 20, white, setaceous; central spines 4, black, subulate, spreading or reflexed, the lowest one longest; flowers from the upper part of the plant, dark red; perianth segments oblong, acuminate.

67. *Neomammillaria graessneriana* (Bödeker) Britt. & Rose, *Cactaceae* 4: 117. 1923.

Mammillaria graessneriana Bödeker, *Monatsschr. Kakteenk.* 30: 84. 1920.

Mexico, the range not known.

Solitary or becoming cespitose, globose, 6 to 8 cm. in diameter, dark bluish green, somewhat depressed at apex; tubercles 4-angled, 8 mm. long, not milky, obtuse or truncate at apex, not setose in the axils; spine areoles circular,

white-woolly when young, nearly naked in age; radial spines 18 to 20, acicular, 6 to 8 mm. long, white; central spines 2 to 4, stouter than the radials, spreading, 8 mm. long, reddish brown; flowers small, somewhat distant from the apex of the plant.

68. *Neomammillaria spinosissima* (Lem.) Britt. & Rose, Cactaceae 4: 117. 1923.

Mammillaria spinosissima Lem. Cact. Aliq. Nov. 4. 1838.

Mammillaria polycentra Berg, Allg. Gartenz. 8: 130. 1840.

Mammillaria auricoma Dietr. Allg. Gartenz. 14: 308. 1846.

Mammillaria polyacantha Ehrenb. Allg. Gartenz. 16: 265. 1848.

Mammillaria polyactina Ehrenb. Allg. Gartenz. 16: 266. 1848.

Mammillaria hepatica Ehrenb. Allg. Gartenz. 16: 267. 1848.

Mammillaria pomacea Ehrenb. Allg. Gartenz. 16: 267. 1848.

Mammillaria pulcherrima Ehrenb. Allg. Gartenz. 17: 249. 1849.

Mammillaria pretiosa Ehrenb. Allg. Gartenz. 17: 250. 1849.

Mammillaria caesia Ehrenb. Allg. Gartenz. 17: 251. 1849.

Mammillaria mirabilis Ehrenb. Allg. Gartenz. 17: 251. 1849.

Mammillaria pruinosa Ehrenb. Allg. Gartenz. 17: 261. 1849.

Mammillaria seegeri Ehrenb. Allg. Gartenz. 17: 261. 1849.

Mammillaria haseloffii Ehrenb. Allg. Gartenz. 17: 303. 1849.

Mammillaria herrmannii Ehrenb. Allg. Gartenz. 17: 303. 1849.

Mammillaria aurea Ehrenb. Allg. Gartenz. 17: 303. 1849.

Mammillaria linkeana Ehrenb. Allg. Gartenz. 17: 308. 1849.

Mammillaria vulpina Ehrenb. Allg. Gartenz. 17: 308. 1849.

Mammillaria eximia Ehrenb. Allg. Gartenz. 17: 309. 1849.

Mammillaria isabellina Ehrenb. Allg. Gartenz. 17: 309. 1849.

Mammillaria uhdeana Salm-Dyck, Cact. Hort. Dyck. 1849. 83. 1850.

Mammillaria castaneoides Lemaire; Labour. Monogr. Cact. 37. 1853.

Mammillaria sanguinea Haage; Regel, Act. Hort. Petrop. 8: 276. 1883.

Mammillaria poselgeriana Haage; Först. Handb. Cact. ed. 2. 269. 1885.

High mountains of Mexico and Morelos, and elsewhere in central Mexico.

Cylindric, 7 to 30 cm. long, 2.5 to 10 cm. in diameter, almost hidden under a dense covering of spines; axils of tubercles setose; tubercles 2 to 3 mm. long; spines yellow to red, usually weak, hardly pungent; radial spines about 20, 1 cm. long or less; central spines 7 or 8, 2 cm. long or more; flowers from the upper part of the plant, purplish, 12 mm. long; inner perianth segments acute.

69. *Neomammillaria densispina* (Coulter) Britt. & Rose, Cactaceae 4: 119. 1923.

Cactus densispinus Coulter, Contr. U. S. Nat. Herb. 3: 96. 1894.

Mammillaria pseudofuscata Quehl, Monatsschr. Kakteenk. 24: 114. 1914.

San Luis Potosí

Globose, 6 to 10 cm. in diameter, entirely hidden by the dense covering of spines; tubercles short and thick, green, not milky; radial spines 25 or more, slightly spreading, about 1 cm. long, whitish or pale yellow; central spines 5 or 6, longer than the radials, 10 to 12 mm. long, the upper half or third dark brown; flowers purple without, yellowish within, 1.5 cm. long; seeds obovate, reddish brown, 1 mm. in diameter.

70. *Neomammillaria nunezii* Britt. & Rose, Cactaceae 4: 120. 1923.

Guerrero, the type from Buenavista de Cuellar.

Globose to cylindric, 1.5 cm. long, 6 to 8 cm. in diameter; tubercles closely set, short, terete, setose in their axils; radial spines white, stiff, about 30,

widely spreading; central spines 2 to 4, stout, 10 to 15 mm. long, brown to nearly blackish at tip; fruit 2.5 cm. long, clavate, white or tinged with pink; seeds small, brown.

71. *Neomammillaria amoena* (Hoppfer) Britt. & Rose, *Cactaceae* 4: 120. 1923.

Mammillaria amoena Hoppfer; Salm-Dyck, *Cact. Hort. Dyck.* 1849. 99. 1850. Morelos and elsewhere in central Mexico.

Stems robust, columnar; tubercles green, ovoid, obtuse, subglaucous; radial spines 16, slender, radiating, white; central spines 2, rigid, yellowish brown, 8 to 10 mm. long, the upper one longer and recurved; flowers appearing from the axils above the middle of the plant, 2 cm. long, the tube cone-shaped, green; outer perianth segments somewhat brownish, the inner with a pale brown central stripe, the margins nearly white, obtuse, entire.

72. *Neomammillaria rhodantha* (Link & Otto) Britt. & Rose, *Cactaceae* 4: 121. 1923.

Mammillaria rhodantha Link & Otto, *Icon. Pl. Rar.* 51. 1829.

Mammillaria pulchra Haw. in Edwards, *Bot. Reg.* 16: pl. 1329. 1830.

Mammillaria fulvispina Haw. *Phil. Mag.* 7: 108. 1830.

?*Mammillaria inuncta* Hoffmannsegg, *Preiss-Verz.* ed. 7. 23. 1833.

Mammillaria erinacea Wendl. *Cact. Herrenh.* 1835.

Mammillaria chrysacantha Otto; Pfeiff. *Enum. Cact.* 28. 1837.

Mammillaria fuscata Pfeiff. *Enum. Cact.* 28. 1837.

Mammillaria tentaculata Otto; Pfeiff. *Enum. Cact.* 29. 1837.

Mammillaria ruficeps Lem. *Cact. Hort. Monv.* 37. 1839.

Mammillaria odierana Lem. *Cact. Hort. Monv.* 46. 1839.

Mammillaria pyrrhochracantha Lem. *Cact. Hort. Monv.* 51. 1839.

Mammillaria pfeifferi Booth; Scheidw. *Bull. Acad. Brux.* 6: 93. 1839.

?*Mammillaria crassispina* Pfeiff. *Allg. Gartenz.* 8: 406. 1840.

Mammillaria stenocephala Scheidw. *Allg. Gartenz.* 9: 43. 1841.

?*Mammillaria imbricata* Wegener, *Allg. Gartenz.* 12: 66. 1844.

Mammillaria sulphurea Senke; Först. *Handb. Cact.* 200. 1846.

Mammillaria robusta Otto; Först. *Handb. Cact.* 207. 1846.

Mammillaria stueberi Otto; Först. *Handb. Cact.* 517. 1846.

Mammillaria lanifera Salm-Dyck, *Cact. Hort. Dyck.* 1849. 98. 1850.

?*Mammillaria russea* Dietr. *Allg. Gartenz.* 19: 347. 1851.

Probably central Mexico.

Cylindric, 10 to 30 cm. long, erect, dull green; tubercles terete, somewhat narrowed toward the apex, 3 to 5 mm. long, not milky; axils of tubercles sometimes bearing bristles, often naked; radial spines 15 to 20, white, 5 to 7 mm. long; central spines 4 to 6, reddish brown, straight, ascending, much stouter than the radials, 10 to 12 mm. long; flowers numerous, rose-colored, 12 mm. broad; inner perianth segments linear, somewhat spreading, pointed; fruit 2.5 cm. long, cylindric, lilac to red; seeds brownish.

73. *Neomammillaria plumosa* (Weber) Britt. & Rose, *Cactaceae* 4: 123. 1923.

Mammillaria plumosa Weber, *Dict. Hort. Bois* 804. 1898.

Northern Mexico.

Small, growing in dense clusters, sometimes 15 cm. broad, entirely covered by the mass of white spines; tubercles somewhat woolly in their axils, 2 to 3 mm. long; spines about 40, all radial, weak, plumose, 3 to 7 mm. long; flowers white, 3 to 4 mm. long; perianth segments with a red line running down the center; seeds black.

74. *Neomammillaria multiceps* (Salm-Dyck) Britt. & Rose, *Cactaceae* 4: 125. 1923.

Mammillaria multiceps Salm-Dyck, *Cact. Hort. Dyck.* 1849. 81. 1850.

Northeastern Mexico. Texas.

Cespitose, often forming large clumps; separate plants globose to short-oblong, often only 1 to 2 cm. in diameter; tubercles small, terete, hairy in their axils; radial spines hairlike, white; central spines several, pubescent, yellowish at base, dark brown above; flowers about 12 mm. long, whitish to salmon-yellowish, often becoming reddish on the outside; fruit oblong, 8 to 12 mm. long, scarlet; seeds black, 1 mm. long, punctate.

75. *Neomammillaria camptotricha* (Dams) Britt. & Rose, *Cactaceae* 4: 126. 1923.

Mammillaria camptotricha Dams, *Gartenwelt* 10: 14. 1905.

Deserts of eastern Querétaro.

Plants globose, cespitose, deep green, 5 cm. in diameter; tubercles somewhat elongate, often curved, 2 cm. long, terete, not at all milky, bearing bristles in the axils; spines 2 to 4, described as up to as many as 8, yellowish, bristle-like, spreading and twisted or bent, often 3 cm. long; spine areoles small, circular, a little woolly at first; axils of tubercles bristly; flowers about 1 cm. long; outer perianth segments greenish, the inner white, 10 mm. long, acute.

76. *Neomammillaria eriacantha* (Link & Otto) Britt. & Rose, *Cactaceae* 4: 127. 1923.

Mammillaria eriacantha Link & Otto; Pfeiff. *Enum. Cact.* 32. 1837.

Central Mexico.

Solitary or cespitose, 10 to 15 cm. high, cylindric, 5 cm. in diameter; tubercles spiraled, in 22 rows; radial spines about 20, delicate, spreading, pubescent; central spines 2, widely spreading, stouter than the radials, pubescent, yellowish; flowers borne in a ring above the middle of the plant, yellow, 14 mm. broad; inner perianth segments about 14, linear, acute; fruit at first greenish white, afterwards tinged with red, short-clavate.

77. *Neomammillaria schiedeana* (Ehrenb.) Britt. & Rose, *Cactaceae* 4: 128. 1923.

Mammillaria schiedeana Ehrenb.; Schlecht. *Allg. Gartenz.* 6: 249. 1838.

?*Mammillaria sericata* Lem. *Cact. Hort. Monv.* 44. 1839.

Mammillaria dumetorum Purpus, *Monatsschr. Kakteenk.* 22: 149. 1912.

?*Mammillaria cephalophora* Quehl, *Monatsschr. Kakteenk.* 24: 158. 1914.

Central Mexico, the type from Puente de Dios.

Densely cespitose, somewhat soft in texture; axils of tubercles bearing long bristle-like white hairs; tubercles green, terete; radial spines about 30, white, spreading, bristle-like, puberulent; central spines 6 to 10, spreading and appressed against the radials, a little stouter, often tinged with yellow; flowers 15 mm. long; inner perianth segments white.

78. *Neomammillaria lasiacantha* (Engelm.) Britt. & Rose, *Cactaceae* 4: 128. 1923.

Mammillaria lasiacantha Engelm. *Proc. Amer. Acad.* 3: 261. 1856.

Northern Chihuahua. Texas.

Globose, 2 to 2.5 cm. in diameter; tubercles small, their axils naked; spines 40 to 60, in more than one series, white, puberulent, 2 to 4 mm. long; flowers 12 mm. long, whitish or pink; fruit 1 to 2 cm. long; seeds blackish, pitted.

79. *Neomammillaria denudata* (Engelm.) Britt. & Rose, Cactaceae 4: 129. 1923.

Mammillaria lasiacantha denudata Engelm. U. S. & Mex. Bound. Cact. 5. 1859.

Coahuila. Texas.

Globose, 2.5 to 3.5 cm. in diameter; tubercles 5 to 6 mm. long; spines 50 to 80, glabrous or nearly so, 3 to 5 mm. long, the innermost usually much shorter; flowers and fruit from near the center but not from the axils of young tubercles; flowers 10 to 12 mm. long; perianth segments about 12, oblong, obtuse, the margins white, the center light purple; fruit clavate, red, 1.5 to 2 cm. long; seeds black.

80. *Neomammillaria lenta* (K. Brandeg.) Britt. & Rose, Cactaceae 4: 129. 1923.

Mammillaria lenta K. Brandeg. Zoe 5: 194. 1904.

Coahuila, the type from Viesca.

Described as cespitose; individuals globose to short-cylindric, almost hidden by the white delicate spines; tubercles very slender, light green; spine areoles naked; spines about 40, very fragile; axils woolly and occasionally bearing a single bristle; flowers whitish, 7 mm. long; perianth segments pointed; fruit red, clavate; seeds 1 mm. in diameter, dull black.

81. *Neomammillaria candida* (Scheidw.) Britt. & Rose, Cactaceae 4: 130. 1923.

Mammillaria candida Scheidw. Bull. Acad. Brux. 5: 496. 1838.

Mammillaria sphaerotracha Lem. Cact. Hort. Monv. 33. 1839.

Mammillaria humboldtii Ehrenb. Linnaea 14: 378. 1840.

Central Mexico; type from San Luis Potosí.

Cespitose; individual plants globose, 5 to 7 cm. in diameter, almost hidden by the white spines; radial spines numerous, radiating; central spines 8 to 12, porrect, often brownish at tip, a little stouter than the radials; axils setose; flowers 2 cm. long, rose-colored; perianth segments serrulate toward the apex; fruit red; seeds black.

82. *Neomammillaria vetula* (Mart.) Britt. & Rose, Cactaceae 4: 130. 1923.

Mammillaria vetula Mart. Nov. Act. Nat. Cur. 16: 338. 1832.

Hidalgo; type from San José del Oro.

Plant somewhat club-shaped, 4 to 5 cm. high; tubercles terete, light green, somewhat shining; axils naked or sometimes with a small tuft of wool; radial spines about 25, spreading, white, bristle-like; central spines 1 to 6, stouter than the radials, brownish; flowers 12 to 15 mm. long, borne at upper part of the plant; outer perianth segments red, with yellowish margins, the inner cream-colored.

83. *Neomammillaria fertilis* (Hildm.) Britt. & Rose, Cactaceae 4: 131. 1923.

Mammillaria fertilis Hildm.; Schum. Gesamtb. Kakt. 530. 1898.

Mexico, the range not known.

Cespitose, the individual plant globose to short-cylindric, dark green; tubercles arranged in 8 or 13 rows, a little woolly in their axils; radial spines 7 to 10, acicular, 6 mm. long; central spines 1 or 2, straight, stouter than the radials, 10 mm. long; flowers deep crimson, 2 cm. long; inner perianth segments linear-lanceolate, acute.

84. *Neomammillaria decipiens* (Scheidw.) Britt. & Rose, Cactaceae 4: 131. 1923.

Mammillaria decipiens Scheidw. Bull. Acad. Brux. 5: 496. 1838.

Mammillaria anancistria Lem. Cact. Hort. Monv. 39. 1839.

Mammillaria guilleminiana Lem. Cact. Hort. Monv. 48. 1839.

San Luis Potosí.

Usually cespitose, deep green; tubercles soft, cylindric, about 1 cm. long, their axils bearing 2 or 3 bristles each; radial spines 7 to 9, spreading, slender, white, sometimes yellowish with brown tips, puberulent when young; central spine 1, much longer than the radials, erect or ascending, 15 to 18 mm. long, dark brown; flower 15 mm. long, broadly funnel-shaped; inner perianth segments nearly white or faintly tinged with pink, acute.

85. *Neomammillaria discolor* (Haw.) Britt. & Rose, Cactaceae 4: 132. 1923.

Mammillaria discolor Haw. Syn. Pl. Succ. 177. 1812.

Cactus depressus DC. Cact. Hort. Monsp. 84. 1813. Not *C. depressus* Haw. 1812.

Cactus pseudomammillaris Salm-Dyck, Liste Pl. 1: 1. 1815.

Cactus spini Colla, Mém. Accad. Sci. Torino 33: 133. 1826.

Mammillaria albida Haage; Pfeiff. Enum. Cact. 28. 1837.

Mammillaria aciculata Otto; Pfeiff. Enum. Cact. 29. 1837.

? *Mammillaria curvispina* Otto; Dietr. Allg. Gartenz. 14: 204. 1846.

Mammillaria nitens Otto; Linke, Allg. Gartenz. 16: 331. 1848.

Mammillaria pulchella Otto; Linke, Allg. Gartenz. 16: 331. 1848.

Puebla.

Globose or somewhat depressed, often solitary, about 7 cm. in diameter; tubercles ovoid-conic, arranged in 13 to 15 spirals, their axils naked; radial spines 16 to 20, white, setaceous, widely spreading; central spines about 6, stouter than the radials, straight, at first black with white bases; flowers 15 mm. broad when fully open; inner perianth segments linear, white, with violet-rose band; fruit red, 2.5 cm. long.

86. *Neomammillaria fragilis* (Salm-Dyck) Britt. & Rose, Cactaceae 4: 133. 1923.

Mammillaria fragilis Salm-Dyck, Cact. Hort. Dyck. 1849. 103. 1850.

Mexico, the range not known.

Stems usually oblong or club-shaped, sprouting freely toward the top; branches globose and breaking off at the slightest touch; tubercles bright green, terete, their axils nearly naked; radial spines 12 to 14, white, naked, spreading; central spines usually wanting, especially on branches, if present 1 or 2, elongate, erect, brownish especially at tip; young spine areoles with white wool; flowers from the upper part of plant but not from the center, small, lasting for several days, cream-colored, the outer segments somewhat pinkish; petals broad, with mucronate tip.

87. *Neomammillaria elongata* (DC.) Britt. & Rose, Cactaceae 4: 134. 1923.

Mammillaria elongata DC. Mém. Mus. Hist. Nat. 17: 109. 1828.

Mammillaria subcrocea DC. Mém. Mus. Hist. Nat. 17: 110. 1828.

Mammillaria intertexta DC. Mém. Mus. Hist. Nat. 17: 110. 1828.

Mammillaria tenuis DC. Mém. Mus. Hist. Nat. 17: 110. 1828.

? *Mammillaria densa* Link & Otto, Icon. Pl. Rar. 69. 1830.

Mammillaria stella-aurata Mart.; Zucc. Abh. Akad. Wiss. München 2: 101. 1837.

? *Mammillaria anguinea* Otto; Salm-Dyck, Cact. Hort. Dyck. 1849. 101. 1850.

?*Mammillaria subechinata* Salm-Dyck, Cact. Hort. Dyck. 1849. 101. 1850.

Mammillaria rufocrocea Salm-Dyck, Cact. Hort. Dyck. 1849. 102. 1850.

Eastern Mexico.

Densely cespitose, forming small clumps, erect, ascending, or prostrate, 3 to 10 cm. long, 1 to 1.5 cm. in diameter, almost covered by a mass of interlocking spines; tubercles arranged in few rows, usually in spirals, short, their axils naked; spines usually all radial but sometimes with 1 porrect central spine, yellow or with brown tips, more or less recurved, 8 to 12 mm. long; spine areoles pubescent when young; flowers at the upper part of the plant but from the axils of old tubercles, white or nearly so, rather short and broad, 6 to 7 mm. long; perianth segments about 12, rather broad, obtuse or sometimes apiculate.

88. *Neomammillaria echinaria* (DC.) Britt. & Rose, Cactaceae 4: 136. 1923.

Mammillaria echinaria DC. Mém. Mus. Hist. Nat. 17: 110. 1828.

Mammillaria echinata DC. Mém. Cact. 3. 1834.

Mammillaria gracilis Pfeiff. Allg. Gartenz. 6: 275. 1838.

Hidalgo.

Plants cespitose, often forming large clumps, ascending or spreading, 1 to 1.5 cm. in diameter; tubercles short, terete, their axils naked; spines pale yellow to glossy white; radial spines about 15, spreading; central spines one, straight, acicular, about 1 cm. long; flowers and fruit not known.

89. *Neomammillaria pottsii* (Scheer) Britt. & Rose, Cactaceae 4: 136. 1923.

Mammillaria pottsii Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 104. 1850.

Mammillaria leona Poselger, Allg. Gartenz. 21: 94. 1853.

Nuevo León, Coahuila, Chihuahua, and Zacatecas. Texas.

More or less cespitose, the individual plants cylindric, 12 cm. long or more; tubercles almost hidden by the spines; radial spines about 30, white, weak, short; central spines 6 to 12, much stouter and longer, more or less ascending, grayish with brown tips; axils of tubercles woolly; flowers borne in a circle about 2 cm. below the top of the plant, about 1 cm. long; inner perianth segments light purple, somewhat spreading at tip, acute; fruit red, clavate; seeds blackish brown, the surface deeply pitted.

90. *Neomammillaria mazatlanensis* (Schum.) Britt. & Rose, Cactaceae 4: 138. 1923.

Mammillaria mazatlanensis Schum. Monatschr. Kakteenk. 11: 154. 1901.

Mammillaria littoralis K. Brandeg. Kew Bull. Misc. Inf. 1908: App. 91. 1908.

On hills near the sea, about Mazatlán, Sinaloa.

Plants cespitose, often forming broad clumps with many oblong heads, 4 to 10 cm. long, about 2 cm. in diameter; tubercles terete, 3 to 4 mm. long, their axils naked; radial spines 12 to 15, setaceous, spreading, white; central spines 4 to 6, stouter than the radials, reddish, ascending, 8 to 10 mm. long; flowers from the axils of the old tubercles but toward the top of the plant, 3 cm. long or more, red; perianth segments oblong, spreading.

91. *Neomammillaria sphacelata* (Mart.) Britt. & Rose, Cactaceae 4: 138. 1923.

Mammillaria sphacelata Mart. Nov. Act. Nat. Cur. 16: 339. 1832.

Puebla and Oaxaca.

Usually densely cespitose, often grayish, forming clumps 30 to 40 cm. in diameter, the individual plants cylindric, more or less elongate, often 10 to 20 cm. high; radial spines 14 to 20, usually white with black tips; central spines 3 or 4, usually black or reddish throughout, sometimes becoming white in age; axils of tubercles often bearing tufts of short hairs and occasionally

a few bristles; flowers about 15 mm. long, purplish; fruit red, clavate; seeds black, the surface deeply pitted.

92. *Neomammillaria albicans* Britt. & Rose, Cactaceae 4: 138. 1923.

Islands of the Gulf of California; type from Santa Cruz Island.

Plants at first globose but becoming cylindric and then 10 to 20 cm. long, up to 6 cm. in diameter, often in clumps of 5 to 15 plants; spines almost hiding the plant body and often pure white; radial spines numerous, short, stiff, widely spreading; central spines several, straight, stiff, often brownish or blackish at tip; spine areoles when young densely white-woolly; fruit clavate, red, 10 to 18 mm. long; seeds black.

93. *Neomammillaria slevinii* Britt. & Rose, Cactaceae 4: 139. 1923.

Islands of Baja California, the type from San Josef Island.

Plants simple, cylindric, 10 cm. high or more, 5 to 6 cm. in diameter, entirely hidden under the mass of closely set spines; spines at the top of plant pinkish below, with brown to blackish tips, those on the lower part of plant bleaching white; radial spines numerous, acicular, widely spreading; central spines about 6, a little longer and stouter than the radials, slightly spreading; flowers about 2 cm. broad; outer perianth segments with a pinkish midrib, the inner white; fruit red, about 1 cm. long; seeds black.

94. *Neomammillaria palmeri* (Coulter) Britt. & Rose, Cactaceae 4: 140. 1923.

Mammillaria palmeri Coulter, Contr. U. S. Nat. Herb. 3: 108. 1894.

San Benito Island and possibly Guadalupe Island, Baja California.

Densely cespitose; individuals small; axils densely woolly and bristly; radial spines 25 to 30, slender, white, 5 mm. long, radiating; central spines 3 to 5, stouter and longer than the radials, brownish with black tips, straight, 7 to 8 mm. long; flowers cream-colored, sometimes tinged with pink; fruit clavate, scarlet; seeds black.

95. *Neomammillaria uncinata* (Zucc.) Britt. & Rose, Cactaceae 4: 140. 1923.

Mammillaria uncinata Zucc.; Pfeiff. Enum. Cact. 34. 1837.

Mammillaria bihamata Pfeiff. Allg. Gartenz. 6: 274. 1838.

Mammillaria depressa Scheidw. Bull. Acad. Brux. 5: 494. 1838.

Hidalgo and San Luis Potosí, and elsewhere in central Mexico.

Globose or somewhat depressed, usually half-buried in the soil, 8 to 10 cm. in diameter; tubercles lactiferous, short, obtuse; axils of old tubercles naked, of young ones lanate, forming a mass of wool at the top; young spine areoles also lanate; radial spines 4 to 6, usually white, subulate, 4 to 5 mm. long; central spines usually solitary, sometimes 2 or 3, much stouter than the radials, 8 to 12 mm. long, brown, hooked at apex; flowers reddish white, about 2 cm. long; inner perianth segments linear-oblong; fruit clavate, 10 to 18 mm. long, red; seeds small, brown.

96. *Neomammillaria hamata* (Lehm.) Britt. & Rose, Cactaceae 4: 140. 1923.

Cactus cylindricus Orteg. Hort. Matr. Dec. 128. 1800. Not *C. cylindricus* Lam. 1783.

Mammillaria hamata Lehm.; Pfeiff. Enum. Cact. 34. 1837.

Mexico, the range not known.

Stem 60 cm. long, cylindric, somewhat branched at base, said to be milky; tubercles conic or a little compressed; radial spines 15 to 20, white, spreading; central spines several, brownish, stouter than the radials, one of them hooked; flowers small, probably scarlet, from near the top of the plant but from the axils of old tubercles; inner perianth segments lanceolate, acute; fruit slender, clavate, probably red; seeds minute, brown.

97. *Neomammillaria rekoï* Britt. & Rose, Cactaceae 4: 141. 1923.

Oaxaca.

Globular to short-cylindric, becoming 10 cm. long, 5 to 6 cm. in diameter, not milky; tubercles green, terete, 8 to 10 mm. long, not very closely set, each bearing in its axil a tuft of short white wool and 5 to 8 long white bristles; radial spines spreading, about 20, white, delicately acicular, 4 to 6 mm. long; central spines 4, brown, much stouter than the radials, 10 to 15 mm. long, the lower one usually strongly hooked; flowers from axils of old tubercles, near the top of the plant, 1.5 cm. long, deep purple; inner perianth segments narrowly oblong, apiculate; fruit clavate, red, 12 mm. long; seeds minute, brown.

98. *Neomammillaria solisii* Britt. & Rose, Cactaceae 4: 142. 1923.

Guerrero, the type from Cerro de Buenavista de Cuellar.

Simple, globose or nearly so, 5 to 7 cm. in diameter, green or becoming purplish; tubercles 8 mm. long, terete, a little narrow toward the tip and thus separated above from the adjoining tubercles, their axils without wool even when young and usually with 1 to many bristles; radial spines 10 to 20, spreading, 6 to 7 mm. long, white, bristle-like; central spines 3 or 4, a little stouter than the radials, becoming brown, one of them strongly hooked (sometimes 2 cm. long); flowers from axils near base of the plant; ovary remaining dormant for a long time (at least a month), then elongating and the fruit maturing quickly, this short-oblong, 10 to 12 mm. long, green; seeds 1 mm. long, brown, pitted.

99. *Neomammillaria pygmaea* Britt. & Rose, Cactaceae 4: 142. 1923.

Querétaro; type from Cadereyta.

Plant very small, globose to cylindric, 2 to 3 cm. in diameter; tubercles small, obtuse; radial spines about 15, white, stiff, hardly puberulent even under a lens; central spines 4, ascending, golden yellow, the lower one hooked, 5 to 6 cm. long; flowers about 1 cm. long, the outer segments tinged with red, apiculate; inner perianth segments about 10, cream-colored.

100. *Neomammillaria wildii* (Dietr.) Britt. & Rose, Cactaceae 4: 143. 1923.*Mammillaria wildii* Dietr. Allg. Gartenz. 4: 137. 1836.

Hidalgo.

Cylindric to globose, cespitose at base; axils of tubercles bearing rose-colored hairs and bristles; tubercles slender, elongate, 8 to 10 mm. long, obtuse, green or somewhat rose-colored at base; young areoles tomentose; spines all puberulent; radial spines 8 to 10, 8 mm. long, setiform, white; central spines 4, yellow, one of them hooked; flowers white, 12 mm. in diameter; inner perianth segments acuminate; fruit clavate, red.

101. *Neomammillaria seideliana* (Quehl) Britt. & Rose, Cactaceae 4: 144. 1923.*Mammillaria seideliana* Quehl, Monatsschr. Kakteenk. 21: 154. 1911.

Zacatecas.

Solitary, globose, becoming cespitose, 3 to 4 cm. in diameter; tubercles purplish, their axils naked; radial spines 20 to 25, white, long and slender, ascending, puberulent; central spines yellow, 3 or 4, one hooked, puberulent when young; flowers arising from near the top of the plant, 15 to 18 mm. long, creamy yellow, the outer perianth segments brownish, the inner oblong, acute; fruit persisting in the axils of the tubercles apparently for a number of years; seeds black.

102. *Neomammillaria barbata* (Engelm.) Britt. & Rose, *Cactaceae* 4: 144. 1923.

Mammillaria barbata Engelm. in Wislitz. Mem. North. Mex. 105. 1848.

Chihuahua, the type from Cosihuirachi.

Often densely cespitose, globose, 3 to 4 cm. in diameter; radial spines 20 or more, acicular, spreading or ascending, white, sometimes with brown tips; central spines several, subulate, brown, puberulent, 1 or 2 hooked; flowers 15 mm. long; outer perianth segments ovate to lanceolate, ciliate, the inner erect or spreading at tip, light straw-colored or greenish, brown without, acute.

103. *Neomammillaria mercadensis* (Patoni) Britt. & Rose, *Cactaceae* 4: 145. 1923.

Mammillaria mercadensis Patoni, *Alianza Cient. Univ.* 1: 54. 1910.

Mammillaria ocamponis Ochoterena, *Méx. Estud. Biol. Bol.* 2: 355. 1918.

Durango, the type from Cerro de Mercado.

Solitary or cespitose, small, globose; radial spines numerous, sometimes 25, widely spreading, white; central spines 4 or 5, elongate, much longer than the flowers, one of them strongly hooked at apex; flowers small, pale rose-colored; perianth segments oblong, obtuse.

104. *Neomammillaria kunzeana* (Bödek. & Quehl) Britt. & Rose, *Cactaceae* 4: 145. 1923.

Mammillaria kunzeana Bödek. & Quehl, *Monatsschr. Kakteenk.* 22: 177. 1912.

Mexico, the range not known.

Cespitose, globose or sometimes becoming cylindric, light green; tubercles cylindric, setose in their axils; radial spines about 25, white, setaceous; central spines 3 or 4, brown, puberulent, one of them hooked; flowers white or yellowish white, rose-colored on the outside, 2 cm. long; inner perianth segments acuminate.

105. *Neomammillaria hirsuta* (Bödeker) Britt. & Rose, *Cactaceae* 4: 146. 1923.

Mammillaria hirsuta Bödeker, *Monatsschr. Kakteenk.* 29: 130. 1919.

Mexico, the range not known.

Solitary, becoming cespitose, somewhat globose, 6 cm. in diameter; tubercles 10 mm. long, in 8 or 13 spiraled rows, cylindric, their axils setose; spine areoles naked; radial spines about 20, white, 10 to 15 mm. long; central spines 3 or 4, the lower one hooked; flowers 10 mm. long.

106. *Neomammillaria multihamata* (Bödeker) Britt. & Rose, *Cactaceae* 4: 146. 1923.

Mammillaria multihamata Bödeker, *Monatsschr. Kakteenk.* 25: 76. 1915.

Mexico, the range not known.

Short-cylindric, about 5 cm. in diameter; tubercles cylindric, setose in their axils; spine areoles white-lanate; radial spines 25, acicular, white, 8 mm. long; central spines 7 to 9, several of them hooked; flowers numerous from near the top of the plant, 1.5 cm. long; inner perianth segments narrow, acute, spreading; seeds blackish brown.

107. *Neomammillaria longicoma* Britt. & Rose, *Cactaceae* 4: 146. 1923.

San Luis Potosí.

Cespitose, often forming broad clumps; individual specimens 3 to 5 cm. in diameter; tubercles conic, 4 to 5 mm. long, dark green, obtuse, bearing long white hairs in their axils; radial spines 25 or more, weak and hairlike, more or less interlocking; central spines 4, 10 to 12 mm. long, brown above, a little

paler below, 1 or 2 hooked; flowers from the axils of the upper tubercles; outer perianth segments pinkish, darker along the center, the inner lanceolate, acute, nearly white, sometimes tinged with rose (?).

- 108. *Neomammillaria bocasana* (Poselg.) Britt. & Rose, Cactaceae 4: 147. 1923.**

Mammillaria bocasana Poselger, Allg. Gartenz. 21: 94. 1853.

Northern central Mexico; type from Sierra de Bocas, San Luis Potosí.

Cespitose, often forming large mounds; individual plants globose, 3 to 4 cm. in diameter, light green; tubercles slender, 6 to 8 mm. long, terete, their axils sometimes hairy or bristly; radial spines represented by numerous long white silky hairs; central spines solitary, 5 to 8 mm. long, brown but paler at base, hooked, much shorter than the radial spines; flowers described as white; perianth segments lance-linear, acute, spreading; fruit "green, 4 mm. long; seeds cinnamon brown."

- 109. *Neomammillaria multiformis* Britt. & Rose, Cactaceae 4: 148. 1923.**

San Luis Potosí, the type from Alvarez.

Cespitose, forming dense clumps, sometimes 25 or more from a single root, either globose or much elongate and 3 to 6 times as long as thick; tubercles terete, 6 to 8 mm. long, their axils bearing long white bristles and white wool; radial spines 30 or more, acicular, 8 mm. long, yellow or at least becoming so, ascending; central spines 4, a little longer and stouter than the radials, nearly erect, reddish in the upper part, one of them strongly hooked; flowers deep purplish red, 8 to 10 mm. long, usually broader than long; inner perianth segments oblong, acute; fruit never globose, at least when dry; seeds black.

- 110. *Neomammillaria scheidweileriana* (Otto) Britt. & Rose, Cactaceae 4: 148. 1923.**

Mammillaria scheidweileriana Otto; Dietr. Allg. Gartenz. 9: 179. 1841.

Mammillaria monancistria Berg; Schum. Gesamtb. Kakt. 533. 1898.

Mexico, the range not known.

Cespitose, globose to cylindric, light green; tubercles setose in their axils, in 8 and 13 spirals, cylindric; spines all puberulent; radial spines 9 to 11, setaceous, white, 1 cm. long; central spines 1 to 4, brown, 1 or 2 hooked; flowers rose-colored, 12 to 13 mm. long.

- 111. *Neomammillaria saffordii* Britt. & Rose, Cactaceae 4: 149. 1923.**

Type from Icamole, Nuevo León.

Plants small, globose to short-cylindric, 3 to 4 cm. high, dull green, nearly hidden under the dense covering of spines; axils naked; spine areoles when quite young slightly woolly but early glabrate, circular; spines all puberulent under a lens when young; radial spines 12 to 14, somewhat ascending but in age more or less curved outward, when just developing with bright red tips and white bases, later the lower part becoming yellowish; central spines single, stout, reddish, 1.5 cm. long, hooked at apex; flowers 2.5 cm. long, rose-colored; outer perianth segments tipped by long bristles, the inner obtuse.

- 112. *Neomammillaria schelhasei* (Pfeiff.) Britt. & Rose, Cactaceae 4: 149. 1923.**

Mammillaria schelhasei Pfeiff. Allg. Gartenz. 6: 274. 1838.

Hidalgo, the type from Mineral del Monte.

Cespitose, forming a large hemispheric mound; individual plants globose to short-cylindric, olive-green; tubercles cylindric, their axils a little woolly but not setose; radial spines 14 to 16, setaceous, white; central spines 3, brown, one of them hooked at apex; flowers 2.2 to 2.5 cm. long, salmon or rose-colored; fruit 5 mm. long.

113. *Neomammillaria glochidiata* (Mart.) Britt. & Rose, *Cactaceae* 4: 149. 1923.

Mammillaria glochidiata Mart. Nov. Act. Nat. Cur. 16: 337. 1832.

?*Mammillaria ancistroides* Lehm. Del. Sem. Hort. Hamb. 1832.

Southern Mexico.

Densely cespitose, forming clusters sometimes 15 cm. high; tubercles cylindric, green, shining, 8 to 15 mm. long, well separated from one another toward the tip, obtuse, terete; radial spines 12 to 15, widely spreading, puberulent, white, setiform, 10 to 12 mm. long; central spines 4, brownish, one of them hooked; flowers white; inner perianth segments lanceolate, acuminate; fruit clavate, scarlet, 16 mm. long; seeds black.

114. *Neomammillaria trichacantha* (Schum.) Britt. & Rose, *Cactaceae* 4: 151. 1923.

Mammillaria trichacantha Schum. Gesamtb. Kakt. Nachtr. 133. 1903.

Mexico, the range not known.

Solitary, globose to short-cylindric, small; tubercles clavate, 4 to 5 cm. high, slightly glaucous; radial spines 15 to 18, pubescent, acicular, white, 8 mm. long; central spines 2, brownish, 12 mm. long, one of them hooked; flowers red or yellow, 1.5 cm. long; inner perianth segments lanceolate, widely spreading, acuminate.

115. *Neomammillaria painteri* (Rose) Britt. & Rose, *Cactaceae* 4: 151. 1923.

Mammillaria painteri Rose; Quehl, Monatsschr. Kakteenk. 27: 22. 1917.

Mammillaria erythrosperma Bödeker, Monatsschr. Kakteenk. 28: 101. 1918.

Central Mexico, the type from San Juan del Río, Querétaro.

Plant globose, 2 cm. in diameter, almost hidden by the spines; tubercles without bristles in their axils; radial spines about 20, stiff, white, puberulent under a hand lens; central spines 4 or 5, ascending, dark brown, one hooked, puberulent; flowers 15 mm. long, greenish white, the outer segments brownish; inner perianth segments broad, with an ovate acute tip.

116. *Neomammillaria mainae* (K. Brandeg.) Britt. & Rose, *Cactaceae* 4: 154. 1923.

Mammillaria mainae K. Brandeg. Zoe 5: 31. 1900.

Northern Sonora; type collected south of Nogales.

Globose or somewhat depressed, 5 to 8 cm. broad; tubercles pale green, naked in their axils; spines all puberulent, at least when young; radial spines about 10, widely spreading, yellowish or white except the brownish tips; central spines usually stout, yellowish except the strongly hooked tip; flowers from the upper part of the plant but in the old axils, about 2 cm. long, the outer segments with a brownish stripe, the inner ones with a reddish central stripe, with broad, nearly white margins, acute; fruit red, globose to obovate, not projecting beyond the tubercles; seeds dull black, 1 mm. long, punctate.

117. *Neomammillaria boedekeriana* (Quehl) Britt. & Rose, *Cactaceae* 4: 154. 1923.

Mammillaria boedekeriana Quehl, Monatsschr. Kakteenk. 20: 108. 1910.

Mexico, the range not known.

Globose to ovoid, but in collections becoming cylindric, dull green; tubercles cylindric; radial spines about 20, white; central spines 3, brownish black, one hooked; axils naked; flowers white, with brownish stripes.

118. *Neomammillaria microcarpa* (Engelm.) Britt. & Rose, Cactaceae 4: 155. 1923.

Mammillaria microcarpa Engelm. in Emory, Mil. Recon. 157. 1848.

Mammillaria grahamii Engelm. Proc. Amer. Acad. 3: 262. 1856.

Chihuahua and Sonora. Texas.

Globose to cylindric, simple or branched either at base or near the middle, often cespitose, sometimes 8 cm. high; tubercles small, corky when old; axils of tubercles naked; radial spines 15 to 30, spreading, white, sometimes with dark tips, slender, rigid, glabrous, 6 to 12 mm. long; central spines 1 to 3, dark, when more than one the lower stouter, often 18 mm. long, hooked; flowers from near the top of the plant, 2 to 2.5 cm. long, broadly funnel-shaped; outer perianth segments ovate, obtuse, short-ciliate, the inner purplish, sometimes with whitish margins, obovate, acuminate; fruit clavate, 2 to 2.5 cm. long, scarlet; seeds black, shining, pitted.

Cactus eschanzieri Coulter (Contr. U. S. Nat. Herb. 3: 104. 1894), described from San Luis Potosí, is probably closely related to this species.

119. *Neomammillaria sheldonii* Britt. & Rose, Cactaceae 4: 156. 1923.

Sonora, the type from Hermosillo.

Stems slender-cylindric, about 8 cm. high; axils of tubercles without setae; radial spines 12 to 15, pale with dark tips, the 3 or 4 upper ones darker, a little stouter and 1 or 2 of them subcentral, the true central erect or porrect with an upturned hook at the end; outer perianth segments ciliate, the inner about 10, broad, acute, light purple with very pale margins.

120. *Neomammillaria armillata* (K. Brandeg.) Britt. & Rose, Cactaceae 4: 157. 1923.

Mammillaria armillata K. Brandeg. Zoe 5: 7. 1900.

Southern Baja California; type from San José del Cabo.

In clusters of 3 to 12, cylindric, sometimes 30 cm. high; tubercles bluish green, somewhat angled; axils setose and slightly woolly; radial spines 9 to 15, 7 to 12 mm. long, yellowish; central spines 1 to 4 but usually 2, brownish, the lowest one hooked and a little longer than the others; flowers 10 to 12 mm. long, greenish to flesh-colored; fruit red, clavate, 15 to 30 mm. long; seeds black, punctate.

121. *Neomammillaria fraileana* Britt. & Rose, Cactaceae 4: 157. 1923.

Islands of Baja California; type from Pichilique Island.

Stems elongate, cylindric, 1 to 1.5 cm. long; axils of tubercles naked or containing at most a single bristle; central spines dark brown, one of them strongly hooked; flowers rather large, pinkish; inner perianth segments acuminate, 2 to 2.5 cm. long, often lacerate toward the tip.

122. *Neomammillaria swinglei* Britt. & Rose, Cactaceae 4: 158. 1923.

Sonora; type from Guaymas.

Stems cylindric, 10 to 20 cm. long, 3 to 5 cm. in diameter; axils of tubercles more or less setose; radial spines rather stout for this group, spreading, dull white with dark tips; central spines 4, ascending, dark brown or black, the lowest one elongate (1 to 1.5 cm.), hooked at apex or sometimes straight; outer perianth segments greenish or sometimes pinkish, the margins somewhat scarious; inner perianth segments narrowly oblong, nearly white, with a brown stripe down the center; fruit red, clavate, 18 mm. long; seeds 1 mm. in diameter, black.

- 123. *Neomammillaria dioica* (K. Brandeg.) Britt. & Rose, Cactaceae 4: 158. 1923.**

Mammillaria dioica K. Brandeg. Erythea 5: 115. 1897.

Mammillaria fordii Orcutt, West Amer. Sci. 13: 49. 1902.

Northwestern Baja California. Southern California.

Either solitary or clustered, cylindric, 5 to 25 cm. high or even higher; axils of tubercles woolly and short-setose; radial spines 11 to 22, white, the tips often brownish to black or rose-colored throughout, 5 to 7 mm. long, spreading; central spines 3 or 4, brownish, the lower one a little longer than the others and hooked; flowers borne toward the top of the plant, yellowish white with purplish midrib, 10 to 22 mm. long, incompletely dioecious; outer perianth segments reddish, especially along the midrib; the inner oblong, pale cream-colored, notched or toothed near the apex; fruit scarlet, clavate, 10 to 25 mm. long; seeds black.

- 124. *Neomammillaria goodridgei* (Scheer) Britt. & Rose, Cactaceae 4: 158. 1923.**

Mammillaria goodridgei Scheer; Salm-Dyck, Cact. Hort. Dyck. 1849. 91. 1850.

Cedros Island and the adjacent mainland of Baja California; type from Cedros Island.

Stems clustered, erect, globose to cylindric, up to 10 cm. long, 3 to 4 cm. in diameter; axils of tubercles not setose; radial spines 12 to 15, spreading, white, sometimes with dark tips; central spine usually 1, white below, brown above, the lower one hooked; flowers perfect, rose-colored, 15 mm. long; segments oblong, obtuse or retuse; fruit clavate, 1.5 to 2 cm. long, scarlet, naked; seeds black, punctate. "Llavina."

- 125. *Neomammillaria zephyranthoides* (Scheidw.) Britt. & Rose, Cactaceae 4: 159. 1923.**

Mammillaria zephyranthoides Scheidw. Allg. Gartenz. 9: 41. 1841.

Mammillaria fennelii Hopffer, Allg. Gartenz. 11: 3. 1843.

Oaxaca.

Depressed-globose to short-cylindric, up to 35 mm. high, 25 mm. in diameter; tubercles 6 mm. long; radial spines 14 to 18, 8 to 10 mm. long, very slender, white; central spine 1 (sometimes 2), larger than the radials and hooked, at first purple but in age yellowish at base; flowers large, with rotate limb and exerted stamens and style; perianth segments white with red stripes.

- 126. *Neomammillaria carretii* (Rebut) Britt. & Rose, Cactaceae 4: 160. 1923.**

Mammillaria carretii Rebut; Schum. Gesamtb. Kakt. 542. 1898.

Mexico, the range not known.

Solitary, dull green, globose, depressed, 5 to 6 cm. in diameter; tubercles cylindric; axils of tubercles naked; radial spines 14, subulate, spreading, recurved, nearly clothing the plant, long, yellowish; central spine 1, slender, chestnut-brown, hooked; flowers 2.5 cm. long; inner perianth segments white, streaked with rose.

- 127. *Neomammillaria jaliscana* Britt. & Rose, Cactaceae 4: 160. 1923.**

Type from Río Blanco near Guadalajara, Jalisco.

Cespitose, globose, 5 cm. in diameter, bright green; tubercles in 13 rows, 4 or 5 mm. high; radial spines 30 or more, at right angles to the tubercles; central spines 4 to 6, reddish brown, darker toward the tips, one of them strongly hooked; axils naked; flowers purplish, 1 cm. broad.

128. *Neomammillaria bombycina*. (Quehl) Britt. & Rose, *Cactaceae* 4: 161. 1923.

Mammillaria bombycina Quehl, *Monatsschr. Kakteenk.* 20: 149. 1910.

Mexico, the range not known.

Cylindric, 15 to 20 cm. long, 5 to 6 cm. in diameter; tubercles spiraled, obtuse; young areoles conspicuously white-woolly; radial spines numerous, acicular, widely spreading, 1 cm. long or less; central spines 4, elongate, a little spreading, those toward the top of plant erect, 2 cm. long, brown except at base, the lower one hooked; flowers from near the top, light purple, about 1 cm. long; perianth segments narrowly oblong.

129. *Neomammillaria occidentalis* Britt. & Rose, *Cactaceae* 4: 161. 1923.

Type from Manzanillo, Colima.

Cespitose, the branches slender, cylindric, 10 cm. high, densely spiny; radial spines about 12, yellowish, spreading; central spines 4 or 5, reddish or brown, one of them longer and hooked; flowers 1 cm. long, pink; fruit said to be red.

130. *Neomammillaria nelsonii* Britt. & Rose, *Cactaceae* 4: 163. 1923.

Type from cliffs at La Solada, Michoacán.

Globose, 5 cm. in diameter; tubercles numerous, terete, apparently not milky, 5 to 7 mm. long, their axils naked; radial spines about 15, acicular, white, 6 to 8 mm. long, spreading; central spines several, all like the radials but one of them elongate, stouter, and longer than the others, brown to black, strongly hooked, 12 to 15 mm. long; fruit very slender, clavate, 3 cm. long or more, red, few-seeded; seeds globose, black, rugose, 2 mm. in diameter.

131. *Neomammillaria longiflora* Britt. & Rose, *Cactaceae* 4: 163. 1923.

Durango; type from Santiago Papasquiaro.

Solitary or clustered, 3 cm. in diameter, apparently not at all milky; tubercles terete, not grooved on upper side, 5 to 7 mm. long, rather closely set and nearly hidden by the spines; radial spines about 30, acicular, 10 to 13 mm. long, yellow or straw-colored, somewhat spreading; central spines 4, reddish brown, much stouter than the radials, 3 of them straight, about the length of the radials, 1 of them hooked at apex, twice as long as the others; flowers several, even on small plants, borne near the top, 2 cm. long or more, with a distinct narrow tube; perianth segments pinkish, oblong, acute; ovary very small, ovoid, more or less sunken in the axils, thin above and perhaps dehiscing by an operculum, the lower part with the seeds persisting for years; seeds nearly globose, minutely pitted, 1 to 1.5 mm. in diameter, black.

132. *Neomammillaria tacubayensis* (Fedde) Britt. & Rose, *Cactaceae* 4: 164. 1923.

Mammillaria tacubayensis Fedde, *Nov. Gen. Sp. Ind.* 1905. 443. 1905.

Type from Tacubaya, Distrito Federal.

Globose, 3 to 5 cm. in diameter; radial spines 35 to 40, white, 3 to 5 mm. long; central spine 1, black, 5 to 6 mm. long, hooked; flowers 1.5 cm. long.

133. *Neomammillaria umbrina* (Ehrenb.) Britt. & Rose, *Cactaceae* 4: 164. 1923.

Mammillaria umbrina Ehrenb. *Allg. Gartenz.* 17: 287. 1849.

Hidalgo.

Simple or becoming cespitose, cylindric, 10 to 12.5 cm. high, dull green; tubercles conic; axils of tubercles naked; radial spines 22 to 25, spreading, white, 4 to 6 mm. long; central spines 4, 3 being 8 to 10 mm. long, one being 20 to 24 mm. long, hooked; flowers 2 cm. long; inner perianth segments about 15, narrowly lanceolate, acute, purple.

134. *Neomammillaria verhaertiana* (Bödeker) Britt. & Rose, Cactaceae 4: 164. 1923.

Mammillaria verhaertiana Bödeker, Monatsschr. Kakteenk. 22: 152. 1912. Mexico.

Solitary, short-cylindric; tubercles subconic, their axils setose; radial spines 20 or more, yellowish, setaceous, 1 cm. long, glabrous; central spines 4 to 8, stouter than the radials, brown at tip, one of them hooked at apex; flowers white, 2 cm. long, appearing in a circle below the top of the plant; outer perianth segments broadly lanceolate, yellowish white.

Besides the species formally listed here, there remain numerous others published under the generic name *Mammillaria*, but they have been so poorly described that their identity is likely to remain unsolved.

51. *EPIPHYLLUM* Haw. Syn. Pl. Succ. 197. 1812.

Plants mostly epiphytic, the main stem often terete and woody; branches usually much flattened, often thin and leaflike, sometimes 3-winged; areoles small, borne along the margins of the flattened branches; spines usually wanting in mature plants but often represented in seedlings and juvenile forms by slender bristles; flowers usually large, in some species nocturnal, in others diurnal, either odorless or very fragrant; flower tube longer than the limb, in some species greatly elongate; filaments usually long, borne at the top of the tube or scattered over the surface of the throat; style elongate, white or colored; stigma lobes several, linear; fruit globular or short-oblong to narrowly oblong, often with low ridges, sometimes tubercled, red or purple, edible or insipid, when mature splitting down one side and exposing the white or crimson pulpy interior; seeds black, shining.

Several species besides those listed here occur in tropical America.

Ultimate joints acuminate.

Flowers 25 to 30 cm. long-----1. *E. oxypetalum*.

Flowers 10 to 15 cm. long-----2. *E. caudatum*.

Ultimate joints acute, obtuse, or rounded.

Joints deeply lobed.

Lobes of joints spreading; outer perianth segments lemon-yellow.

3. *E. darrahii*.

Lobes of joints pointing forward; outer perianth segments reddish yellow.

4. *E. anguliger*.

Joints crenate or nearly entire.

Joints very stiff-----5. *E. strictum*.

Joints flexible-----6. *E. stenopetalum*.

1. *Epiphyllum oxypetalum* (DC.) Haw. Phil. Mag. 6: 109. 1829.

Cereus oxypetalus DC. Prodr. 3: 470. 1828.

Cereus latifrons Pfeiff. Enum. Cact. 125. 1837.

Phyllocactus oxypetalus Link; Walp. Repert. Bot. 2: 341. 1843.

Phyllocactus latifrons Link; Walp. Repert. Bot. 2: 341. 1843.

Phyllocactus purpusii Weing. Monatsschr. Kakteenk. 17: 34. 1907.

Mexico, often cultivated. Central America to Brazil.

Plants stout, 3 meters long or more, much branched; branches flat and thin, 10 to 12 cm. broad, long-acuminate, deeply crenate; flowers opening in the evening, drooping and limp after anthesis, fragrant; tube of flower 13 to 15 cm. long, rather stout, red, about 1 cm. thick, bearing distant nar-

row scales about 10 mm. long; outer perianth segments narrow, reddish to amber, 8 to 10 cm. long, the inner oblong, white; stamens numerous, white; style white, thick, 20 cm. long; stigma lobes numerous, cream-colored, entire. "Reina de la noche," "junco oloroso;" "flor de balle" (Venezuela); "galán de noche" (El Salvador).

2. *Epiphyllum caudatum* (Vaupel) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 256. 1913.

Phyllocactus caudatus Vaupel, Monatsschr. Kakteenk. 23: 116. 1913.

Oaxaca, the type from Comaltepec.

Old stems terete and slender; lateral branches elongate-lanceolate, cuneately narrowed at base into a terete stalk, long-acuminate, 15 to 20 cm. long, 3 to 4 cm. wide, the margins low-crenate; flowers white, the tube slender, about 7 cm. long; inner perianth segments about 6 cm. long; ovary and most of the flower tube quite naked.

3. *Epiphyllum darrahi* (Schum.) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 256. 1913.

Phyllocactus darrahi Schum. Gesamtb. Kakt. Nachtr. 69. 1903.

Much cultivated in Mexico; probably also wild.

Stems much branched, often terete and woody below; joints rather thick, 20 to 30 cm. long, 3 to 5 cm. wide, deeply lobed, sometimes nearly to the midrib, the lobes usually obtuse; tube of flower 9 cm. long, somewhat curved, greenish; scales on tube and ovary small, linear, green, appressed; outer perianth segments 10, linear, spreading or reflexed, acute, 4 cm. long, lemon-yellow; inner perianth segments pure white, nearly as long as the outer, broader and more erect, short-acuminate; filaments white, nearly as long as the perianth segments; style overtopping the stamens, pure white; stigma lobes 8, linear.

4. *Epiphyllum anguliger* (Lem.) Don; Loud. Encycl. Pl. ed. 3. 1380. 1855.

Phyllocactus anguliger Lem. Jard. Fleur. 1: pl. 92. 1851.

Phyllocactus serratus Brongn.; Labour. Monogr. Cact. 417. 1853.

Central and southern Mexico, the type from Matanejo.

Much branched; stems and lower branches terete; upper branches flattened, with deeply toothed margins, rather fleshy; areoles small, usually felted and sometimes bearing 1 or 2 white bristles; flower tube stout, without scales, about 8 cm. long; outer perianth segments brownish yellow, the inner white, oblong, acuminate, about 5 cm. long; style slender, white. "Pitayita del cerro," "jarana de pitahayita," "nopalillo," "nopalillo blanco."

5. *Epiphyllum strictum* (Lem.) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 259. 1913.

Phyllocactus strictus Lem. Illustr. Hort. Lem. 1: Misc. 107. 1854.

Southern Mexico. Central America.

Plant up to 2 meters long; joints linear, green, 5 to 8 cm. broad, coarsely serrate, stiff; tube of flower 13 to 15 cm. long, slender, green, bearing a few distant scales 8 to 12 mm. long; outer perianth segments greenish pink, the inner white, narrow, acuminate, 6 to 8 cm. long; filaments white; style pink or red; stigma lobes yellow; fruit globose, 4 to 5 cm. in diameter; seeds black.

6. *Epiphyllum stenopetalum* (Först.) Britt. & Rose, Contr. U. S. Nat. Herb. 16: 259. 1913.

Phyllocactus stenopetalus Först. Handb. Cact. 441. 1846.

Oaxaca.

Described as with the habit of *Epiphyllum latifrons* but with different flowers, these delicately fragrant; flower tube 12 to 15 cm. long, bearing small spreading rose-colored scales; outer perianth segments rose-colored to reddish green, the inner white, elongate, linear (7 to 8 cm. long, 4 to 7 mm. broad), spreading or recurved; stamens somewhat exserted; style slender, pink or purplish; stigma lobes 12 to 14, yellow.

HYBRID SPECIES.

EPIPHYLLUM ACKERMANNII Haw. Phil. Mag. 6: 109. 1829.

Phyllocactus ackermannii Lindl. in Edwards, Bot. Reg. 16: pl. 1331. 1830. Mexico.

Branches weak, flat and thin, with crenate margins; areoles felted, often bristly or with weak spines, especially on the young growth; flowers day-blooming, very large, sometimes 15 to 20 cm. broad, crimson; inner perianth segments oblong, acute; filaments long, weak, declined; style more or less declined, pinkish; stigma lobes white; ovary more or less bristly.

This species is commonly grown in hothouses. It is believed to be of hybrid origin.

52. CHIAPASIA Britt. & Rose, Cactaceae 4: 203. 1923.

The genus consists of a single species.

1. *Chiapasla nelsonii* Britt. & Rose, Cactaceae 4: 203. 1923.

Epiphyllum nelsonii Britt. & Rose, Contr. U. S. Nat. Herb. 16: 257. 1913.

Phyllocactus nelsonii Vaupel, Monatsschr. Kakteenk. 23: 116. 1913.

Phyllocactus chiapensis Purpus, Monatsschr. Kakteenk. 28: 118. 1918.

Chiapas, the type from Chicharras.

Branches 60 to 120 cm. long, slender and terete below, flat and thin above, 3 to 4 cm. broad, the margin low, crenate; flowers light rose-red, the tube 2 to 3 cm. long, the segments about 6 cm. long, narrow, acute.

53. NOPALXOCHIA Britt. & Rose, Cactaceae 4: 204. 1923.

The genus consists of a single species.

1. *Nopalxochia phyllanthoides* (DC.) Britt. & Rose, Cactaceae 4: 205. 1923.

Cactus phyllanthoides DC. Cat. Hort. Monsp. 84. 1813.

Cactus speciosus Bonpl. Descr. Pl. Rar. 8. 1813. Not *C. speciosus* Cav. 1803.

Cactus elegans Link, Enum. Pl. 2: 25. 1822.

Epiphyllum phyllanthoides Sweet, Hort. Brit. 172. 1826.

Phyllocactus phyllanthoides Link, Handb. Gewächse. 2: 11. 1831.

Supposed to be a native of Mexico or Colombia, but known only from cultivated plants; commonly cultivated in Mexico.

Stems somewhat woody, branching, the branches terete at base, flattened and thin above, sometimes 5 cm. broad, green; margin of branches coarsely crenate; flowers diurnal, rose or red, the tube 2 cm. long; inner perianth segments oblong, more or less spreading; filaments and style elongate, slender; stigma lobes 5 to 7. "Nopalillo," "Marta."

54. RHIPSALIS Gaertn. Fruct. & Sem. 1: 137. 1788.

Plants sometimes growing in humus but usually epiphytic and hanging from trees, sometimes erect, sometimes clambering over rocks, more or less rooting or, when hanging, irregularly producing aerial roots; stems usually much branched (often heteromorphic), terete, angled, or much flattened and leaflike, very slender and threadlike or stout and stiff; leaves wanting or represented

by minute bracts; areoles borne along the margin of the flat-branched forms, along the ribs or scattered irregularly in the other forms, usually small, bearing hairs, wool, bristles and flowers; flowers usually solitary, small; perianth segments distinct, few, sometimes only 5, usually spreading, sometimes reflexed; filaments few or numerous, erect, slender, borne on the outer margin of the disk in one or two rows; stigma lobes 3 or more, usually slender, spreading; ovary small, sometimes depressed or sunken in the branch; fruit globular or oblong, sometimes angled when immature, but finally turgid, juicy, white or colored, usually naked.

Numerous other species occur in tropical America, mostly in South America.

Stems terete-----1. *R. cassutha*.
Stems flattened-----2. *R. purpusii*.

1. *Rhipsalis cassutha* Gaertn. Fruct. & Sem. 1: 137. 1788.

Eastern Mexico. West Indies and South America.

Epiphytic or saxicolous, usually growing on trunk or branches of large trees, hanging in large clusters, 1 to 4 meters long, the branches weak and pendent, when young bearing 5 to 9 white bristles at the areoles, when old naked, terete, sometimes producing aerial roots, often only 3 mm. in diameter, light green, usually growing from the tips of other branches, generally in pairs but sometimes in clusters of 6 or 8; flowers lateral, solitary, small, greenish in bud, sometimes subtended by a single bristle; petals 2 mm. long, cream-colored; ovary exserted; fruit naked, white, maturing a few days after flowering, globose, 5 mm. in diameter.

2. *Rhipsalis purpusii* Weingart, Monatsschr. Kakteenk. 28: 78. 1918.

Chiapas; type from Cerro de Boquerón.

Plant epiphytic; stems 8 mm. in diameter, woody, terete, brown; branches weak, elongate, terete below, flattened above, thin, remotely crenate; flowers small, white, solitary.

117. THYMELAEACEAE. Mezereum Family.

1. *DAPHNOPSIS* Mart. & Zucc. Nov. Gen. & Sp. 1: 65. 1824.

REFERENCE: Meisner in DC. Prodr. 15: 520-524. 1856.

Trees or shrubs; leaves alternate, entire, coriaceous, estipulate; flowers by abortion dioecious, umbellate or subracemose, axillary or terminal; perianth of staminate flower with a slender tube and 4 spreading lobes; stamens 8, 4 inserted on the perianth lobes and 4 in the throat, the anthers sessile; perianth of pistillate flower smaller, turbinate or urceolate; style short, the stigma capitate; fruit subglobose, 1-seeded, drupaceous, with thin pericarp.

Leaves variously pubescent beneath.

Leaves densely tomentose beneath with matted hairs-----1. *D. purpusii*.

Leaves covered beneath with straight stiff hairs-----2. *D. mollis*.

Leaves glabrous beneath, except sometimes when very young.

Leaves elliptic-lanceolate, broadest at or below the middle----3. *D. lindenii*.

Leaves obovate to linear-oblong, broadest above the middle.

Peduncles elongate, much longer than the flowers-----4. *D. bonplandii*.

Peduncles short, usually shorter than the combined flower and pedicel.

Leaves linear-oblong, 5 to 10 cm. long, 8 to 14 mm. wide.

5. *D. salicifolia*.

Leaves oblong-oblong, 3.5 to 7 cm. long, 10 to 20 mm. wide.

6. *D. cestrifolia*.

1. *Daphnopsis purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 89. 1910.

Known only from the type locality, Cerro de Paxtle, Puebla.

Shrub; leaves obovate or elliptic-oblong, 2 to 4 cm. long, 10 to 13 mm. wide, obtuse or subacute, coriaceous; peduncles 3 to 8 mm. long; perianth tube 8 mm. long, tomentulose, the lobes 2 mm. long; fruit 6 mm. long.

2. *Daphnopsis mollis* (Meisn.) Standl.

Daphnopsis bonplandii mollis Meisn. in DC. Prodr. 14: 521. 1856.

San Luis Potosí and Veracruz; type from Papantla, Veracruz.

Shrub, 0.6 to 1 meter high; leaves oval or elliptic, 5 to 9 cm. long, 2.5 to 3.5 cm. wide, acute or obtuse at base and apex, glabrous on the upper surface; peduncles longer than the flowers; perianth tube 6 mm. long, the lobes 3 mm. long; fruit globose, glabrous, nearly 1 cm. in diameter.

3. *Daphnopsis lindenii* Meisn. in DC. Prodr. 14: 522. 1856.

Type from Mirador, Veracruz, at 300 meters. Guatemala.

Leaves short-petiolate, obtuse or acute, reticulate-veined; peduncles slender, 12 to 16 mm. long, 6 to 10-flowered, the pedicels 4 to 5 mm. long; pistillate calyx 3 to 4 mm. long, tubular; ovary glabrous.

4. *Daphnopsis bonplandiana* (Kunth) Standl.

Daphne bonplandiana Kunth, Syn. Pl. Aequin. 1: 447. 1822.

Hargasseria mexicana C. A. Meyer, Bull. Acad. St. Pétersb. Phys. Math. 1: 358. 1843.

Hargasseria schiedeana Endl. Gen. Pl. Suppl. 4²: 66. 1847.

Daphnopsis bonplandii Meisn. in DC. Prodr. 14: 521. 1856.

Veracruz.

Tree; leaves oblong-obovate or oblanceolate, 7 to 13 cm. long, 2.5 to 3.5 cm. wide, obtuse or acute, coriaceous, attenuate at base; peduncles 1.5 to 3 cm. long, 8 to 16-flowered, the pedicels very short; staminate perianth 6 mm. long, densely sericeous.

5. *Daphnopsis salicifolia* (H. B. K.) Meisn. in DC. Prodr. 14: 522. 1856.

Daphne salicifolia H. B. K. Nov. Gen. & Sp. 2: 150. 1817.

Daphne maxicana Spreng. Syst. Veg. 2: 236. 1825.

Morelos, the type from Cuernavaca; reported from Veracruz.

Shrub or tree, 1.5 to 6 meters high, ill-scented; leaves obtuse or acute, attenuate at base, nearly sessile, coriaceous, yellowish green when dry; umbels 8 to 20-flowered, the pedicels very short; staminate perianth 4 mm. long; fruit ovoid, 12 mm. long. "Hoja de San Pedro."

Reported by Sessé and Mocino¹ as *Daphne laureola*. They state that the bark and leaves are acrid, drastic, and corrosive. It is reported that the leaves are employed for blistering, like a mustard plaster.

6. *Daphnopsis cestrifolia* (H. B. K.) Meisn. in DC. Prodr. 14: 523. 1856.

Daphne cestrifolia H. B. K. Nov. Gen. & Sp. 2: 150. 1817.

Veracruz and Puebla. Type from Colombia.

Shrub, 1 to 3 meters high; leaves usually thin, obtuse or acute, attenuate at base, short-petiolate; peduncles 6 to 10-flowered, the pedicels very short; perianth 5 mm. long, sericeous; fruit ovoid-globose, red.

This, like *D. bonplandiana*, is closely related to *D. salicifolia*. With the scant material available, it is impossible to determine how many of the species listed here are really valid.

¹ Pl. Nov. Hisp. 59. 1887.

118. LYTHRACEAE. Loosestrife Family.

REFERENCE: Koehne in Engl. Pflanzenreich IV. 216. 1903.

Trees, shrubs, or herbs; leaves opposite, whorled, or alternate, entire; stipules minute or none; flowers perfect, 4 to 16-parted, the pedicels usually bi-bracteolate; calyx tubular to campanulate, the lobes valvate, petals inserted in the throat of the calyx between the lobes; stamens inserted on the calyx tube; style simple or none, the stigma capitate; fruit capsular, dry.

Leaves black-dotted.....1. **ADENARIA**.

Leaves never black-dotted.

Calyx tubular, slightly curved or else spurred or gibbous at base.

2. **PARSONSIA**.

Calyx not tubular or, if so, neither curved nor gibbous at base.

Flowers 12 to 16-parted; calyx 3 cm. long.....3. **LAFOENSIA**.

Flowers 4 to 7-parted; calyx much less than 3 cm. long.

Calyx tubular.....4. **LYTHRUM**.

Calyx campanulate or broadly turbinate.

Stamens 8.....5. **LAWSONIA**.

Stamens 10 to 42.

Petals yellow; stamens 10 to 18.....6. **HEIMIA**.

Petals not yellow; stamens 28 to 42.

Petals on long slender claws, the blade cordate at base.

7. **LAGERSTROEMIA**.

Petals cuneate at base, not clawed.....8. **GINORIA**.

1. **ADENARIA** H. B. K. Nov. Gen. & Sp. 6: 185. 1823.

The following is the only species.

1. **Adenaria floribunda** H. B. K. Nov. Gen. & Sp. 6: 188. *pl.* 549. 1823.

Oaxaca. Central and South America.

Shrub or small tree, 1 to 6 meters high, covered everywhere with dotlike black glands; leaves opposite, nearly sessile, elliptic-lanceolate, 3 to 10 cm. long, acute or acuminate, puberulent beneath; flowers yellow, in short dense axillary cymes, 4 or 5-parted; calyx broadly turbinate, 3 to 4 mm. long, not appendaged; petals slightly exserted; stamens 7 to 12. "Chaparral" (Colombia); "guayabito" (Venezuela).

The sapwood is said to be light cream-colored or nearly white, the heartwood light yellow, turning darker or reddish on exposure, moderately soft and light, very fine-grained, and taking a good polish.

2. **PARSONSIA** Adans. Fam. Pl. 2: 234. 1763.

Shrubs or herbs; leaves opposite or ternate; flowers 6-parted, racemose or lateral, the pedicels axillary or interpetiolar; calyx tubular, often spurred at base; petals 6, 2, or none; stamens 11 or 9; ovary with a dorsal or cupuliform disk at base; fruit capsular, 1-celled, dehiscent along one side; seeds few or numerous.

Numerous herbaceous species occur in Mexico. Many of those listed below do not merit classification as shrubs, but others are truly woody. Some of the Brazilian species are reported to have sudorific, antisyphilitic, and diaphoretic properties. *P. petiolata* (L.) Rusby, of the United States, is said to resemble digitalis in its physiological action.

Bractlets none. Calyx 4 to 14 mm. long.

Two dorsal petals larger than the others-----1. *P. racemosa*.

Two dorsal petals smaller than the others.

The 9 ventral stamens alternately unequal, 5 of them often subexserted.

Disk cuplike, investing the base of the ovary.-----2. *P. gaumeri*.

Disk large and investing part of the ovary base, interrupted dorsally.

3. *P. ciliata*.

The 9 ventral stamens not alternately unequal, included.

Disk cupuliform-----4. *P. utriculosa*.

Disk dorsal-----5. *P. salicifolia*.

Bractlets present on the pedicel, sometimes very small.

Calyx 3 to 11 mm. long; ovules 2 to 32.

Flowers opposite-----6. *P. epilobiifolia*.

Flowers alternate.

Stamens in anthesis nearly or quite as long as the calyx.

7. *P. hyssopifolia*.

Stamens much shorter than the calyx-----8. *P. calophylla*.

Calyx 12 to 40 mm. long or, if smaller, bialate within dorsally or the dorsal lobe produced; ovules sometimes as many as 50.

Calyx evidently bialate within, 10 to 24 mm. long, the spur usually sub-ascending, rarely incurved.

Two interior wings of the calyx retrorse-hairy; petals 2.

Petals about 10 mm. long, dark purple; spur of calyx incurved.

9. *P. nitidula*.

Petals 2 to 3.5 mm. long, violet-black; spur straight or subascend-
ing-----10. *P. cyanea*.

Two interior wings of calyx glabrous; petals usually 6, rarely 2.

Pedicels axillary; petioles up to 17 mm. long-----11. *P. nudicostata*.

Pedicels interpetiolar; petioles less than 12 mm. long.

Leaves 10 to 12 mm. long, glabrous on the upper surface.

12. *P. empetrifolia*.

Leaves mostly more than 2 cm. long, usually scabrous or pubescent
on the upper surface.

Ventral petals about half as long as the 2 dorsal ones.

13. *P. pinetorum*.

Ventral petals 3 mm. long or less, or absent, much less than half
as long as the dorsal petals.

Flowers not in distinct racemes, the pedicels interpetiolar.

14. *P. chiapensis*.

Flowers in distinct racemes.

Branches glandular-hirsute; petioles 1 to 2 mm. long.

15. *P. ixodes*.

Branches retrorse-scabrous or puberulent, glandular-hirtellous
only in the inflorescence; petioles usually 8 to 12 mm.
long-----16. *P. hookeriana*.

Calyx not bialate within, sometimes slightly bicostate.

Dorsal lobe of the calyx large, produced; calyx usually violet or purplish,
never scarlet. Petals usually 6.

Scales absent below the petals.

Petals 2-----17. *P. llavea*.

Petals 6.

Calyx 25 to 28 mm. long-----18. *P. blepharophylla*.

Calyx 15 to 20 mm. long.

Calyx hirsute with eglandular hairs-----19. *P. bilimekii*.

Calyx minutely glandular-hirtellous-----20. *P. goldmani*.

- Scale present below each dorsal petal.
- Four ventral petals very obtuse at base and apex; longer stamens equaling the calyx lobes-----21. *P. arnottiana*.
- Four ventral petals cuneate at base, acute or obtuse at apex; longer stamens slightly exceeding the calyx lobes.
- Leaves rounded or subcordate at base; pedicels mostly 2 to 4 mm. long-----22. *P. lobophora*.
- Leaves acute or obtuse at base; pedicels mostly 5 to 10 mm. long-----23. *P. squamuligera*.
- Dorsal lobe of the calyx not produced or, if so, the calyx scarlet.
- Calyx slender or very slender, the dorsal lobe usually broad but shorter than the others, the mouth of the calyx oblique.
- Petals 6, subequal-----24. *P. aequipetala*.
- Petals 2, or 6 but very unequal.
- Stamens 9; ovules 12 to 23; spur of calyx strongly incurved.
25. *P. bustamanta*.
- Stamens 11; ovules 3 to 11; spur obsolete or, if evident, never incurved.
- Flowers solitary, not racemose-----26. *P. appendiculata*.
- Flowers in evident terminal racemes.
- Calyx spurred at base-----27. *P. roseana*.
- Calyx not spurred, merely gibbous at base.
- Calyx glabrous within at base.
- Leaves setose-hirsute on the upper surface.
28. *P. megalophylla*.
- Leaves merely scaberulous on the upper surface.
29. *P. cristata*.
- Calyx hairy within at base.
- Appendages of calyx shorter than the lobes; calyx hirtellous-----30. *P. graciliflora*.
- Appendages longer than the lobes; calyx minutely strigillose-----31. *P. boissieriana*.
- Calyx thick and stout, convex dorsally, the lobes usually very short or none.
- Ovules 48 to 100.
- Petals included-----32. *P. micropetala*.
- Petals, at least the 2 dorsal ones, exserted, nearly half as long as the calyx-----33. *P. heteropetala*.
- Ovules 4 to 26.
- Appendages of the calyx longer than the lobes, bulbous-ciliate at base.
- Ovules 8; stems not hirsute-----34. *P. schumannii*.
- Ovules 4; stems hirsute-----35. *P. bracteolosa*.
- Appendages obsolete or shorter than the lobes or, if longer, never bulbous-ciliate.
- Calyx lobes eciliate-----36. *P. baillonis*.
- Calyx lobes ciliate.
- Petals evident, 2 mm. long or much longer.
- Petals, at least the 4 ventral ones, very small.
- Petals very unequal, the 2 dorsal ones about half as long as the calyx, the 4 ventral ones half as long and much narrower-----37. *P. heterophylla*.
- Petals subequal, about 2 mm. long-----38. *P. jorullensis*.

Petals all large and of equal length, the ventral ones narrower than the dorsal.

Dorsal petals rounded-obovate; ovules about 15; leaves opposite-----39. *P. intermedia*.

Dorsal petals narrowly obovate; ovules 5; leaves ternate or scattered-----40. *P. retroscabra*.

Petals none or minute and subulate.

Spur of the calyx very short, not compressed at base.

41. *P. watsoniana*.

Spur orbicular, compressed at base.

Inflorescence distinctly racemose, the flowers fasciculate.

Axis of the inflorescence pubescent and often sparsely hispidulous; petals 6-----42. *P. subuligera*.

Axis of the inflorescence densely glandular-hirtellous; petals none-----43. *P. caeciliae*.

Inflorescence leafy, the flowers solitary in the axils.

Plant glabrous-----44. *P. ignea*.

Plant hirtellous or hispidulous---45. *P. liebmanni*.

1. *Parsonsia racemosa* (L. f.) Standl.

Lythrum racemosum L. f. Suppl. Pl. 250. 1781.

Cuphea spicata Cav. Icon. Pl. 4: 56. pl. 381. 1797.

Cuphea racemosa Spreng. Syst. Veg. 2: 455. 1825.

Veracruz and Oaxaca. West Indies and South America.

Plants herbaceous or suffrutescent, viscid, hirsute; leaves ovate or ovate-elliptic, 2 to 5 cm. long, acute or obtuse; flowers in naked racemes, the pedicels 3 to 6 mm. long; calyx 5.5 to 10 mm. long, short-hirtellous; petals pink, about half as long as the calyx. "Hierba del fraile" (Colombia).

2. *Parsonsia gaumeri* (Koehne) Standl.

Cuphea gaumeri Koehne, Bot. Jahrb. Engler 29: 154. 1900.

Yucatán; type from Buena Vista Xbac.

Stems herbaceous or suffrutescent, glandular-pubescent; leaves subsessile, oblong to elliptic, 1 to 2 cm. long, obtuse or acute, obscurely ciliolate; flowers chiefly axillary, the pedicels 3 to 5 mm. long; calyx 6.5 mm. long, hirtellous on the nerves.

Reported by Millspaugh¹ as *Cuphea trinitatis* DC.

3. *Parsonsia ciliata* (Swartz) Standl.

Lythrum ciliatum Swartz, Prodr. Veg. Ind. Occ. 76. 1788.

Cuphea decandra Ait. Hort. Kew. ed. 2. 3: 151. 1811.

Cuphea ciliata Koehne, Bot. Jahrb. Engler 1: 454. 1881.

Cuphea purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 378. 1913.

Veracruz. Cuba, Haiti, and Colombia.

Slender shrub, much branched; petioles 1 to 3 mm. long; leaves oblong, obovate, or ovate, 1.5 to 5 cm. long, cuneate or attenuate at base, acute or obtuse at apex, glandular-ciliate; flowers racemose, the pedicels 2 to 5 mm. long; calyx green, 7 to 11 mm. long, glandular-hirtellous; petals purple, the ventral ones 4 to 5.5 mm. long.

4. *Parsonsia utriculosa* (Koehne) Standl.

Cuphea utriculosa Koehne in Mart. Fl. Bras. 13²: 452. 1877.

Tepic to Chiapas and Tabasco. Central America.

Slender shrub, the stems glandular-hirtellous or glabrate; leaves sessile or subsessile, 1 to 3.5 cm. long, oblong-lanceolate to linear, glabrous but often

¹Field Mus. Bot. 1: 311. 1896.

ciliate; racemes leafy, the pedicels 5 to 12 mm. long; calyx 4 to 7 mm. long, green, glabrous; petals pink or purple, the ventral ones 3 to 4 mm. long.

Specimens from Tepic are noteworthy because of their broad leaves, and may represent a distinct species.

5. *Parsonsia salicifolia* (Schlecht. & Cham.) Standl.

Cuphea salicifolia Schlecht. & Cham. *Linnaea* 5: 569. 1830.

In wet soil, Veracruz and Oaxaca; type collected near Misantla and Papantla, Veracruz.

Slender shrub, 1 meter high or less, glabrous; leaves oblanceolate or linear-oblanceolate, 3 to 12 cm. long, obtuse, attenuate at base; flowers in slender racemes, the pedicels 5 to 11 mm. long; calyx green, 6 to 9 mm. long; petals purple, the ventral ones 4 to 5 mm. long. "Xoniguilli."

6. *Parsonsia epilobiifolia* (Koehne) Standl.

Cuphea epilobiifolia Koehne in Mart. Fl. Bras. 13²: 223. 1877.

Oaxaca. Costa Rica and Venezuela.

Shrub, 1.3 meters high or less, the branches canescent-puberulent; leaves subsessile, narrowly lanceolate, 4.5 to 9 cm. long, attenuate to each end, strigillose or glabrate beneath, pale; racemes long and slender, the pedicels 2 to 5 mm. long; calyx green, 6 to 9 mm. long, canescent-hirtellous; petals purple.

7. *Parsonsia hyssopifolia* (H. B. K.) Standl.

Cuphea hyssopifolia H. B. K. Nov. Gen. & Sp. 6: 199. 1823.

Sinaloa to San Luis Potosí, Veracruz, Tabasco, and Chiapas; type from Jalapa, Veracruz. Guatemala.

Slender shrub, 30 to 60 cm. high, often much branched, the branches appressed-hispidulous, densely leafy; leaves subsessile, linear to lanceolate or oblong, 1 to 3 cm. long, glabrous or nearly so; flowers axillary, the pedicels 3 to 7 mm. long; calyx green, 5.5 to 8 mm. long, glabrous or aculeolate-hispidulous; petals purple, pink, or white.

8. *Parsonsia calophylla* (Cham. & Schlecht.) Standl.

Cuphea calophylla Cham. & Schlecht. *Linnaea* 2: 361. 1827.

Cuphea orthodisca Koehne in Mart. Fl. Bras. 13²: 224. 1877.

Oaxaca. Central America to Brazil.

Plants 30 to 100 cm. high, woody at base, the stems hispid or pilose; leaves subsessile, 1 to 5 cm. long, oblong, oblanceolate, or obovate, obtuse, ciliate and hispidulous; racemes leafy, the pedicels 2 to 6 mm. long; calyx green, 6 mm. long, viscid-hirtellous.

The Mexican form is *Cuphea calophylla orthodisca* Koehne.¹

9. *Parsonsia nitidula* (H. B. K.) Standl.

Cuphea nitidula H. B. K. Nov. Gen. & Sp. 6: 162. 1823.

Veracruz; type from Jalapa.

Shrub, sometimes 4.5 meters high; petioles 1 to 9 mm. long; leaves lanceolate to broadly ovate, 2 to 10 cm. long, acute or acuminate, obtuse to subcordate at base, strigose or hirtellous beneath; inflorescence leafy, the pedicels 5 to 13 mm. long; calyx 15 to 24 mm. long, green or purplish; petals purple.

10. *Parsonsia cyanea* (DC.) Standl.

Cuphea cyanea DC. Prodr. 3: 85. 1828.

Cuphea coccinea DC. Prodr. 3: 85. 1828.

Cuphea pubiflora Benth. Pl. Hartw. 61. 1840.

¹ Bot. Jahrb. Engler 2: 138. 1881.

Cuphea strigulosa Lemaire, Fl. Gewächshäus. 1: 87. 1845.

Cuphea strigillosa Lindl. Bot. Reg. 32: pl. 4. 1846.

Coahuila to Guerrero, Chiapas, and Veracruz.

Plants suffrutescent at base, sometimes 2 meters high, the branches pubescent and glandular-hirtellous or glabrate; petioles 5 to 30 mm. long; leaves ovate or broadly ovate, 1.5 to 9 cm. long, acute or acuminate, rounded at base, strigulose or sparsely pilosulous; racemes often naked and paniculate, the pedicels 2.5 to 10 mm. long; calyx 16 to 23 mm. long, viscid-hirtellous, red, yellow, and green.

This species has been introduced into cultivation in Europe and the United States.

11. *Parsonsia nudicostata* (Hemsl.) Standl.

Cuphea nudicostata Hemsl. Diag. Pl. Mex. 52. 1880.

Known only from the type locality, "Ciudad Real."

Stems covered with long purple glandular-setose hairs; leaves lance-oblong, 5.5 to 7.5 cm. long, acute, strigose and hispidulous; calyx 25 mm. long, glandular-pilose; 2 dorsal petals 10 to 13 mm. long.

12. *Parsonsia empetrifolia* (Rose) Standl.

Cuphea empetrifolia Rose, Contr. U. S. Nat. Herb. 5: 137. 1897.

Known only from the type locality, Chilpancingo, Guerrero, altitude 2,650 to 3,000 meters.

Slender shrub, the branches puberulent or hirtellous; leaves subsessile, linear or oblong, obtuse or acute, lustrous above; flowers in distinct racemes; calyx 15 mm. long, purplish, glandular-hispidulous; petals purple, the 2 dorsal ones 8 mm. long.

13. *Parsonsia pinetorum* (Benth.) Standl.

Cuphea pinetorum Benth. Pl. Hartw. 74. 1841.

Veracruz and Chiapas. Guatemala; type from San Ramón.

Slender shrub, the branches puberulent-scabrous; leaves subsessile, lanceolate, 2.5 to 7 cm. long, attenuate, obtuse to subcordate at base, scabrous; racemes leafy, the pedicels 4 to 7 mm. long; calyx 17 to 20 mm. long, viscid-hirtellous, not colored; petals black-purple.

14. *Parsonsia chiapensis* (T. S. Brandeg.) Standl.

Cuphea chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 187. 1915.

Known only from the type locality, Cerro del Boquerón, Chiapas.

Shrub, the branches viscid-hirtellous; petioles 7 to 15 mm. long; leaves ovate, 2 to 5.5 cm. long, acuminate, rounded at base, scabrous; calyx about 23 mm. long, hirtellous; 2 dorsal petals 12 mm. long, red.

15. *Parsonsia ixodes* (Hemsl.) Standl.

Cuphea ixodes Hemsl. Diag. Pl. Mex. 52. 1880.

Described from southern Mexico, the locality not known.

Petioles 1 to 2 mm. long; leaves ovate-lanceolate, 2.5 to 5 cm. long, scabrous and hirtellous; pedicels 6 to 10 mm. long; calyx 20 to 25 mm. long, glandular-hispidulous; 2 dorsal petals 8 to 9 mm. long.

16. *Parsonsia hookeriana* (Walp.) Standl.

Cuphea floribunda Hook. & Arn. Bot. Beechey Voy. 289. 1841. Not *C.*

floribunda Lehm. 1831.

Cuphea hookeriana Walp. Repert. Bot. 2: 107. 1843.

Cuphea cinnabarina Planch. Fl. Serr. Jard. 5: pl. 527. 1849.

Cuphea roezlii Carrière, Rev. Hort. 1877: 469. 1877.

Cuphea pringlei S. Wats. Proc. Amer. Acad. 25: 149. 1890.

Sinaloa to Veracruz and Chiapas; type collected between San Blas and Tepic. Guatemala and Nicaragua.

Plants usually shrubby, sometimes 2 meters high; leaves lanceolate or ovate, 2 to 11 cm. long, acuminate; pedicels 2 to 9 mm. long; calyx 10 to 22 mm. long, bright red, viscid-pubescent; petals purple.

17. *Parsonsia llavea* (Lex.) Standl.

Cuphea llavea Lex.; Llave & Lex. Nov. Veg. Descr. 1: 20. 1824.

Cuphea barbigera Hook. & Arn. Bot. Beechey Voy. 289. 1841.

Cuphea miniata Brongn. in Van Houtte, Fl. Gewächshäus. 2: pl. 9. 1846.

Chihuahua to Sinaloa, Zacatecas, and Oaxaca.

Shrub, the branches strigose or hirtellous; leaves subsessile, lanceolate or ovate, 2 to 8 cm. long, acute or acuminate, obtuse to subcordate at base, scabrous; pedicels 2 to 4 mm. long, the racemes leafy; calyx 20 to 40 mm. long, green or purplish, grayish-hirsute; petals bright red. "Hierba de San Pedro" (Koehne).

Forms of this species are frequently cultivated, and hybrids between this and other species have been produced in European gardens.

18. *Parsonsia blepharophylla* Blake, Proc. Biol. Soc. Washington 32: 190. 1919.

Known only from the type locality, between Ixtagua and Agua Fría, Sinaloa.

Leaves short-petiolate, lanceolate to oblong-ovate, 2 to 4 cm. long or larger, acute, or acuminate, rounded or obtuse at base, very scabrous; calyx hirsute with eglandular hairs, purplish; petals bright red.

19. *Parsonsia bilimekii* (Koehne) Standl.

Cuphea bilimekii Koehne in Engl. Pflanzenreich IV. 216: 155. 1903.

Known only from the type locality, Orizaba, Veracruz.

Branches pubescent and hirsute; leaves subsessile, ovate-oblong, 2 to 3 cm. long, acute, rounded at base; racemes short, leafy, the pedicels 2 to 3 mm. long; calyx purplish; petals purple.

20. *Parsonsia goldmanii* (Rose) Standl.

Cuphea goldmanii Rose, Contr. U. S. Nat. Herb. 12: 287. f. 28. 1909.

Known only from the type locality, Comitán, Chiapas.

Shrub, 1 to 2 meters high; leaves elliptic or oval-ovate, 2 to 4 cm. long, obtuse or subacute, rounded at base, scabrous above, hirtellous beneath, short-petiolate; calyx green; petals dark red.

21. *Parsonsia arnottiana* Standl.

Cuphea bracteata Hook. & Arn. Bot. Beechey Voy. 289. 1841. Not *C. bracteata* Lag. 1814.

Jalisco and Tepic; type from San Blas and Tepic.

Leaves subsessile, oblong or ovate, 10 to 15 mm. long, acute, strigose-hirtellous; pedicels 4 mm. long; calyx 10 to 12 mm. long, short-hirtellous and setulose; dorsal petals 7 mm. long, purple.

22. *Parsonsia lobophora* (Koehne) Standl.

Cuphea lobophora Koehne in Mart. Fl. Bras. 13²: 235. 1877.

Sinaloa and Jalisco to Morelos and Oaxaca; type from Oaxaca.

Plants woody at base, 60 cm. high or less; leaves sessile, linear to oblong ovate, 2 to 5 cm. long, acute; calyx green or purplish, hirtellous or scabrous.

23. *Parsonsia squamuligera* (Koehne) Standl.

Cuphea squamuligera Koehne in Mart. Fl. Bras. 13²: 235. 1877.

Guerrero, Michoacán, Morelos, and Mexico; type from Morelia, Michoacán.

Plants usually suffrutescent at base; leaves subsessile, lanceolate or oblong-ovate, 2 to 5 cm. long, acute; calyx green or purplish, hirtellous or scabrous.

24. *Parsonsia aequipetala* (Cav.) Standl.

Cuphea aequipetala Cav. Icon. Pl. 4: 57. pl. 382, f. 2. 1797.

Cuphea bracteata Lag. Nov. Gen. & Sp. 16. 1814.

Cuphea scabrida H. B. K. Nov. Gen. & Sp. 6: 203. 1823.

Cuphea apanxaloe DC. Prodr. 3: 88. 1828.

Cuphea floribunda Lehm. Linnaea 6: Lit. 11. 1831.

Cuphea violacea Regel, Flora 33: 354. 1850.

Cuphea ocymoides Decaisne, Journ. d'Hort. 3: pl. 3. 1859.

Coahuila to Michoacán, Chiapas, and Veracruz. Guatemala.

Plants a meter high or less, herbaceous or suffrutescent; petioles 5 mm. long or less; leaves lanceolate or ovate, 2 to 5 cm. long, acute, acute to rounded at base, glabrous or hispidulous beneath; inflorescence leafy, the pedicels 1 to 5 mm. long; calyx 13 to 23 mm. long, purplish; petals violet or purple. "Apancholoa" (Veracruz).

25. *Parsonsia bustamanta* (Llave & Lex.) Standl.

Cuphea bustamanta Llave & Lex. Nov. Veg. Descr. 1: 21. 1824.

Cuphea platycentra Benth. Pl. Hartw. 7. 1839.

Michoacán to Mexico, Morelos, and Oaxaca; type from Morelia, Michoacán.

Stems herbaceous or suffrutescent, strigose-puberulent; petioles 4 to 10 mm. long; leaves ovate or rounded-ovate, 2 to 5 cm. long, scaberulous or hispidulous; calyx 22 to 25 mm. long, red, puberulent or hispidulous; petals yellow, or the dorsal ones purple.

26. *Parsonsia appendiculata* (Benth.) Standl.

Cuphea appendiculata Benth. Pl. Hartw. 61. 1840.

Oaxaca and Chiapas; type from Juquila, Oaxaca.

Shrub, 2 meters high or less, the branches hispidulous; leaves lance-elliptic, 5 to 12 cm. long, acuminate, attenuate at base to a short petiole, hispidulous beneath along the nerves; calyx 25 to 33 mm. long, green, strigillose; petals red-purple, 5 to 9 mm. long.

27. *Parsonsia roseana* (Koehne) Standl.

Cuphea trichopetala Rose, Contr. U. S. Nat. Herb. 9: 261. 1900. Not *C. trichopetala* Rusby & Koehne, 1896.

Cuphea roseana Koehne, Bot. Jahrb. Engler 29: 261. 1900.

Known only from the type locality, near Colomas, Sinaloa.

Stems suffrutescent at base, puberulent or glabrous; leaves sessile, oblong-obovate, 5 to 14 cm. long, acute or acuminate, narrowed to the clasping base, densely scaberulous beneath; calyx 16 to 23 mm. long, green, setose-hirsute; dorsal petals dark purple-red, 7 mm. long, the ventral petals filiform, spirally contorted above.

28. *Parsonsia megalophylla* (Blake) Standl.

Cuphea megalophylla Blake, Contr. Gray Herb. n. ser. 53: 63. 1918.

Known only from the type locality, Cafetal Concordia, Pochutla, Oaxaca, altitude 500 meters.

Stems densely hispidulous and setose-pilose; leaves oval, 10 to 14 cm. long, acuminate, cuneate-acuminate at base, minutely tuberculate-hispidulous beneath; calyx 27 mm. long, greenish, setose-pilose with purple hairs.

29. *Parsonsia cristata* (Rose) Standl.

Cuphea cristata Rose, Contr. U. S. Nat. Herb. 5: 196. pl. 23. 1899.

Tepic and Michoacán or Guerrero; type collected between Tepic and Pedro Paulo.

Stems suffrutescent at base, strigillose; leaves petiolate, elliptic or elliptic-lanceolate, 7 to 12 cm. long, acuminate, abruptly attenuate at base, scaberulous beneath; calyx about 30 mm. long, red and green, setose-hirsute; petals red, narrowly oblong.

30. *Parsonsia graciliflora* (Koehne) Standl.

Cuphea graciliflora Koehne in Mart. Fl. Bras. 13²: 236. 1877.

Veracruz, Oaxaca, and Chiapas.

Plants usually suffrutescent, the stems densely hispid or hirsute; leaves petiolate or subsessile, ovate or elliptic, 4 to 18 cm. long, acute or acuminate, acute or obtuse at base, thick, hispidulous beneath; inflorescence racemose-paniculate, many-flowered; calyx 24 to 30 mm. long, hirtellous or hirsute, green or purplish; petals bright red.

31. *Parsonsia boissieriana* (Koehne) Standl.

Cuphea boissieriana Koehne, Bot. Jahrb. Engler 7: 42. 1885.

Type from Mexico, the locality not known.

Branches strigillose-scabrous and sparsely pilose; leaves sessile, lanceolate, 3.5 to 7 cm. long, scaberulous; pedicels 1 to 2 mm. long; calyx 25 mm. long, red.

32. *Parsonsia micropetala* (H. B. K.) Standl.

Cuphea micropetala H. B. K. Nov. Gen. & Sp. 6: 209. pl. 551. 1823.

Cuphea eminens Planch. & Lind. Fl. Serres 10: pl. 99 $\frac{1}{4}$. 1854.

Collima to Morelos and Oaxaca; type from Guanajuato.

Plants shrubby or herbaceous, 1 meter high or less, the stems puberulent and sometimes hirtellous; petioles 10 mm. long or less; leaves oblong-lanceolate or narrowly lanceolate, 5 to 16 cm. long, attenuate at each end, scaberulous; calyx 20 to 35 mm. long, red and yellow; stamens often exserted.

33. *Parsonsia heteropetala* (Koehne) Standl.

Cuphea heteropetala Koehne in Mart. Fl. Bras. 13²: 232. 1877.

Oaxaca.

Branches glandular-hirtellous or hispidulous; leaves petiolate or subsessile, lanceolate or linear-lanceolate, glabrous, 2.5 to 10 cm. long; pedicels 7 to 11 mm. long; calyx 21 to 25 mm. long, glandular-hirtellous.

34. *Parsonsia schumannii* (Koehne) Standl.

Cuphea schumannii Koehne, Bot. Jahrb. Engler 29: 160. 1900.

Type from Córdoba, Veracruz.

Stems biserially glandular-setose; petioles 15 mm. long or less; leaves 7.5 to 9.5 cm. long, acute, acute to subcordate at base, scabrous above; pedicels 3 mm. long or less; calyx 23 to 25 mm. long, red.

35. *Parsonsia bracteolosa* (Koehne) Standl.

Cuphea bracteolosa Koehne, Bot. Jahrb. Engler 41: 95. 1907.

Known only from the type locality, La Tuveria, Michoacán or Guerrero, altitude 900 meters.

Stems suffrutescent, 60 cm. high, strigose and hirsute; leaves ternate, subsessile, lanceolate, 3 to 6 cm. long, acuminate, rounded at base, glabrous beneath, scabrous above; pedicels axillary, 4 to 7 mm. long; calyx about 20 mm. long, red, hirsute; petals black-purple, 3 mm. long.

36. *Parsonsia baillonis* (Koehne) Standl.*Cuphea baillonis* Koehne, Bot. Jahrb. Engler 4: 401. 1833.

Type from Oaxaca.

Stems sparsely pubescent below; petioles 1 to 2 mm. long; leaves opposite, 3.5 to 5 cm. long, acute, rounded or obtuse at base, scabrous above, glabrous beneath; racemes leafy, the pedicels 8 to 10 mm. long; calyx 20 to 22 mm. long, red.

37. *Parsonsia heterophylla* (Benth.) Standl.*Cuphea heterophylla* Benth. Pl. Hartw. 37. 1840.*Cuphea terna* Peyritsch, Linnaea 30: 71. 1857.*Cuphea propinqua* Hemsl. Diag. Pl. Mex. 53. 1880.

Michoacán to Mexico, Morelos, and Oaxaca; perhaps also in Tepic; type from Morelia, Michoacán.

Stems herbaceous or suffrutescent, 60 cm. high or less, hirsute, pubescent, or glabrous; petioles 3 mm. long or less; leaves mostly ternate, ovate to oblong-lanceolate, 3 to 10 cm. long, scabrous; racemes distinct, leafy or nearly naked, the pedicels 4 to 20 mm. long; calyx 15 to 25 mm. long, purplish or reddish, puberulent or short-hirsute; petals red. "Moradilla" (Koehne).

38. *Parsonsia jorullensis* (H. B. K.) Standl.*Cuphea jorullensis* H. B. K. Nov. Gen. & Sp. 6: 208. 1823.*Cuphea arvensis* Benth. Pl. Hartw. 37. 1840.*Cuphea viridostoma* S. Wats. Proc. Amer. Acad. 22: 412. 1887.*Cuphea mesochloa* Greene, Pittonia 1: 141. 1887.

Durango to Morelos and Oaxaca; type from Jorullo, Michoacán.

Stems herbaceous or suffrutescent, 80 cm. high or less, puberulent and hispidulous; petioles 1 to 5 mm. long; leaves mostly opposite, oblong, lanceolate, or ovate, 2 to 6 cm. long, obtuse or acute, very scabrous; flowers in distinct racemes, the pedicels 5 to 20 mm. long; calyx 20 to 28 mm. long, red and green; petals whitish.

39. *Parsonsia intermedia* (Hemsl.) Standl.*Cuphea intermedia* Hemsl. Diag. Pl. Mex. 52. 1880.

Type from Chiapas.

Stems puberulent when young; leaves short-petiolate, ovate-lanceolate or ovate, 3 to 4 cm. long, acute or obtuse, scabrous above and sparsely pilose, pubescent and scaberulous beneath; flowers solitary; calyx 25 mm. long, hirtellous-pubescent; petals purple or pink.

40. *Parsonsia retroscabra* (S. Wats.) Standl.*Cuphea retroscabra* S. Wats. Proc. Amer. Acad. 22: 413. 1887.

Jalisco, the type from Río Blanco.

Stems herbaceous or suffrutescent at base, hispidulous and retrorse-scabrous; leaves mostly ternate, oval to oblong-linear, 2 to 3 cm. long, obtuse or acute, scabrous; flowers in distinct racemes, the pedicels 6 to 20 mm. long; calyx about 16 mm. long, purplish, puberulent and hispidulous; petals pink.

41. *Parsonsia watsoniana* (Koehne) Standl.*Cuphea watsoniana* Koehne, Bot. Jahrb. Engler 23: Beibl. 57: 29. 1897.

Known only from the type locality, Lake Chapala, Jalisco.

Stems suffrutescent, scaberulous and hispid; petioles 2 to 5 mm. long; leaves ovate-lanceolate or oblong-lanceolate, 3 to 6.5 cm. long, acute, very scabrous; flowers lateral, the pedicels 4 to 7 mm. long; calyx 25 to 30 mm. long, red.

42. *Parsonsia subuligera* (Koehne) Standl.*Cuphea subuligera* Koehne in Mart. Fl. Bras. 13²: 231. 1877.*Cuphea dodecandra* Hemsl. Diag. Pl. Mex. 51. 1880.

Puebla and Chiapas.

Stems suffrutescent, glabrous; leaves short-petiolate, lance-ovate to oblong-lanceolate, 4 to 10 cm. long, long-acuminate, glabrous and smooth; flowers in distinct racemes, the pedicels 3 to 11 mm. long; calyx 23 to 28 mm. long, pink or purple, glabrate.

43. *Parsonsia caeciliae* (Koehne) Standl.*Cuphea caeciliae* Koehne, Bull. Herb. Boiss. 7: 564. 1899.

Known only from the type locality, Rfo Saconeja, Chiapas.

Similar to *P. subuligera*; leaves wider; calyx 20 to 30 mm. long, purple-red, densely glandular-hirtellous.

44. *Parsonsia ignea* (A. DC.) Standl.*Cuphea platycentra* Lem. Fl. Gewächshäus. 2: pl. 180. 1846. Not *C. platycentra* Benth. 1839.*Cuphea ignea* A. DC. Fl. Serr. Jard. 3: 500C. 1849.

Veracruz, Oaxaca, and Chiapas. Jamaica.

Stems suffrutescent 1 meter high or less, glabrous; leaves short-petiolate, lanceolate or ovate, 2 to 8.5 cm. long, acuminate, glabrous; pedicels 5 to 20 mm. long; calyx 18 to 25 mm. long, bright red.

45. *Parsonsia liebmannii* (Koehne) Standl.*Cuphea liebmannii* Koehne in Mart. Fl. Bras. 13²: 231. 1877.

Type from Tolontepec.

Similar to *P. ignea*; stem, leaves, and calyx pilose with spreading hairs; calyx 17 mm. long.

3. *LAFOENSIA* Vand. Fl. Lusit. Bras. 33. 1788.

The other species are natives of South America.

1. *Lafoensia punicaefolia* DC. Mém. Soc. Phys. Hist. Nat. Genève 3²: 86. pl. 1. 1826.

Guerrero and Oaxaca, at altitudes of 300 to 450 meters. Central America to Bolivia and Venezuela; type from Santa Marta, Colombia.

Tree, 16 meters high or less, the bark dark brown; leaves opposite, short-petiolate, oblong-lanceolate, 5 to 11 cm. long, obtuse-acuminate, glabrous, with a conspicuous pore beneath just below the apex; flowers racemose or subpaniculate, 12 to 16-parted; calyx campanulate, 3 cm. long, very thick and leathery; petals 3 to 3.5 cm. long, pale yellow, turning red in age; stamens several times as long as the calyx, the filaments red; fruit an ovoid capsule, 3 cm. long or larger; wood rather hard, heavy, strong, tough, fine-grained, taking a good polish, the sapwood pale yellow, the heartwood slightly darker. "Coquito" (Oaxaca); "moreno" (Guerrero); "palo culebra," "palo de culebra" (Guatemala); "amarillo" (Panama); "trompillo," "cuyapo" (El Salvador).

A fine yellow dye is obtained from the tree in Guerrero and Panama. In El Salvador it is often planted for shade.

4. *LYTHRUM* L. Sp. Pl. 446. 1753.

Plants herbaceous or sometimes frutescent, slender, glabrous, growing in wet soil; leaves opposite in the species here listed, sometimes alternate, narrow; flowers axillary, solitary, 4 to 6-parted; calyx tubular, with small appendages; petals white, pink, or purple; capsule bivalvate.

Several herbaceous species occur in Mexico. The two listed here scarcely deserve mention, but they are usually somewhat woody at base.

Leaves short-petiolate, obtuse or rounded at base-----1. *L. acinifolium*.

Leaves, at least the upper ones, sessile and cordate at base----2. *L. gracile*.

1. *Lythrum acinifolium* Koehne, Bot. Jahrb. Engler 1: 322. 1881.

Durango to San Luis Potosí, Veracruz, Puebla, and Chiapas. Guatemala and Chile.

Plants very slender, much branched, sometimes 2 meters high, the stems brown, with exfoliating bark; leaves oblong to elliptic-ovate, 5 to 30 mm. long, obtuse; calyx 4 to 6 mm. long; petals purple or white.

2. *Lythrum gracile* Benth. Pl. Hartw. 7. 1839.

Nuevo León to Jalisco and Veracruz; type from Zacatecas.

Plants usually less than 60 cm. high, much branched; leaves cordate-oblong or ovate, 5 to 13 mm. long, acute or obtuse; calyx 4 to 5 mm. long.

5. *LAWSONIA* L. Sp. Pl. 349. 1753.

The genus consists of a single species.

1. *Lawsonia inermis* L. Sp. Pl. 349. 1753.

Lawsonia alba Lam. Encycl. 3: 106. 1789.

Cultivated in many parts of Mexico, and in places growing without cultivation. Native probably of Africa and Asia, but commonly cultivated in most tropical and subtropical regions.

Shrub or tree, 2 to 6 meters high, glabrous, the branchlets often spinelike; leaves opposite, oblong or obovate, 1 to 2.5 cm. long, mucronate-acuminate, narrowed at base; flowers 4-parted, in large open terminal panicles, sweet-scented; calyx broadly turbinate, 3 to 5 mm. long; petals yellow, reniform, nearly sessile; stamens 8; fruit globose, 2 to 4-celled, indehiscent. "Reseda" (Sinaloa, Tamaulipas, El Salvador, Nicaragua, Costa Rica, Colombia, Porto Rico); "cinamomo" (Philippines).

The henna plant is cultivated in tropical America for its sweet-scented flowers. It grows readily from cuttings and makes a good hedge plant, somewhat resembling privet. The odor of the flowers is strong and resembles that of mignonette. The leaves of henna are much used in the Orient for staining the nails, hands, and feet yellow, and also for dyeing the hair and beard. A paste of the leaves applied to the hair or beard soon produces a bright red color, which is considered becoming among certain classes of Mohammedans. Frequently, however, an indigo paste is next applied, and this turns the hair jet black. The tails and manes of horses are sometimes colored red in the same way. From the flowers is obtained a perfume which becomes an ingredient of oils and ointments, and was employed by the Egyptians in embalming; also by the Jews in baths and in religious ceremonies (it is the "camphire" of Solomon). The plant yields a dull red dye for cloth. The fruit is reputed to have emmenagogue properties and the leaves are used internally and externally for jaundice, leprosy, and various cutaneous affections.

6. *HEIMIA* Link, Enum. Pl. 2: 3. 1822.

Only one other species is known, a native of South America.

1. *Heimia salicifolia* (H. B. K.) Link, Enum. Pl. 2: 3. 1822.

Nesaea salicifolia H. B. K. Nov. Gen. & Sp. 6: 192. 1823.

Heimia syphilitica DC. Mém. Soc. Phys. Hist. Nat. Genève 3²: 12. 1826.

Nesaea syphilitica Steud. Flora 25: 474. 1842.

Along streams or in wet soil, Baja California to Coahuila, Veracruz, and Oaxaca. Western Texas, El Salvador, Jamaica, and South America.

Shrub, 0.5 to 3 meters high, glabrous; leaves mostly opposite, sessile, linear-lanceolate or lanceolate, 2 to 9 cm. long, acuminate; flowers yellow, inodorous, pedicellate, solitary in the axils; calyx campanulate, 5 to 9 mm. long, with hornlike appendages at base of lobes; petals 5 to 7, 12 to 17 mm. long; stamens 10 to 18. "Hauchinal," "hauchinol," "hauchinoli," "hachinal," "huauchinal," "hanchinol," "hanchinoli," "hanchinal," (Oaxaca, Morelos, Mexico, and elsewhere); "jarilla" (Oaxaca); "sinicuiche," "sinicuiche," "sinicuil" (Nuevo León, Jalisco); "granadillo" (*Urbina*); "escobilla del río" (Tamaulipas); "quiebra yugo," "quiebra arado" (Argentina, Uruguay).

The petals fall soon after the flowers open. The plant is much used locally in medicine, emetic, antisyphilitic, hemostatic, febrifuge, diuretic, laxative, vulnerary, sudorific, tonic and astringent properties being ascribed to it. It is employed most commonly for syphilitic affections. The leaves are said to contain 9 per cent of a bitter principle, nesine, and about 14 per cent of a resin, the latter being the active principle. If the juice or a decoction of the plant is taken internally it is said to produce a mild and pleasant intoxication, during which all objects seen appear to be yellow. Palmer reports that in Tamaulipas a decoction of the plant is employed as a wash to relieve the effects of poison ivy (*Rhus toxicodendron*).

This plant was listed by Sessé and Mocifio¹ as "*Ginora* [*Ginoria*] *americana*," a name pertaining to a Cuban plant of a different genus. It is described also by Hernández.²

7. *LAGERSTROEMIA* L. Syst. Nat. ed. 10. 1076. 1759.

The species are all natives of the Old World.

1. *Lagerstroemia indica* L. Sp. Pl. ed. 2. 734. 1762.

Commonly cultivated in Mexico and sometimes escaping. Native of Asia, East Indies, and Australia, but widely cultivated.

Shrub or tree, 2 to 7 meters high, the trunk 6 to 17 cm. in diameter, the bark smooth, gray; leaves alternate, sessile or nearly so, oblong-elliptic to rounded, 2 to 7 cm. long, short-acuminate, rounded, or emarginate at apex, glabrous or hirtellous beneath along the nerves; flowers in terminal panicles, pedicellate, 4 to 7-parted; calyx campanulate, 7 to 10 mm. long; petals white, pink, or purple, 12 to 20 mm. long, on slender claws, the blade orbicular-cordate, crispate and erose; stamens 36 to 42; capsule 6-celled, 9 to 13 mm. long, ellipsoid-globose. "Astronómica" (Durango, Oaxaca, etc.); "crespón" (San Luis Potosí); "atmosférica" (Durango, Oaxaca); "atmósfera" (Sinaloa); "Júpiter" (Cuba, El Salvador, Nicaragua); "astromeda" (Porto Rico); "melindres" (Philippines).

Crape-myrtle is an extremely handsome plant, with very showy and handsome flowers which are borne in great profusion and for most of the year. Although it grows well in the tropics, it is not a tropical plant, but can stand considerable freezing. In the United States it is hardy as far north as Baltimore, and is grown out of doors still farther north.

8. *GINORIA* Jacq. Enum. Pl. Carib. 5. 1760.

Six other species are known, all natives of the West Indies.

1. *Ginoria nudiflora* (Hemsl.) Koehne, Bot. Jahrb. Engler 3: 351. 1882.

Antheryllum nudiflorum Hemsl. Diag. Pl. Mex. 13. 1878.

The type was collected somewhere in southern Mexico by Jurgensen; the writer has seen another specimen collected by Galeotti in 1845, probably in Oaxaca.

¹ Pl. Nov. Hisp. 78. 1887.

² Thesaurus 105, 415. 1651.

Glabrous shrub or tree, leafless at anthesis, the leaves not known; flowers in axillary 5 to 10-flowered umbels, the pedicels 5 to 12 mm. long, slender; calyx 6 mm. long, 4-lobate; petals about 7 mm. long, erose; stamens 28 to 30; ovary 3 or 4-celled.

119. PUNICACEAE. Pomegranate Family.

The family consists of a single genus and species.

1. PUNICA L. Sp. Pl. 472. 1753.

The generic name is derived from the Latin name for the Carthaginians (*Punici*), who are said to have introduced the pomegranate into Italy.

1. *Punica granatum* L. Sp. Pl. 472. 1753.

Common in cultivation nearly throughout Mexico. Native of the Mediterranean region, but cultivated everywhere in warm countries.

Shrub or small tree, 6 meters high or less, sometimes with a short trunk, the bark very thin, brownish gray, shallowly reticulate; leaves opposite or clustered, short-petiolate, elliptic, oblong, or oblanceolate, 2 to 6 cm. long, obtuse, attenuate at base, entire, glabrous; flowers perfect, short-pedicellate, solitary or clustered; calyx leathery, 5 to 7-lobate, the lobes triangular; petals 5 to 7, obovate to suborbicular, 1.5 to 2.5 cm. long, bright red; stamens numerous; fruit a leathery berry, globose, 5 to 10 cm. in diameter, several-celled; seeds numerous, surrounded by white or pink, acidulous pulp; wood hard, close-grained, light yellow, its specific gravity about 0.93. The plant is known everywhere in Spanish-speaking countries as "granado," the fruit as "granada"; the following names also are reported: "Tzapyan," "tzapyon" (Mixe, *Belmar*); "yaga-zehi" (Oaxaca, Zapotec, *Reko*); "yutnu-didzi" (Oaxaca, Mixtec, *Reko*).

The pomegranate is cultivated in the southern United States and is hardy as far north as the city of Washington. It is one of the best of the tropical fruits, being one of the few that are acidulous, most tropical fruits being sweet or insipid. It is a favorite fruit in Mexico, where numerous varieties are grown, such as the "granada de China," "granada agria," and others. The principal variation is in the size of the fruit and the color of the pulp. The pomegranates of Tehuacán, Puebla, are famous for their quality. The fruit is eaten without special preparation, or is made into sherbets and beverages.

The hard wood is sometimes used by engravers as a substitute for boxwood (*Buxus sempervirens*). The bark and the rind of the fruit are astringent, and are employed for tanning and dyeing leather. The bark, with iron sulphate, gives a black ink, and the flowers with alum a red ink.

The bark of the stem and root is official in the United States Pharmacopoeia, its active power being due to an alkaloid, pelletierine. The bark contains over 22 per cent of tannic acid. The bark is employed as a vermifuge and teniafuge, being particularly efficient for the latter purpose. It is used locally also for dysentery and intermittent fevers and as a gargle for sore throat.

120. RHIZOPHORACEAE. Mangrove Family.

1. RHIZOPHORA L. Sp. Pl. 443. 1753.

The genus consists of about three species, widely distributed on tropical coasts.

1. *Rhizophora mangle* L. Sp. Pl. 443. 1753.

Common along both Mexican coasts from Tamaulipas and southern Baja California southward. Widely distributed in tropical America.

Tree, sometimes 25 meters high, with a trunk 1.2 meters in diameter, but usually much smaller; bark thin, brownish gray, shallowly furrowed, red within; leaves opposite, petiolate, obovate or elliptic, 5 to 15 cm. long, obtuse, entire, leathery, glabrous, dark green, with deciduous stipules; flowers perfect, on 2 or 3-flowered axillary peduncles; calyx leathery, 4-lobed; petals 4, yellowish white, linear, hairy; stamens 8; fruit baccate, conic, 2 to 2.5 cm. long, leathery, brown; seed usually germinating in the fruit, the radicle pushing out and growing downward, becoming 25 to 30 cm. long before it falls from the plant and takes root in the mud; wood hard, close-grained, strong, dark red-brown, its specific gravity about 1.16. "Tab-ché" or "tap-ché" (Yucatán, Maya); "mangle" (Baja California, Oaxaca, and elsewhere, Costa Rica, Porto Rico, Santo Domingo, etc.; the word probably of Carib origin; "manglar" is a mangrove thicket); "mangle dulce" (Baja California); "mangle Colorado" (Tabasco, Tamaulipas, Oaxaca, Veracruz, Guerrero, Cuba, Panama, Guatemala, Porto Rico, Venezuela); "mangle tinto" (Veracruz); "candelón" (Veracruz, Colima, Sinaloa, *Ramírez*); "mangle salado" (Panama); "mangle zapatero" (Porto Rico); "mangle gateador" (Costa Rica).

The mangrove (sometimes known as "red mangrove") is the most abundant and conspicuous tree of tropical coasts, forming dense forests or thickets of great extent almost everywhere that the water is brackish. The plants send out numerous arching prop roots in all directions, which are covered at high tide, and these form impenetrable tangles. The roots are often covered with oysters. The mangrove is important in land building, preventing washing away of land by waves and also affording a place of protection for soil and refuse. Thus small islands gradually increase greatly in size. The soil underneath mangrove trees usually consists of black oozy mud, and the mangrove forests are extremely repellent in appearance when seen at close hand, although when viewed from a distance they are strikingly handsome.

The wood is used for fuel and for building wharfs and docks, since it is durable in water and is not attacked by the mollusk *Teredo*. Clavigero states that it was employed for making oars, and Oviedo states that "it is one of the best woods there is here (West Indies) for the poles of huts and timbers of houses, and for door and window frames." The leaves and especially the bark are rich in tannin and the latter is used for tanning leather. The bark, with salts of copper or iron, yields olive, brown, and slate dyes. Of the fruit, Oviedo (Lib. IX, Cap. VI) states that it "is tawny and within is a marrow or heart which the Indians eat when they can find no better fruit (for it is somewhat bitter), and they say it is wholesome." The bark has been employed as a febrifuge and to stop hemorrhages, also as a remedy for sore throat. Pittier reports that in Panama a red dye is obtained from the young shoots.

121. COMBRETACEAE. Combretum Family.

Trees or shrubs, sometimes scandent, in some genera armed with spines; leaves opposite or alternate, entire, estipulate; flowers spicate, racemose, or capitate, bracteate, perfect or polygamo-dioecious; calyx tube adnate to the ovary, the limb 4 or 5-lobate, the lobes usually valvate; petals 4 or 5 or none, small; stamens as many or twice as many as the calyx lobes, inserted on the limb or base of the calyx; style simple, the stigma entire; fruit coriaceous or drupaceous, 1-celled, 1-seeded, indehiscent.

Flowers in dense globose conelike heads-----1. **CONOCARPUS**.

Flowers spicate or racemose.

Leaves alternate; petals none.

Calyx limb deciduous; branches unarmed-----2. **TERMINALIA**.

Calyx limb persistent; branches usually armed with spines---3. **BUCIDA**.

Leaves opposite; petals present.

Calyx limb persistent; fruit not winged; plants erect.

4. **LAGUNCULARIA**.

Calyx limb deciduous; fruit broadly winged; plants scandent.

5. **COMBRETUM**.

1. **CONOCARPUS** L. Sp. Pl. 176. 1753.

A single species is known.

1. **Conocarpus erecta** L. Sp. Pl. 176. 1753.

On both coasts of Mexico, from Tamaulipas and southern Baja California southward. Widely distributed on tropical American shores and in western Africa.

Variable in size, sometimes a prostrate shrub but usually erect, becoming a tree 20 meters high, with a trunk 80 cm. in diameter; bark dark brown, fissured into irregular ridges and thin scales; leaves alternate, short-petiolate, obovate to elliptic or oval, 2 to 10 cm. long, obtuse or acute at each end, entire, leathery, glabrous or sericeous, the petiole bearing 2 glands; flowers perfect, very small, green, in globose paniculate heads 1 cm. or less in diameter; calyx 2 mm. long; corolla none; stamens usually 5, exserted; fruit a conelike head of small flat winged scalelike drupes, purplish green; wood hard, close-grained, grayish or yellowish brown, its specific gravity nearly 1.00. "Mangle negro" (Oaxaca); "xtabché" or "xkanché" (Yucatán, Maya); "estachahuite" (from the Nahuatl *iztac-cuahuitl*, "white-tree," referring to the whitish branches, *Reko*); "botoncahui" (Sinaloa); "botoncillo" (Yucatán, Venezuela); "mangle" (Guerrero, Santo Domingo); "mangle prieto" (Tabasco); "saragoza" (Colombia, Panama); "mangle botoncillo" (Venezuela, Porto Rico); "mangle botón" (Porto Rico, Cuba); "mangle colorado" (Porto Rico); "mangle piñuelo" (Panama); "yana" (Cuba); "mariquito" (Costa Rica); "mangle torcido" (Panama).

The buttonwood grows in mangrove swamps with the mangroves and *Avicennia nitida*. The wood is used for rafters, boats, cabinet work, and various other purposes; it is said to be durable in the soil. The leaves and bark are employed for tanning skins. The bitter bark finds use locally in medicine as an astringent and tonic.

Conocarpus erecta sericea DC.¹ is a form with densely sericeous leaves. It occurs on both coasts of Mexico with the typical glabrate form. By some authors it has been considered a distinct species, but it grades gradually into the common form.

2. **TERMINALIA** L. Mant. Pl. 1: 21. 1771.

Trees; leaves alternate, crowded at the ends of the branches, deciduous, petiolate; flowers perfect or polygamous, small, green, in lax elongate spikes; calyx tube constricted above the ovary, the limb campanulate, 5-dentate; petals none; stamens 10; fruit ovoid, compressed or winged, 1-seeded, drupaceous.

Ovary compressed, not winged; calyx limb 2.5 mm. long-----1. **T. catappa**.

Ovary with 2 broad wings; calyx limb 1.5 mm. long or less-----2. **T. excelsa**.

¹ Prodr. 3: 16. 1828.

1. *Terminalia catappa* L. Mant. Pl. 2: 519. 1771.

Cultivated in Mexico and perhaps naturalized; specimens seen from Sinaloa, Tepic, Guerrero, Oaxaca, and Yucatán. Native of the East Indies, but generally cultivated in tropical regions.

Large tree, sometimes 25 meters high, with a trunk 1.5 meters in diameter, the branches whorled, spreading; leaves obovate, 10 to 30 cm. long, rounded and abruptly pointed at apex, narrowed to the base, nearly glabrous; spikes 5 to 15 cm. long, the pistillate below; fruit a woody drupe, ellipsoid or rounded, 4 to 7 cm. long, compressed, 2-edged; seed 3 to 4 cm. long; wood hard, close-grained, red-brown, the specific gravity about 0.70. "Almendra" (fruit), "almendro" (tree), "almendrón" (Yucatán, Guerrero, Oaxaca, Porto Rico, Costa Rica, Philippines, El Salvador, Santo Domingo); "almendrillo" (Oaxaca); "almendra de la India" (Cuba, El Salvador).

The wood of the Indian almond is a valuable source of lumber when procurable in sufficient quantity. The roots, bark, and fruit contain much tannin, and are employed for tanning skins. The fruit and other parts furnish a permanent black ink and dye, and in India the fruit is employed to color the teeth black. Silkworms are fed upon the leaves. The seeds contain about 50 per cent of a fixed oil. They are edible and are used like almonds; in flavor they suggest filberts. The plant is sometimes used locally in medicine because of its astringent and supposed tonic properties. For illustrations of this species see Contr. U. S. Nat. Herb. 8: f. 13, pl. 57.

2. *Terminalia excelsa* Liebm. (Hemsl. Biol. Centr. Amer. Bot. 1: 402. 1880, nomen nudum).

Veracruz.

Tree; leaves obovate, obtuse or acute, attenuate at base to a slender petiole, thinly sericeous when young but soon glabrate; racemes lax, 8 to 10 cm. long, finely fulvous-tomentulose; calyx lobes short, rounded or very obtuse; stamens long-exserted, the filaments glabrous; style 3 to 4 mm. long, glabrous; very young fruit thinly fulvous-tomentulose.

No description of this species has been published, apparently. Presumably it was based upon specimens collected at Mirador by Liebmann. The writer has seen a single flowering specimen, with immature leaves, from Zacuapan (*Purpus* 3800), which is probably of the same species. It appears distinct from either of the species recently described from Panama.

According to Ramírez, the tree is known in Veracruz as "pucté."

3. *BUCIDA* L. Syst. Nat. ed. 10. 2: 1025. 1759.

The genus consists of a single species.

1. *Bucida buceras* L. Syst. Nat. ed. 10. 1025. 1759.

Campeche; reported from Tabasco. Southern Florida, West Indies, and Panama.

Tree, sometimes 25 meters high, with a trunk 90 cm. in diameter, the crown broad and spreading; bark gray, scaly; branches often armed with spines 2 to 3 cm. long; leaves alternate but crowded at the ends of the branches, petiolate, obovate, oval, or elliptic, 3 to 9 cm. long, rounded or retuse at apex, entire, coriaceous, sparsely sericeous when young; flowers perfect, green, in slender spikes; calyx 3 mm. long, sericeous; petals none; stamens 10, exserted; fruit a drupe, ovoid, 7 to 8 mm. long; wood hard, close-grained, yellowish brown, its specific gravity about 1.04. "Puk-té" or "puc-té" (Campeche, Tabasco); "úcar," "búcaro" (Porto Rico); "júcaro de playa" (Cuba).

The tree is said to be abundant in some parts of the Yucatán Peninsula, and to be a valuable source of lumber. The wood is very durable and is em-

ployed for posts, piling, axles, wheel hubs, and other purposes. The bark is employed for tanning. For an illustration of a tree see Contr. U. S. Nat. Herb. 8: pl. 20.

4. **LAGUNCULARIA** Gaertn. f. Fruct. & Sem. 3: 209. 1807.

The genus consists of a single species.

1. **Laguncularia racemosa** (L.) Gaertn. f. Fruct. & Sem. 3: 209. 1807.

Conocarpus racemosa L. Syst. Nat. ed. 10. 930. 1759.

Coasts of Tamaulipas and Yucatán. Southern Florida, West Indies, Panama, South America, and western Africa.

Shrub or tree, sometimes 20 meters high, with a trunk 80 cm. in diameter; bark thin, reddish brown, fissured into long scales; leaves opposite, petiolate, oblong to oval, 2 to 7 cm. long, rounded at apex, entire, leathery, glabrous, the petiole with 2 large glands; flowers perfect or polygamous, in lax clustered spikes; calyx 5-lobate, sericeous, 2 to 3 mm. long; petals 5, suborbicular, not exceeding the calyx; stamens 10; fruit a leathery 10-ribbed reddish drupe, oblong or obovoid, 15 mm. long; wood hard, strong, dense, yellowish brown, its specific gravity about 0.86. "Mangle blanco" (Tamaulipas, Sinaloa, Panama, Porto Rico); "mangle amarillo," "patabán" (Cuba); "mangle prieto" (Santo Domingo); "mangle chino" (Sinaloa).

The white mangrove (known also as "white buttonwood") is usually associated with *Rhizophora mangle*, *Conocarpus erecta*, and *Avicennia nitida*. The bark contains about 14 per cent of tannin, and is used for tanning skins. It is employed locally in medicine as an astringent and tonic. For an illustration of the flowers see Contr. U. S. Nat. Herb. 8: pl. 43.

5. **COMBRETUM** L. Syst. Nat. ed. 10. 999. 1759.

Scandent shrubs, sometimes armed with spines; leaves opposite, petiolate, entire; flowers polygamo-dioecious, in terete or one-sided spikes or racemes; calyx tube cylindric or angulate, constricted above the ovary, the limb campanulate, 4 or 5-lobate, deciduous; petals 4 or 5, small, inserted between the calyx lobes; stamens 8 or 10, long-exserted; fruit coriaceous, longitudinally 4 to 6-winged, 1-seeded.

Flowers small, the calyx limb less than 2 mm. long; spikes not secund.

Calyx puberulent or tomentose; stems unarmed-----1. *C. mexicanum*.

Calyx glabrous; stems armed with spines-----2. *C. palmeri*.

Flowers large, the calyx limb 4 to 5 mm. long or larger; spikes secund.

Calyx lepidote and pilosulous-----3. *C. erianthum*.

Calyx merely lepidote, not pilosulous-----4. *C. farinosum*.

1. **Combretum mexicanum** Humb. & Bonpl. Pl. Aequin. 2: 159. pl. 132. 1809.

? *Combretum odoratissimum* Sessé & Moc. Fl. Mex. 99. 1894.

Guerrero to Oaxaca; type from Acapulco. Nicaragua.

Large vine; leaves short-petiolate, oblong or oval-oblong, 6 to 15 cm. long, obtuse to acuminate, glabrous or nearly so; flowers white, sweet-scented, in dense panicle spikes; fruit 2 to 2.5 cm. long, puberulent, the wings 4 to 5 mm. wide.

2. **Combretum palmeri** Rose, Contr. U. S. Nat. Herb. 5: 136. 1897.

Known only from the type locality, Acapulco, Guerrero.

Large vine; leaves elliptic to oblong-obovate, 5 to 7 cm. long, obtuse or acute, sparsely pilosulous beneath along the nerves; spikes very lax, in large panicles; flowers white, sweet-scented; petals 2 mm. long; fruit (immature) 1.5 cm. long, glabrous.

3. *Combretum erianthum* Benth. Pl. Hartw. 73. 1840.

Oaxaca and Campeche. Guatemala, the type from Retalhuleu.

Large vine; leaves oblong to elliptic, 7 to 15 cm. long, obtuse to acuminate, densely brownish-lepidote beneath; spikes solitary or paniculate, dense; calyx limb sometimes 1 cm. long; petals 2.5 mm. long; fruit about 2 cm. long, puberulent, with broad wings. "Bejuco de peine," "bejuco de toro" (Oaxaca); "chupamiel," "peine de mico" (El Salvador).

4. *Combretum farinosum* H. B. K. Nov. Gen. & Sp. 6: 110. 1823.

Combretum argenteum Bertol. Nov. Comm. Acad. Bonon. 4: 412. 1840.

Sinaloa to Chiapas and Veracruz; type collected between Acapulco and Venta del Ejido, Guerrero. Guatemala and El Salvador.

Large vine, unarmed; leaves broadly oval to elliptic-oblong, 5 to 15 cm. long, obtuse or short-acuminate, sparsely or densely lepidote beneath; spikes very thick and dense, solitary or paniculate; flowers blood-red or greenish yellow, sweet-scented; calyx limb often 1 cm. long; petals oblong-spatulate to broadly ovate, 1.5 to 2 mm. long, obtuse or acute; fruit about 2 cm. long, lepidote. "Carape" or "carapi" (Michoacán, Guerrero) "peinetillas" (the spikes), "compio" (Sinaloa); "angarilla" (Durango, *Patoni*); "peinecillo" (Veracruz); "quile-tzine" (Oaxaca, *Seler*); "abacamiel," "abamiel" (Central America); "papa-miel" (Nicragua); "chupamiel," "peineta," "chupamiel de peineta," "chupa-chupa" (El Salvador).

The branches were formerly used for arrow shafts and are now sometimes woven into baskets. The showy flowers are full of sweet nectar. When cut, the stems yield a considerable amount of water, a fact of which advantage is taken by travelers through the forests when other water is absent. In Sinaloa the leaves are applied as a remedy for headache.

In a recent account of the species of *Combretum* of the section *Micropetalae*¹, Pittier has treated *C. argenteum* as a valid species, distinguished from *C. farinosum* chiefly by its broader petals. Examination of the available material shows that there is too great variation in petal shape to admit of its use as a basis of specific segregation.

122. MYRTACEAE. Myrtle Family.

Trees or shrubs, usually aromatic; leaves entire, opposite, pellucid-punctate or gland-dotted, estipulate; flowers perfect, regular, variously arranged, bi-bracteolate; calyx tube adnate to the ovary, the limb 4 or 5-lobate, or the lobes united in bud and sometimes circumscissile; petals 4 or 5 or none; stamens numerous; ovary 2 to several-celled, the style simple, the stigma capitate; fruit baccate or drupaceous, large or small, containing 1 to many seeds.

This is one of the large families in tropical America, and its representatives are easily recognized by the combination of punctate leaves, numerous stamens, and characteristic fruit. It is, however, almost impossible to distinguish the genera by the embryo characters upon which they are based, and it is extremely difficult to identify a plant of the family except by comparison with named specimens.

Several species of the Australian genus *Eucalyptus* are grown in Mexico for ornament. They are known as "eucalipto" and "gigante." *Eucalyptus* trees grow rapidly, and for this reason they are planted in Florida and California as shade trees and as a source of lumber. As shade trees, however, they are not desirable, for their foliage is so thin and their crowns so narrow that they

¹ Contr. U. S. Nat. Herb. 18: 239-246. 1917.

afford little shade, while their roots spread in every direction, making it impossible to grow other plants in their vicinity. They are not particularly handsome trees, and their only good feature is rapidity of growth.

Calyx limb closed in bud or nearly so, in anthesis longitudinally cleft or circumscissile.

Flowers umbellate.....1. **CALYCORECTES**.

Flowers solitary, cymose, or paniculate.

Calyx limb circumscissile; petals 1 or 2 or none...2. **CALYPTRANTHES**.

Calyx limb cleft longitudinally in anthesis, or partly circumscissile but remaining attached to the tube at one side; petals 4 or 5...3. **PSIDIUM**.

Calyx limb not closed in bud, the sepals imbricate.

Embryo circinate, the radicle elongate.

Flowers numerous, in cymes; testa of seed thin.....4. **PIMENTA**.

Flowers solitary or rarely racemose; testa horny.....5. **MYRTUS**.

Embryo not circinate, the cotyledons and radicle folded together, the radicle sometimes very short.

Radicle very short; flowers variously arranged but not paniculate.

6. **EUGENIA**.

Radicle elongate; flowers in loose panicles.....7. **MYRCIA**.

1. **CALYCORECTES** Berg, *Linnaea* 27: 317. 1854.

1. *Calycorectes mexicanus* Berg, *Linnaea* 27: 318. 1854.

Type from mountains of Oaxaca.

Branchlets puberulent; leaves petiolate, oblong, 7.5 to 10 cm. long, 2.5 to 4 cm. wide, obtuse-acuminate, acute at base, glabrous above, puberulent or glabrate beneath; flowers in 2 to 6-flowered umbels equaling or shorter than the petiole, the pedicels 2 mm. long, puberulent; calyx globose, apiculate, rupturing into 4 ovate lobes; petals 4, orbicular, 2 mm. long.

2. **CALYPTRANTHES** Swartz, *Prodr. Veg. Ind. Occ.* 79. 1788.

Trees or shrubs; flowers small, in axillary and terminal cymes or panicles; calyx tube turbinate, the limb closed in bud, in anthesis circumscissile and deciduous; petals 1 or 2 or none; fruit baccate, 2 or 3-celled, usually 1 or 2-seeded.

The flower buds of the Brazilian *C. aromatica* St. Hil. are used as a spice.

Leaves sessile, cordate at base.....1. *C. karwinskyana*.

Leaves petiolate, rounded to acute at base.

Leaves linear-lanceolate, 10 to 12.5 cm. long, 1.5 to 2 cm. wide.

2. *C. Lindeniana*.

Leaves lanceolate to oval.

Leaves rounded at base, the petioles very short and thick.

3. *C. euryphylla*.

Leaves acute or obtuse at base, the petioles comparatively long and slender.

Leaves obtuse.....4. *C. zuzygium*.

Leaves acuminate.

Buds glabrous; flowers mostly pedicellate.....5. *C. schiedeana*.

Buds sericeous; flowers sessile.....6. *C. pendula*.

1. *Calyptranthès karwinskyana* Berg, *Linnaea* 29: 214. 1857.

Known only from the type locality, "Mesa Chica," southern Mexico.

Glabrous throughout; leaves ovate-oblong, 9 to 11.5 cm. long, 3.5 to 5 cm. wide, acuminate, clasping at base; cymes equaling the leaves, the flowers in clusters of 3 or 5, sessile, the buds 4 mm. long; petals none.

2. *Calyptranthes lindeniana* Berg, *Linnaea* 29: 213. 1857.

Known only from the type locality, Rio Teapa, Tabasco.

Branchlets strigose-sericeous; petioles 4 mm. long; leaves narrowed to each end, pilosulous or glabrate; cymes half as long as the leaves, strigose-sericeous; buds 3 mm. long; petals none.

3. *Calyptranthes euryphylla* Standl., sp. nov.

Type from Catemaco, Veracruz (*Nelson* 421; U. S. Nat. Herb. no. 569276).

Branches terete, gray, glabrous; petioles very stout, 2.5 mm. long or shorter; leaf blades ovate-elliptic or elliptic-oval, 3.5 to 6.5 cm. long, 1.8 to 4 cm. wide, rounded at base, abruptly short-acuminate at apex, with obtuse tip, coriaceous, when young minutely strigillose beneath but soon glabrate, the lateral nerves slender but conspicuous on both surfaces, numerous; cymes equaling or longer than the leaves, strigillose or glabrate, the flowers sessile; fruit didymous-globose, about 6 mm. long and 7 mm. broad, 2-celled, 2-seeded.

4. *Calyptranthes zuzygium* (L.) Swartz, *Prodr. Veg. Ind. Occ.* 79. 1788.

Myrtus zuzygium L. *Syst. Nat.* ed. 10. 1056. 1759.

Michoacán and Tres Marias Islands. Florida and Greater Antilles.

Tree, sometimes 12 meters high; leaves short-petiolate or subsessile, elliptic-oblong to obovate-elliptic, 3.5 to 7 cm. long, acute at base, coriaceous; cymes equaling or longer than the leaves, glabrous or nearly so, the flowers mostly pedicellate; petals none; fruit subglobose, 8 to 10 mm. in diameter.

5. *Calyptranthes schiedeana* Berg, *Linnaea* 27: 28. 1854.

Myrcia aromatica Schlecht. *Linnaea* 13: 415. 1839. Not *Calyptranthes aromatica* St. Hil. 1828.

Calyptranthes schlechtendaliana Berg, *Linnaea* 27: 29. 1854.

Veracruz, the type from Hacienda de la Laguna. Reported from Panama.

Tree or shrub, glabrous throughout; leaves petiolate, broadly elliptic to lance-oblong, 4.5 to 7.5 cm. long, 2 to 4.5 cm. wide, acute or obtuse at base; cymes shorter than the leaves, many-flowered; fruit globose, 4 to 6 mm. in diameter, 1 to 5-seeded.

6. *Calyptranthes pendula* Berg, *Linnaea* 27: 21. 1854.

Sinaloa to Oaxaca; type from mountains of Oaxaca.

Shrub or small tree, 4 to 5 meters high or larger; leaves slender-petiolate, lanceolate to oblong-ovate, 5 to 11 cm. long, acuminate, in age glabrous or nearly so; cymes about as long as the leaves, the flowers glomerate, sessile; buds about 2 mm. long; petals 1 or 2.

Closely related to *C. chytraculia* (L.) Swartz, of the West Indies, and perhaps not distinct.

3. **PSIDIUM** L. *Sp. Pl.* 470. 1753.

Trees or shrubs; flowers usually large, the peduncles axillary, 1 to 3-flowered; calyx tube campanulate or urceolate, the limb 4 or 5-lobate, the lobes partly or wholly united before anthesis; petals 4 or 5, spreading, white; fruit baccate, globose or pyriform, commonly 4 or 5-celled, usually large.

Calyx limb at anthesis circumscissile, but remaining attached to the tube on one side.

Leaves 1.2 to 4 cm. long, ovate-----1. *P. sartorianum*.

Leaves 5.5 to 15 cm. long, oblong or elliptic-oblong--2. *P. friedrichsthalianum*.

Calyx limb at or before anthesis splitting vertically into lobes.

Calyx open in bud; leaves small, 6.5 cm. long or less, sessile or subsessile.

3. *P. oerstedianum*.

Calyx closed in bud; leaves usually much larger or, if small, conspicuously petiolate.

Lateral nerves of the leaves usually 12 or more, parallel, approximate, impressed above; leaves mostly oblong and rounded or subcordate at base, pale beneath, the pubescence minute, whitish, usually appressed.

4. *P. guajava*.

Lateral nerves few, 7 to 10, rarely 12, remote, curved, not impressed above; leaves mostly elliptic or oblong-elliptic and often narrowed at base, never pale beneath, the pubescence spreading and often long, commonly brown or fulvous.

5. *P. molle*.

1. *Psidium sartorianum* (Berg) Niedenzu in Engl. & Prantl, Pflanzenfam. 3⁷: 69. 1893.

Mitranthes sartoriana Berg, Linnaea 29: 248. 1857.

Tepic to Oaxaca, Veracruz, and Yucatán; type from Mirador, Veracruz.

Shrub or tree, sometimes 15 meters high, the bark gray, smooth; leaves petiolate, ovate or broadly ovate, acuminate or abruptly acuminate, obtuse or acute at base, glabrous, the lateral nerves obsolete or nearly so; peduncles axillary, slender, 1-flowered, 1 to 1.5 cm. long; buds glabrous; fruit subglobose, 1.2 to 2 cm. in diameter, greenish yellow, containing several seeds. "Pichiché" (Yucatán, Maya); "arrayán" (Jalisco, Veracruz, Oaxaca, Durango); "guayabillo" (Guerrero, El Salvador).

This tree is often planted for its fruit and as an ornamental tree. The fruit is juicy and has a rich spicy subacid flavor. It is employed chiefly in making refreshing drinks, and is used either fresh or dried. The bark is employed for tanning, and the leaves are reputed to have tonic and astringent properties.

This species has been mentioned in literature as *Myrtus arrayan* H. B. K., an error for which Sereno Watson¹ seems to have been responsible. He had little ground for such an identification, except the fact that the vernacular name "arrayán" was applied to both species. *Myrtus arrayan* is a Peruvian species, and Watson evidently believed that it had been introduced into Mexico from South America. Some Mexican writers have been so ignorant of the significance of the name arrayán that they have suggested that it might be of Carib origin. It is, however, the name applied in Spain to one of the forms of *Myrtus communis*, consequently it is not surprising to find it applied in widely separated localities of America to other Myrtaceous plants.

2. *Psidium friedrichsthalianum* (Berg) Niedenzu in Engl. & Prantl, Pflanzenfam. 3⁷: 69. 1893.

Calypdropsidium friedrichsthalianum Berg, Linnaea 27: 350. 1854.

Oaxaca. Guatemala; cultivated in El Salvador.

Tree, 9 meters high, the branchlets quadrangular, glabrate; petioles 4 to 6 mm. long; leaves thin, acuminate, acute at base, lustrous, nearly glabrous; peduncles slender, 1-flowered, 3.5 cm. long or less; buds glabrous, cuspidate; petals 5, suborbicular or oval, 8 to 14 mm. long; fruit oval or globose, yellow. "Guayaba montés" (Oaxaca); "arrayán" (El Salvador).

3. *Psidium oerstedianum* Berg, Linnaea 27: 360. 1854.

Tepic to Veracruz and Chiapas. Guatemala and Costa Rica; type from Guanacaste, Costa Rica.

Leaves oval-oblong, ovate-elliptic, or oval, acute to rounded at apex, rounded at base, coriaceous, when young usually gray-tomentulose beneath but soon glabrate, the lateral nerves few, not impressed above; peduncles slender, 1-flowered; buds tomentulose or glabrate; petals 5.

¹Proc. Amer. Acad. 22: 412. 1887.

4. *Psidium guajava* L. Sp. Pl. 470. 1753.*Psidium pyriferum* L. Sp. Pl. ed. 2. 672. 1762.*Psidium pomiferum* L. Sp. Pl. ed. 2. 672. 1762.

Widely distributed in Mexico, in the southern part probably native, but in places probably only naturalized; frequent in cultivation. Southern Florida, West Indies, and Central and South America; cultivated in the Old World and in many places thoroughly naturalized.

Shrub or tree, sometimes 8 meters high, with a trunk 30 cm. in diameter; bark scaly, reddish; branchlets quadrangular, tomentulose; leaves short-petiolate, 5 to 15 cm. long, acute or obtuse, the upper surface tomentulose when young but soon glabrate, the lateral nerves very conspicuous beneath; peduncles 1 to 3-flowered; buds tomentulose or glabrate; petals 4 or 5, white, 1.5 to 2 cm. long; fruit globose or pyriform, 3 to 6 cm. in diameter, yellow or pinkish; wood hard, strong, elastic, close-grained, brownish or reddish gray, its specific gravity about 0.69. Known generally as "guayaba" (the fruit) and "guayabo," words of Antillean origin. The following additional names are reported, some of them relating to horticultural varieties: "Jalocote" (from the Nahuatl *xal-xocotl*, sand sour fruit); "guayabo de venado" (Colima; a wild form); "pichí" (Yucatán, Maya); "guayaba de China"; "guayaba colorada"; "guayaba peruana"; "guayaba perulera" (form with pyriform fruit); "guayaba de gusano" (Nicaragua); "guayaba manzano" (Colombia); "posh," "posh-kelp" (Mixe, *Belmar*; former the fruit, latter the plant); "enandi" (Tarascan, *León*); "poos," "poos-cuy" (fruit and tree; Zoque, *Gonzales*); "bayabas" (Philippines, a Tagalog corruption of the word *guayaba*).

The name *Psidium pomiferum* relates to the form with globose fruit; *P. pyriferum* to that with pyriform fruit.

The guava is one of the most widely known of tropical fruits, and by many persons it is highly esteemed. The fruit varies greatly in size; the flesh is whitish, yellowish, or pink, full of large seeds, of sweetish or somewhat acid flavor. It has a remarkably strong, musky odor, which is penetrating and persistent. The fruit is rather insipid when raw, and it is more commonly eaten cooked, stewed or made into jelly, paste, preserves, and confections. Guava jelly, particularly, is a noted delicacy. Another species, *P. cattleianum* Sabine, the strawberry guava, a native of Brazil, with glabrous leaves, bears superior fruit, in flavor suggesting a strawberry. It is grown in the United States and perhaps also in parts of Mexico.

In the warmer parts of Mexico and Central America guava bushes often form dense thickets of considerable extent, which are known as "guayabales." The seeds germinate readily, and are spread largely by domestic animals. The plants possess great vitality and behave like weeds. Many Mexican localities are noted for the guavas produced there, and the term "Guayabero" is sometimes applied to the natives of Cuernavaca, because of the abundance of guavas in the vicinity.

The wood is said to take a good polish and to be durable when in contact with the soil, but the trees are usually too small for use. The bark is sometimes employed for tanning. A decoction of the buds is a local remedy in Mexico for diarrhea; the leaves are reputed to be a remedy for itch; and a decoction of the astringent bark is applied to ulcers and taken internally for pains in the stomach.

Guavas are mentioned by all the early writers, as, for instance, Hernández¹ and Acosta. The latter writer, with his customary pessimism, says: "It is

¹ Thesaurus 84-85. 1651.

a tree which is held in low esteem on the mainland and in the islands, for they say it smells like bugs. The flavor of the fruit is very ordinary and the flesh unwholesome."

5. *Psidium molle* Bertol. Nov. Comm. Acad. Bonon. 4: 44. 1840.

Psidium schiedeanum Berg, Linnaea 27: 368. 1854.

Sinaloa to Veracruz and Chiapas. Central America, the type from Guatemala.

Shrub or small tree, often less than a meter high; leaves petiolate, variable in form, obovate-oblong to elliptic or rounded-obovate, 5 to 12 cm. long or larger, rounded at apex or acute, usually narrowed to the base, tomentulose above when young but later glabrate, brownish-tomentose beneath, the pubescence sometimes scant in age; peduncles 1 to 3-flowered; buds usually tomentose, sometimes glabrate; petals white, about 1 cm. long; fruit globose, about 2.5 cm. in diameter, pale yellow, with whitish pulp. "Guayaba agria" (Jalisco); "güfsaro" (Costa Rica); "guayabillo" (El Salvador).

The fruit is very acid and not particularly agreeable. The specimens referred here are variable in leaf characters, and it is not improbable that they represent two or more species. On the other hand, it is doubtful whether *P. molle* is distinct from *P. araca* Raddi, a Brazilian species. Some of the Mexican and Central American material has been referred to the latter.

4. **PIMENTA** Lindl. Coll. Bot. pl. 19. 1821-25.

1. *Pimenta officinalis* Lindl. Coll. Bot. pl. 19. 1821-25.

Myrtus pimenta L. Sp. Pl. 472. 1753.

Myrtus tabasco Schlecht. Linnaea 5: 542. 1830.

Pimenta officinalis tabasco Berg, Linnaea 27: 425. 1854.

Pimenta pimenta Cockerell, Bull. Torrey Club 19: 95. 1892.

Myrtus piperita Sessé & Moc. Fl. Mex. 136. 1894.

Veracruz, Oaxaca, Tabasco, and probably elsewhere. Central America, West Indies, and northern South America.

Tree, 9 to 12 meters high, the branchlets quadrangular; leaves petiolate, oblong to oval-oblong, 9 to 20 cm. long, rounded or obtuse at apex, obtuse or acute at base, coriaceous, when young sparsely puberulent but soon glabrous; flowers in short, axillary or subterminal cymes, sericeous; buds about 2 mm. long; sepals 4, minute; petals 4, rounded; fruit baccate, 1 or 2-celled, 1 or 2-seeded, globose, 4 to 8 mm. in diameter. "Pimiento" (Oaxaca); "pimienta gorda" (Tabasco, Oaxaca, El Salvador, Guatemala); "pimienta de Tabasco" (Tabasco, Oaxaca); "pimentón" (Tabasco); "xocoxochitl" (Nahuatl); "malagueta" (Tabasco); "pimiento oloroso" (Nicaragua); "Jamaica" (Costa Rica).

It is this tree which furnishes the allspice of commerce, and the tree is cultivated for this reason, chiefly in Jamaica. Allspice is the unripe fruit, dried in the sun. The ripe fruit is blackish brown and very odorous. It contains an essential oil. The fruit is used in domestic medicine as a stimulant, and it is said to be smoked like tobacco in some regions. The leaves, either fresh or dried, have a strong, spicy, very agreeable odor. The tree is described by Hernández.¹

¹ Thesaurus 30. 1651.

5. **MYRTUS** L. Sp. Pl. 471. 1753.

Shrubs or trees; peduncles usually axillary and 1-flowered, with 2 bractlets at apex; flowers 4 or 5-parted; calyx tube turbinate, the lobes imbricate; petals spreading; fruit baccate, containing 1 or 2 or several seeds.

The Mexican species are difficult to distinguish from those of *Eugenia*, but the Mexican representatives of the latter genus usually have larger leaves and fasciculate flowers. The common myrtle of southern Europe and western Asia, *Myrtus communis* L. ("mirto") is said to be cultivated occasionally in Mexico. Wreaths of its branches were worn by the Athenian magistrates and by victors in the Olympic games.

Flowers fasciculate or racemose; leaves oblong-linear-----1. *M. oaxacana*.
Flowers solitary; leaves lanceolate or broader.

Calyx lobes suborbicular, rounded at apex.

Leaves obtuse, glabrous-----2. *M. ehrenbergii*.

Leaves acute, strigillose beneath-----3. *M. ledophylla*.

Calyx lobes deltoid or lanceolate, acute or acutish.

Calyx lobes deltoid; petals 6 mm. long-----4. *M. berlandiereana*.

Calyx lobes lance-oblong; petals 3 to 4 mm. long-----5. *M. montana*.

1. **Myrtus oaxacana** Standl., sp. nov.

Type collected between Juchitán and Chivela, Oaxaca (*Nelson* 2631; U. S. Nat. Herb. no. 566319).

Branches terete, grayish, glabrous, densely leafy; leaves short-petiolate, oblong-linear or lance-linear, 14 to 40 mm. long, 2 to 4 mm. wide, obtuse, acute at base, glabrous, densely gland-dotted, the lateral nerves evident, the margins thickened; flowers partly fasciculate in the axils and partly in few-flowered racemes, the pedicels slender, 3 to 5 mm. long; bractlets minute; calyx 1 to 1.5 mm. long, glabrous, gland-dotted, the 4 lobes semiorbicular, shorter than the tube; petals glabrous, eciliate, 2.5 mm. long.

The plant is very unlike the other Mexican species of the genus, and it is not at all certain that it is properly referable to *Myrtus*. In general appearance, however, it bears more resemblance to some of the South American species of this genus than to any other Myrtaceous plant seen by the writer.

2. **Myrtus ehrenbergii** Berg, *Linnaea* 27: 404. 1854.

San Luis Potosí and perhaps elsewhere, the type collected somewhere in southern Mexico by Ehrenberg.

Branchlets puberulent; leaves short-petiolate, lanceolate or lance-oblong, 1 to 2.5 cm. long, acute or obtuse at base, bright green; pedicels 5 to 14 mm. long, the bractlets minute; petals rounded, ciliolate; fruit 10 mm. long, containing 1 or several seeds. "Arrayán" (*Ramírez*).

The aromatic and astringent leaves are said to be used as a tonic.

3. **Myrtus ledophylla** Standl., sp. nov.

Veracruz; type from San Martín, Zacuapan (*Purpus* 7804; U. S. Nat. Herb. no. 877551).

Branchlets minutely hirtellous; petioles 1 to 2 mm. long; leaves elliptic to lanceolate, 1 to 4.5 cm. long, 0.5 to 1.4 cm. wide, acute or acuminate, rarely obtuse, obtuse at base, subcoriaceous, sericeous-strigillose beneath or on both surfaces or finally glabrate, paler beneath, the margins strongly revolute; pedicels solitary, 8 to 15 mm. long, the bractlets rounded-ovate; calyx 3 mm. long, tomentulose, the lobes semiorbicular; petals ciliolate; fruit 6 mm. long or larger, 1-seeded.

4. *Myrtus berlandiereana* Berg, *Linnaea* 27: 403. 1854.

Described from Mexico, the locality not known, but probably in Veracruz, Tamaulipas, or San Luis Potosí.

Branchlets puberulent; leaves short-petiolate, crowded, rigid, oblong-lanceolate, 1 to 2 cm. long, 4 to 6 mm. wide, acute, obtuse at base, pubescent beneath when young; pedicels 12 mm. long, the bractlets subulate, 1.5 mm. long; calyx lobes 5, ciliolate, 2 mm. long; petals oval.

5. *Myrtus montana* Benth. Pl. Hartw. 61. 1840.

Ugni montana Berg, *Linnaea* 27: 392. 1854.

Mountains of Oaxaca; type from Monte Pelado, altitude 2,100 meters.

Densely branched shrub, the branchlets covered with short stout white hairs; leaves short-petiolate, oblong to elliptic, 8 to 13 mm. long, acute or obtuse, acute at base, coriaceous, strigose beneath along the costa or glabrous, pale beneath, the margins revolute; pedicels recurved, 1 to 1.5 cm. long, the bractlets linear, 2 to 4 mm. long; calyx lobes 5, 1.5 mm. long.

Mexican material has been referred to *M. friedrichsthali* (Berg) Donn. Smith, a species occurring in Guatemala, which is probably not distinct from *M. montana*. The latter name, however, is the older one.

6. *EUGENIA* L. Sp. Pl. 470. 1753.

Shrubs or trees; inflorescence racemose, cymose, corymbose, or fasciculate, or the flowers rarely solitary; calyx tube globose or turbinate, the limb usually 4-lobate, the lobes imbricate, commonly suborbicular; petals 4, spreading, white; ovary 2-celled; fruit drupaceous or baccate, containing 1 or few seeds.

This is the largest genus of the family Myrtaceae, including probably 500 species in tropical America. The species are most abundant in the West Indies and South America. In Mexico and Central America there are comparatively few species, but it is likely that the number will be greatly increased by further exploration. Probably the number represented among the Mexican collections available for study is greater than in the following list. Several plants of which specimens have been seen probably belong to distinct species, but it is not advisable to attempt to describe them until more ample material has been collected.

The fruit of most of the species is edible, but the amount of flesh is usually scant, and the seeds large. *Eugenia uniflora* L., the Surinam cherry, known in Brazil as "pitanga," is cultivated in Florida, the West Indies, and South America for its edible fruit. This is as much as 2.5 cm. in diameter, deep crimson, juicy, and of good flavor. It is known in Cuba as "cerezo de Cayena" and in El Salvador as "guinda."

Calyx about 1.5 cm. wide-----1. *E. jambos*.

Calyx 1 cm. wide or usually much less.

Leaves shallowly cordate at base-----2. *E. trunciflora*.

Leaves obtuse or acute at base or rarely rounded.

Flowers in cymes, the central flower sessile, or the pedicels sometimes solitary or fasciculate in the leaf axils, the inflorescence then without a rachis.

Leaves long-acuminate; pedicels filiform-----3. *E. conzattii*.

Leaves rounded to short-acuminate at apex; pedicels stout.

Flowers in cymes-----4. *E. fragrans*.

Flowers fasciculate-----5. *E. rhombea*.

Flowers never in cymes, usually in short or elongate racemes, most or all of the inflorescences with an evident rachis.

Leaves pilosulous or at least with spreading pubescence on one or both surfaces, the pubescence sometimes chiefly confined to the costa.

Leaves rounded or very obtuse at apex.

Leaves 2 to 3 cm. long, very acute at base-----6. *E. mayana*.

Leaves 3.5 to 8 cm. long, very obtuse at base-----7. *E. sinaloae*.

Leaves acute or acuminate-----8. *E. organoides*.

Leaves glabrous, or sometimes sericeous-strigillose or tomentose, the pubescence, if any, appressed or closely matted.

Inflorescence densely sericeous or tomentose; leaves often covered beneath with pale sericeous pubescence.

Leaves narrowly oblong or linear-oblong, rounded at apex.

9. *E. avicenniae*.

Leaves elliptic-lanceolate to elliptic or obovate, or broader, rarely oblong but then acuminate.

Leaves soon glabrous beneath.

Leaves elliptic or oval, 2 to 3.8 cm. wide----10. *E. oaxacana*.

Leaves narrowly oblong-elliptic, 1.3 to 2 cm. wide.

11. *E. inconspicua*.

Leaves tomentulose or sericeous beneath at maturity.

Leaves tomentulose beneath with matted hairs

12. *E. tomentulosa*.

Leaves sericeous with very close, straight hairs.

Leaves acute or obtuse-acuminate.

Leaves elliptic or broadly elliptic--13. *E. guatemalensis*.

Leaves oblong-----14. *E. karwinskyana*.

Leaves rounded or very obtuse at apex.

Leaves 1.5 to 3 cm. wide, cuneate-obovate--15. *E. rekoï*.

Leaves 4 to 6.5 cm wide, rounded or obovate-rounded.

16. *E. hypargyrea*.

Inflorescence glabrous, puberulent, or minutely hirtellous, never sericeous or tomentose; leaves usually quite glabrous, never sericeous or tomentose.

Fruit small, 2.5 to 4 mm. long.

Leaves very obtuse or rounded at apex, 1 to 2.2 cm. long.

17. *E. liebmanni*.

Leaves attenuate or acuminate at apex, most of them 3 cm. long or larger-----18. *E. capuli*.

Fruit large, 6 to 10 mm. long or longer.

Buds 4 to 5 mm. in diameter-----19. *E. mexicana*.

Buds less than 3 mm. in diameter.

Calyx lobes deltoid, acute or acutish. Leaves rounded or very obtuse at apex-----20. *E. deltoidea*.

Calyx lobes suborbicular, rounded at apex.

Leaves linear-lanceolate, 4.5 to 6.5 cm. long, 6 to 9 mm. wide.

21. *E. lindeni*.

Leaves lanceolate to elliptic.

Leaves deep green above, much paler beneath.

22. *E. xalapensis*.

Leaves concolorous or nearly so.

Leaves small, mostly 3 to 4.5 cm. long, turning black when dry-----23. *E. axillaris*.

Leaves large, mostly 6 to 10 cm. long, not turning black when dried-----24. *E. acapulcensis*.

1. *Eugenia jambos* L. Sp. Pl. 470. 1753.*Jambosa vulgaris* DC. Prodr. 3: 286. 1828.*Jambosa jambos* Millsp. Field Mus. Bot. 2: 80. 1900.

Cultivated in Guerrero, Veracruz, Tabasco, and doubtless elsewhere; probably naturalized locally. Native of southeastern Asia and Australia, but widely cultivated and naturalized in tropical regions.

Glabrous tree, 6 to 9 meters high; leaves short-petiolate, narrowly lanceolate, 12 to 20 cm. long, long-attenuate, coriaceous; flowers greenish white, sweet-scented, in few-flowered terminal cymes, the petals 1.5 to 2 cm. long; stamens very numerous, 3 to 4 cm. long; fruit pyriform or subglobose, 3 to 5 cm. thick, white or yellowish, tinged with pink. "Pomarosa" (Veracruz, Oaxaca, El Salvador, Guerrero, Porto Rico); "manzana rosa" (El Salvador).

The rose-apple is cultivated for its fruit, which is fragrant like roses. The fruit is sweet and insipid; it is used locally for making preserves and confectionery. In some parts of the American tropics the tree has become thoroughly naturalized. In Porto Rico the branches are employed for hoops of sugar casks and for coarse baskets. The pulverized seeds are employed in El Salvador as a remedy for diabetes, and the wood is used for fuel. The tree is a handsome one for ornamental planting.

2. *Eugenia trunciflora* (Schlecht. & Cham.) Berg, Linnaea 27: 223. 1854.*Myrtus trunciflora* Schlecht. & Cham. Linnaea 5: 561. 1830.

Veracruz; type material collected between Mesa Chica and Malpique, and at Papantla. El Salvador.

Branchlets pilose or glabrate; leaves short-petiolate, elliptic-oblong, 12 to 25 cm. long, 4 to 10 cm. wide, acuminate, coriaceous, minutely pilosulous beneath or glabrate, lustrous above; pedicels fasciculate on the old branches, the pedicels 8 to 15 mm. long; calyx about 1 cm. wide, the lobes rounded, ciliate. "Icaco" (El Salvador).

The writer has referred here two specimens from Zacuapan, Veracruz (*Purpus* 2434 and 7663). These differ from the original description in having pubescent leaves, and they may be specifically distinct.

3. *Eugenia conzattii* Standl., sp. nov.

San Luis Potosí, Veracruz, Oaxaca, and Guerrero; type from Apango, Distrito de Pochutla, Oaxaca, altitude 400 meters (*Conzatti, Reko & Makrinus* 3113; U. S. Nat. Herb. no. 763841).

Shrub or small tree, glabrous throughout; leaves short-petiolate, lanceolate to oblong-lanceolate or elliptic, 5 to 8.5 cm. long, 1 to 4 cm. wide, abruptly acuminate or long-acuminate, with acute or obtuse tip, acute or obtuse at base, thin; pedicels sometimes fasciculate but most of the flowers in long-pedunculate 3-flowered cymes, the central flower usually sessile, the lateral ones filiform-pedicellate; calyx about 3 mm. broad, the lobes rounded, ciliate; fruit globose, 6 to 8 mm. long, 1-seeded. "Yagalán" (Oaxaca, *Reko*).

Galeotti 2882 and 2887 from Oaxaca belong here, also *Palmer* 148 from San Luis Potosí, and probably *Rovirosa* 510 from Tabasco. The specimens from eastern Mexico have wider leaves than those from Guerrero and Oaxaca, but probably all are conspecific. Upon the same plant some of the flowers are solitary and others cymose. The fruit is said to be edible.

4. *Eugenia fragrans* (Swartz) Willd. Sp. Pl. 2: 964. 1800.*Myrtus fragrans* Swartz, Prodr. Veg. Ind. Occ. 79. 1788.*Ananomis fragrans* Griseb. Fl. Brit. W. Ind. 240. 1860.

Tepic, Durango, San Luis Potosí, Tamaulipas, and Veracruz. West Indies.

Shrub or tree; leaves elliptic-oblong to obovate or elliptic, 2.5 to 7 cm. long, 1.5 to 4 cm. wide, obtuse to rounded at apex, sometimes acutish or emargi-

nate, acute or obtuse at base, coriaceous, glabrous; cymes 3 to several-flowered, or some of the peduncles rarely 1-flowered, the peduncles equaling or shorter than the leaves; calyx 5 to 7 mm. broad, the tube strigillose, the lobes rounded, ciliate; petals white; fruit globose, 8 mm. long or larger, containing 2 or more seeds. "Guayabillo," "pimientilla" (Tamaulipas).

Palmer reports that this is a tree with compact crown, very thin, smooth, whitish bark, and fragrant flowers. The wood is used for building huts and for other purposes.

5. *Eugenia rhombea* (Berg) Krug & Urb. Bot. Jahrb. Engler 19: 644. 1895.
Eugenia foetida rhombea Berg, Linnaea 27: 212. 1854.

Veracruz. Southern Florida and West Indies; type from Florida.

Shrub or tree, sometimes 8 meters high, with a trunk 30 cm. in diameter; bark thin, smooth, light gray or reddish gray; leaves short-petiolate, ovate or elliptic, 3 to 6 cm. long, obtuse-acuminate, acute or obtuse at base, coriaceous, pale, glabrous; pedicels fasciculate, 8 to 15 mm. long; calyx about 5 mm. wide, glabrous; fruit globose, about 1.5 cm. in diameter, orange, reddish, or black, with thin dry flesh.

Known in Florida and the British West Indies as "red stopper" and "spiceberry."

6. *Eugenia mayana* Standl., sp. nov.

Type from Izamal, Yucatán (*Gaumer* 714; U. S. Nat. Herb. no. 571749).

Branches terete, gray, densely puberulent when young; leaves short-petiolate, oblong-obovate or obovate, 2 to 3 cm. long, rounded or very obtuse at apex, cuneate-attenuate at base, thin, puberulent, especially on the upper surface, paler beneath, the margins revolute; flowers in dense axillary and lateral glomerules, the pedicels 1 to 2 mm. long, puberulent, the bractlets minute, rounded; calyx about 1 mm. broad, puberulent, the 4 lobes oval, obtuse; petals about 2 mm. long.

7. *Eugenia sinaloae* Standl. sp. nov.

Sinaloa; type from Guadalupe (*Rose, Standley & Russell* 14793; U. S. Nat. Herb. no. 637673).

Shrub or small tree, the branches terete, gray, the young ones brown, densely pilosulous; leaves short-petiolate, oval or oval-obovate, 3.5 to 8 cm. long, 2 to 4.5 cm. wide, rounded at apex, obtuse or rounded at base, minutely pilosulous at first but sometimes glabrate in age, the margins plane; flowers glomerate, but the inflorescence with a very short puberulent rachis; fruit sessile or nearly so, red, 7 to 8 mm. in diameter, 1-seeded. "Guayabillo."

The leaves are said to be used as a remedy for bronchitis.

8. *Eugenia origanoides* Berg, Linnaea 29: 229. 1857.

Tamaulipas, Veracruz, Tabasco, and Chiapas; type from Papantla, Veracruz.

Shrub or small tree, 2 to 4.5 meters high, the branchlets fulvous-hirtellous; leaves short-petiolate, broadly elliptic to narrowly elliptic-oblong, 5 to 10.5 cm. long, 2 to 5.5 cm. wide, acute or acuminate, acute to rounded at base, rather thin, deep green above, paler beneath, finely hirtellous or pilosulous, in age glabrate; flowers white, sweet-scented, densely glomerate; fruit 6 mm. in diameter or larger, red or black, 1 or 2-seeded. "Escobillo" (Tabasco); "capulín" (Veracruz; the fruit).

Palmer reports that the edible fruit, which is borne in great profusion, is sold in large quantities in the market at Tampico. The flowers are much frequented by bees.

9. *Eugenia avicenniae* Standl., sp. nov.

Vicinity of Acapulco, Guerrero (type, *Palmer* 57; U. S. Nat. Herb. no. 266797).

Slender shrub, the branches terete, gray, strigillose when young; petioles 1 to 2 mm. long; leaf blades narrowly oblong or linear-oblong, 3.5 to 6 cm. long, 0.7 to 2.3 cm. wide, rounded at apex, slightly narrowed to the obtuse base, coriaceous, thinly strigillose or glabrate; flowers racemose, the racemes half as long as the leaves, 4 or 5-flowered, the pedicels 5 to 8 mm. long, fulvous-sericeous, the bractlets linear, 2 mm. long; calyx 6 to 7 mm. broad, fulvous-sericeous, the lobes rounded; fruit 1 cm. long. "Capulín."

Palmer 358 from Acapulco belongs to this species.

10. *Eugenia oaxacana* Standl., sp. nov.

Oaxaca and perhaps in Morelos; type from San Gerónimo, Oaxaca (*Purpus* 7139; U. S. Nat. Herb. no. 567463).

Tree, 6 meters high, the branches terete, grayish, densely brownish-strigillose when young; petioles 3 to 7 mm. long, broadly elliptic or oval, 3 to 6 cm. long, 2 to 3.8 cm. wide, rounded or obtuse at apex and base, thin, bright green, subconcolorous, glabrous in age; flowers chiefly in elongate racemes (2 to 3.5 cm. long) but partly solitary, the pedicels stout, 2 to 8 mm. long, brownish-strigillose, the bractlets minute, lance-acuminate, caducous; calyx 7 mm. broad, brownish-sericeous, the lobes broadly rounded, ciliate.

Pringle 7234, from Cuernavaca, is probably referable to this species.

11. *Eugenia inconspicua* Standl., sp. nov.

Type from Culiacán, Sinaloa (*Palmer* 1786; U. S. Nat. Herb. no. 567797).

Branches terete, gray, cinereous-strigillose when young; petioles 2 to 3 mm. long; leaf blades narrowly oblong-elliptic, 2.5 to 5 cm. long, 1.3 to 2 cm. wide, narrowed to the obtuse apex, acute or attenuate at base, thin, subconcolorous, glabrous, at least in age; inflorescence short-racemose, the rachis 2 to 4 mm. long, the fruiting pedicels 5 to 7 mm. long, whitish-strigillose, the bractlets lance-deltoid, acute, 1.5 mm. long; calyx about 7 mm. broad, the 4 lobes rounded, minutely sericeous; fruit subglobose, 8 mm. long or larger, glabrate.

12. *Eugenia tomentulosa* Standl., sp. nov.

Type from Acaponeta, Tepic (*Rose* 1476; U. S. Nat. Herb. no. 300313).

Branches terete, gray, the young ones densely grayish-tomentose; petioles very stout, 3 to 9 mm. long; leaf blades oblong-elliptic or obovate, 6.5 to 11.5 cm. long, 3 to 5 cm. wide, obtuse, acute or obtuse at base, coriaceous, opaque, when young densely tomentose on both surfaces, in age glabrate, the venation prominent and reticulate beneath; inflorescence racemose, the racemes 3 to 5-flowered, pedunculate, 3 to 4 cm. long, the pedicels stout, 2 to 5 mm. long, tomentose, the bractlets subulate, caducous; calyx 7 to 10 mm. broad, tomentose, the 4 lobes rounded.

13. *Eugenia guatemalensis* Donn. Smith, Bot. Gaz. 23: 245. 1897.

Sinaloa to Oaxaca. Guatemala and El Salvador; type from Santa Rosa, Guatemala.

Shrub or tree, 2 to 7 meters high; leaves short-petiolate, mostly elliptic, 3.5 to 8.5 cm. long, 1.5 to 5.5 cm. wide, shortly obtuse-acuminate, acute to very obtuse at base, finely sericeous when young, in age usually glabrate above; flowers in short, dense or lax racemes, or glomerate; calyx about 5 mm. broad, sericeous; fruit oval, 8 to 14 mm. long, black at maturity, 1-seeded. "Guayabillo" (Sinaloa); "capulín" (Guerrero); "guacuco" (El Salvador).

The wood is used in Sinaloa for fence posts. It is not at all certain that all the specimens referred here are conspecific, but without more ample material (eight sheets have been seen) it does not seem advisable to attempt any segregations.

14. *Eugenia karwinskyana* Berg, *Linnaea* 29: 244. 1857.

Type from river banks near Huejutla, Hidalgo.

Branchlets silvery-sericeous; leaves oblong, 5 to 10 cm. long, 2 to 3.5 cm. wide, acuminate, acute at base, thin, silvery-sericeous when young, glabrate in age; racemes 2 to 5 cm. long, 6 to 24-flowered; sepals 4, 1 mm. long; fruit depressed-globose, 6 mm. in diameter.

The writer has seen no specimens which agree with the original description.

15. *Eugenia rekoi* Standl., sp. nov.

Type from Cafetal Apango, Cerro Huatulco, Oaxaca, altitude 400 meters (*Reko* 3356; U. S. Nat. Herb. no. 842489).

Branchlets brownish, strigillose when young; petioles 2 to 3 mm. long; leaf blades mostly cuneate-obovate, 4.5 to 6 cm. long, 1.5 to 3 cm. wide, rounded or very obtuse at apex, cuneate at base, chartaceous, paler beneath, very minutely strigillose, glabrate in age; flowers glomerate or in very short racemes with nearly obsolete rachis, the pedicels 2 to 3 mm. long, brown-sericeous; calyx lobes rounded, brown-sericeous.

16. *Eugenia hypargyrea* Standl., sp. nov.

Type from Ternera, Zacuapan, Veracruz (*Purpus* 6171; U. S. Nat. Herb. no. 464686).

Branches brown or gray, the young ones compressed, sericeous; petioles very stout, 5 to 8 mm. long; leaf blades suborbicular to rounded-obovate, 6 to 10 cm. long, 4 to 6.5 cm. wide, broadly rounded at apex, subacute to very obtuse at base, coriaceous, green and glabrous above, densely covered beneath with minute whitish sericeous pubescence; flowers fasciculate or short-racemose, the pedicels stout, 3 to 6 mm. long; fruit globose-oval, about 1 cm. long, 1-seeded.

17. *Eugenia liebmanni* Standl., sp. nov.

Type from Villa Alta, Oaxaca (*Liebmann* 3969; U. S. Nat. Herb. no. 1012959).

Branches slender, terete, grayish, the young ones brownish, compressed, minutely puberulent; petioles 2 mm. long; leaf blades oblong-elliptic or elliptic, 1 to 2.2 cm. long, 0.7 to 1.2 cm. wide, rounded or very obtuse at apex, obtuse at base, thin, glabrous, deep green above, paler beneath and black-punctate; flowers fasciculate or racemulose, the rachis of the raceme 3 mm. long or less; pedicels very slender, 2.5 to 3 mm. long, puberulent, the bractlets minute, rounded; fruit depressed-globose, 5 mm. broad, 4 mm. long, 1-seeded.

18. *Eugenia capuli* (Schlecht. & Cham.) Berg, *Linnaea* 27: 238. 1854.

Myrtus capuli Schlecht. & Cham. *Linnaea* 5: 561. 1830.

Eugenia schiedeana Schlecht. *Linnaea* 13: 418. 1839.

Eugenia capuli micrantha Berg, *Linnaea* 27: 239. 1854.

Eugenia capuli macroterantha Berg, *Linnaea* 27: 239. 1854.

?*Eugenia calycorectoides* Berg, *Linnaea* 29: 236. 1857.

Tamaulipas, San Luis Potosí, and Veracruz; type from Papantla, Veracruz. Guatemala.

Shrub or small tree, 2 to 4.5 meters high, with slender branches and dense crown; leaves petiolate, lanceolate to elliptic, mostly 3 to 5.5 cm. long, obtuse-acuminate, acute at base, dark green, usually glabrous; flowers fasciculate

or in very short racemes, slender-pedicellate, the pedicels 2 to 5 mm. long; fruit subglobose, 3 to 4 mm. in diameter, red turning black. "Capulín" (Tamaulipas, Oaxaca, Veracruz); "yagalán" (Oaxaca, *Conzatti*).

The fruit is edible, but the pulp is very scant. The wood is useful only for fuel.

19. *Eugenia mexicana* Steud. Nom. Bot. ed. 2. 1: 603. 1840.

Eugenia macrocarpa Schlecht. Linnaea 5: 560. 1830. Not *E. macrocarpa* Roxb. 1814.

Veracruz; type from Jalapa.

Shrub or small tree, 4.5 to 6 meters high, glabrous throughout; leaves petiolate, broadly elliptic, 6 to 8.5 cm. long, 2.5 to 5 cm. wide, abruptly obtuse-acuminate, obtuse or rounded at base, bright green above, paler yellow-green beneath, thin; racemes short and dense, 4 to 8-flowered, about equaling the petiole, the flowers subsessile; flowers about 8 mm. broad; fruit 1-seeded.

20. *Eugenia deltoidea* Standl., sp. nov.

Type collected between San Marcos and Copala, Guerrero, altitude 60 to 150 meters (*Nelson* 2292; U. S. Nat. Herb. no. 569295).

Branches terete, gray, the young ones compressed, brownish, glabrous; petioles slender, 4 to 6 mm. long; leaf blades elliptic-oblong to oval-elliptic, 5 to 6 cm. long, 2 to 3 cm. wide, very obtuse or rounded at apex, obtuse at base, subcoriaceous, glabrous, brownish beneath when dry and densely black-punctulate; inflorescence racemulose, dense, 1.5 cm. long or less, the racemes with 10 or fewer flowers, the pedicels 1 to 3 mm. long, glabrous; bractlets deltoid or rounded-deltoid, acute or obtuse; calyx 2.5 mm. broad, glabrous, the lobes deltoid, acute to subobtuse, ciliate; petals densely punctulate.

21. *Eugenia lindeniana* Berg, Linnaea 29: 240. 1857.

Type from Teapa, Tabasco.

Branchlets minutely puberulent; leaves linear-lanceolate, attenuate to each end, subobtuse at apex, thin, when young puberulent along the costa but soon glabrous; racemes slender, 4 to 6-flowered, about as long as the petiole, the pedicels 3 to 4 mm. long, puberulent.

Known to the writer only from the original description.

22. *Eugenia xalapensis* (H. B. K.) DC. Prodr. 3: 276. 1828.

Myrtus xalapensis H. B. K. Nov. Gen. & Sp. 6: 145. 1823.

Veracruz; reported from Oaxaca; type from Jalapa.

Shrub or small tree, glabrous throughout; leaves petiolate, narrowly or broadly elliptic, 3 to 5.5 cm. long, 1.3 to 3 cm. wide, abruptly obtuse-acuminate or cuspidate-acuminate, acute or obtuse at base, dark green above, pale yellowish green beneath; racemes 3 to 9-flowered, short and dense, the pedicels 1.5 to 3 mm. long; fruit subglobose, 8 to 14 mm. in diameter. "Reyán" (Oaxaca, *Conzatti*).

23. *Eugenia axillaris* (Swartz) Willd. Sp. Pl. 2: 970. 1800.

Myrtus axillaris Swartz, Prodr. Veg. Ind. Occ. 78. 1788.

Veracruz and Yucatán. Southern Florida; West Indies and Central America.

Shrub, or sometimes a tree 8 meters high, with a trunk 30 cm. in diameter; bark thin, light brown, shallowly fissured; leaves elliptic or ovate-elliptic, rather long-petiolate, obtuse or acutish, acute or obtuse at base, glabrous; flowers in small dense clusters as long as the petioles or shorter; corolla 3 to 4 mm. broad; fruit globose, 10 to 12 mm. in diameter, the thin flesh sweet, aro-

matic; wood hard, strong, close-grained, brown or reddish brown, its specific gravity about 0.91. "Guayacán negro," "escobo" (El Salvador).

Known in Florida as "white stopper." The leaves have an unpleasant odor. The Mexican material may be different from that of the West Indies.

24. *Eugenia acapulcensis* Steud. Nom. Bot. ed. 2. 1: 601. 1840.

Myrtus maritima H. B. K. Nov. Gen. & Sp. 6: 146. 1823.

Eugenia maritima DC. Prodr. 3: 282. 1828. Not *E. maritima* DC. Prodr. 3: 227. 1828.

?*Eugenia colipensis* Berg, Linnaea 29: 243. 1857.

Sinaloa to Morelos and Chiapas; type from Acapulco, Guerrero. The type of *E. colipensis* is from Colipa, Veracruz.

Shrub or tree, 3 to 12 meters high; leaves short-petiolate, lanceolate to elliptic-oblong or oval-elliptic, acute or obtuse, rarely obtuse-acuminate, acute to rounded at base, glabrous, brownish beneath when dry; flowers white, racemulose, the racemes about as long as the petioles, dense, the pedicels glabrous or puberulent; fruit red or black, usually oval, 8 to 15 mm. long. "Capulín" (Guerrero).

The edible fruit is sold in the markets. The material referred here is rather variable and may represent two or more species.

7. MYRCIA DC.; Guillem. Dict. Class. Hist. Nat. 11: 378. 1826.

Trees or shrubs; flowers small, in axillary and terminal, loose panicles; calyx tube turbinate or hemispheric, the lobes 5; petals 5, spreading; fruit baccate, usually 2-celled.

The fruit of *M. coriacea* Vahl, of the West Indies, is said to be used medicinally, and its bark for tanning, while the wood yields a dye.

Leaves acute or very shortly acuminate, pilose beneath; branches of the inflorescence with spreading pubescence----- 1. *M. rufidula*.

Leaves very long cuspidate-acuminate, glabrous beneath except along the costa; pubescence of the inflorescence appressed----- 2. *M. oerstediana*.

1. *Myrcia rufidula* Schlecht. Linnaea 13: 416. 1839.

Myrcia sartoriana Berg, Linnaea 29: 220. 1857.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Small tree, the branchlets pilose; leaves nearly sessile, lance-oblong to oblong-ovate, 5 to 13 cm. long, rounded or obtuse at base, glabrate on the upper surface, paler beneath; panicles few or many-flowered, equaling or shorter than the leaves; buds 2 mm. long; petals suborbicular, white, sericeous outside.

2. *Myrcia oerstediana* Berg, Linnaea 27: 112. 1854.

Oaxaca. Costa Rica, the type from Cartago.

Branchlets appressed-pilose at first but soon glabrate; leaves subsessile, narrowly lance-oblong, 6 to 12.5 cm. long, acute or obtuse at base, thin, glabrous above; panicles very lax, shorter than the leaves, the flowers slender-pedicellate; buds 1.5 to 2 mm. long; fruit 6 to 12 mm. long, 1-seeded. "Yagalan" (Oaxaca, Zapotec, *Reko*); "turro" (Costa Rica).

123. MELASTOMACEAE. Meadow-beauty Family.

REFERENCE: Cogniaux in DC. Monogr. Phan. 7. 1891.

Shrubs or trees, or sometimes herbs, usually erect, rarely epiphytic; leaves opposite, entire or toothed, commonly 3 to 9-nerved, in one genus pinnate-nerved, estipulate; flowers perfect, showy or inconspicuous, commonly white, pink, red, purple, or yellow; calyx tube free or adnate to the ovary, the limb

truncate, lobed, or calyptriform; petals as many as the calyx lobes, inserted on the limb of the calyx; stamens as many or twice as many as the petals; style simple, the stigma capitate or punctiform; fruit baccate or capsular, 2 to many-celled.

One of the largest families of American plants, in Mexico confined chiefly to the truly tropical, and generally humid portions of the southern states. Since nearly all the Mexican representatives of the family are woody, it has seemed advisable to include in the present treatment the herbaceous species as well.

One class of terms used in describing the nervation of the leaves in this family should be explained here: Three-nerved or 5-nerved leaves are those in which all the nerves arise from the base of the blade; triplinerved or quintuplinerved leaves are those in which the lateral nerves have their origin above the base of the blade.

Fruit capsular; stamens usually unequal.

Capsule 3-winged, dilated at apex-----13. **TRIOLENA**.

Capsule terete or angulate, acute or obtuse at apex.

Connective of the anther usually long-produced below the base of the anther.

Seeds oblong or ovoid.

Anthers rostrate-----1. **RHYNCHANThERA**.

Anthers erostrate-----2. **CENTRADENIA**.

Seeds cochleate.

Stamens very unequal; connective of the larger anthers with 2 elongate appendages.

Lobes of the calyx much shorter than the tube.

3. **ARTHROSTEMMA**.

Lobes equaling the tube or nearly so.

Connective of the smaller anthers bilobate anteriorly; connective of the larger anthers bifid or with 2 long spurs anteriorly.

4. **ACISANTHERA**.

Connective of the smaller anthers not bilobate, that of the larger anthers with an elongate bifid appendage.

5. **HETEROCENTRON**.

Stamens subequal, the anthers all of about the same size, the connective merely biauriculate or bituberculate.

Ovary glabrous at apex-----6. **ACIOTIS**.

Ovary setose at apex.

Calyx tube with 8 very broad, thick tuberculate-setose ribs.

7. **SCHWACKAEA**.

Calyx tube with very slender nervelike ribs.

Calyx lobes alternating with penicillate-stellate bristles.

8. **PTEROLEPIS**.

Calyx lobes without intermediate bristles--9. **TIBOUCHINA**.

Connective of the anther not conspicuously produced below the base of the anther.

Seeds cochleate-----10. **MONOCHAETUM**.

Seeds ovoid or fusiform.

Plants scandent; calyx limb shallowly 5-lobate--11. **ADELOBOTRYS**.

Plants erect; calyx limb circumscissile-----12. **CALYPTRELLA**.

Fruit baccate or coriaceous and rupturing irregularly; stamens equal or nearly so.

Leaves pinnate-nerved-----24. **MOURIRIA**.

Leaves longitudinally 3 to 9-nerved.

Leaves closely transverse-striolate between the primary nerves.

Filaments very thick; anthers short, obtuse-----22. **BLAKEA**.

Filaments filiform; anthers subulate-----23. **TOPOBEA**.

Leaves not striolate.

Inflorescence terminal.

Petals acute-----14. **LEANDRA**.

Petals obtuse.

Calyx limb calyptriform, circumscissile-----15. **CONOSTEGIA**.

Calyx limb truncate or lobate, open in bud, not circumscissile.

Outer calyx lobes none or inconspicuous-----16. **MICONIA**.

Outer calyx lobes larger than the inner ones.

17. **HETEROTRICHUM**.

Inflorescence axillary or lateral.

Petals acute-----18. **OSSAEA**.

Petals obtuse.

Leaves with large inflated bladder-like appendages at base.

19. **MAIETA**.

Leaves not appendaged.

Anthers linear-subulate, with 1 pore at apex-----20. **CLIDEMIA**.

Anthers short, obtuse, with 2 pores at apex-----21. **BELLUCIA**.

1. **RHYNCHANThERA** DC. Prodr. 3: 106. 1828.

1. **Rhynchanthera mexicana** DC. Prodr. 3: 108. 1828.

Rhynchanthera insignis Naud. Ann. Sci. Nat. III. 12: 210. 1849.

Veracruz and perhaps elsewhere. Panama.

Slender shrub, the branches glandular-hirtellous, terete; leaves long-petio- late, lanceolate or ovate-oblong, 6 to 14 cm. long, long-acuminate, 7 or 9-nerved, rounded or subcordate at base, hispidulous, serrulate; flowers in axillary cymes; calyx tube 5 mm. long, the lobes subulate, 5 to 9 mm. long; petals purple-violet, 3 cm. long, acutish; stamens 10, one of them much larger than the others, rostrate; capsule subglobose, 5 to 7 mm. in diameter.

2. **CENTRADENIA** G. Don, Hist. Dichl. Pl. 2: 755. 1832.

Herbs or small shrubs, alternately branched; leaves petiolate, very unequal at base, entire; flowers small, pink or white, in corymbiform cymes, 4-parted; petals obovate or rounded; stamens unequal, the anthers obtuse, the con- nective produced below, bearing a clavate or bilobate appendage; capsule 4- celled, the seeds minute.

Stems glabrous-----1. **C. chiapensis**.

Stems puberulent, pilose, or hirtellous.

Stems glandular-pilose, winged-----2. **C. grandifolia**.

Stems hirtellous or puberulent, the pubescence not glandular; stems not winged.

Pedicels glandular-pilose; leaves 1.5 to 3 cm. wide-----3. **C. salicifolia**.

Pedicels without glandular pubescence; leaves mostly less than 1 cm. wide.

4. **C. inaequilateralis**.

1. **Centradenia chiapensis** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 501. 1919.

Known only from the type locality, Cerro del Boquerón, Chiapas.

Stems 30 cm. high, 4-angulate; leaves ovate-acuminate, 13 cm. long and 4 cm. wide or smaller, cuneate at base, hirtellous above, pilose beneath along the nerves; calyx 6 mm. long, glabrous; petals 4 mm. long.

2. *Centradenia grandifolia* (Schlecht.) Endl. Gen. Pl. 1207. 1836-50.*Plagiophyllum grandifolium* Schlecht. Linnaea 13: 429. 1839.

Type from Chiconquiaco, Veracruz. Guatemala.

Stems 30 to 50 cm. high; leaves oblong-lanceolate, 7 to 11 cm. long and 2 to 3 cm. wide or smaller, acuminate, pilosulous; cymes many-flowered; petals 8 mm. long.

3. *Centradenia salicifolia* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 379. 1913.

Known only from the type locality, wet rocky slopes of the Sierra Madre above Misantla, Veracruz.

Stems suffrutescent, puberulent or glabrate; leaves lanceolate, 13 cm. long or less, nearly glabrous; cymes lax, many-flowered; calyx sparsely setose; petals purplish, 6 to 7 mm. long.

4. *Centradenia inaequilateralis* (Schlecht. & Cham.) Don, Hist. Dichl. Pl. 2: 755. 1832.*Rhexia inaequilateralis* Schlecht. & Cham. Linnaea 5: 567. 1830.*Plagiophyllum parvifolium* Schlecht. Linnaea 13: 428. 1839.*Centradenia rosea* Lindl. Bot. Reg. 29: pl. 20. 1843.

Veracruz; type from Cuesta Grande de Chiconquiaco. Central America.

Plants very slender, 30 to 80 cm. high, often suffrutescent, short-hirtellous; leaves mostly 2 to 4 cm. long, sometimes larger, narrowly lanceolate, sparsely hirtellous or glabrate; calyx hirtellous; petals 5 to 6 mm. long, purplish pink.

3. **ARTHROSTEMMA** Ruiz & Pav. Fl. Peruv. Chil. 4: pl. 326. 1802.

Plants herbaceous or sometimes suffrutescent at base, dichotomous; leaves petiolate, 5 or 7-nerved, serrulate; flowers terminal, cymose, pink or purple, 4-parted; calyx glabrous, the tube narrow, the lobes very short; petals obovate; anthers obtuse, the connective of the larger ones produced below the cells, with a filiform anterior appendage; capsule 4-valvate.

Stamens all of about equal length-----1. **A. fragile.**

Stamens very unequal, the larger ones twice as long as the others.

2. **A. campanulare.**1. *Arthrostemma fragile* Lindl. Journ. Hort. Soc. 3: 74 1848.*Heteronoma galeottianum* Naud. Ann. Sci. Nat. III. 14: 151. 1850.

Veracruz and Chiapas. Central America; Cuba.

Stems succulent, glabrous or sparsely glandular-pilose; leaves oblong-ovate, 3 to 6.5 cm. long, acuminate, rounded at base, 5-nerved; calyx 7 to 9 mm. long; petals pink, 2 to 2.5 cm. long; capsule 10 to 12 mm. long. "Jazmín montés" (El Salvador).

2. *Arthrostemma campanulare* (Naud.) Triana, Trans. Linn. Soc. 28: 35. 1871.*Heteronoma campanulare* Naud. Ann. Sci. Nat. III. 14: 153. 1850.

Chiapas. Central America and northern South America.

Branches sparsely glandular-pilose when young or glabrous; leaves ovate or oblong-ovate, 4 to 6 cm. long acuminate, rounded or subcordate at base, 5-nerved; calyx 7 to 8 mm. long; petals purple, 1.5 to 2 cm. long; capsule about 1.5 cm. long.

4. **ACISANTHERA** Adans. Fam. Pl. 2: 85. 1703.1. *Acisanthera quadrata* Juss.; Polr. Encycl. Suppl. 1: 111. 1810.*Rhexia acisanthera* L. Syst. Nat. ed. 10. 998. 1759.

Guerrero and Veracruz. West Indies; Central and South America.

Plants herbaceous, usually much branched, the stems glandular-pilose; leaves petiolate, broadly ovate to ovate-lanceolate, obtuse or acute, 1 to 1.5 cm. long, serrulate; flowers solitary; calyx tube 3 mm. long; petals pink or purple, 6 mm. long.

5. **HETEROCENTRON** Hook. & Arn. Bot. Beechey Voy. 290. 1840.

Plants herbaceous or suffrutescent; leaves 3-nerved or pinnate-nerved; flowers solitary or paniculate, 4-parted; calyx tube ovoid or hemispheric, the lobes triangular, acute, about as long as the tube; petals ovate or obovate; stamens very unequal, the connective of the larger anther long-produced below the cells and appendaged; capsule 4-valvate.

The following species are all that are known.

Flowers solitary.

Calyx glandular-setose; leaves 3-nerved-----1. *H. elegans*.

Calyx setulose with glandular hairs; leaves pinnate-nerved.

2. *H. suffruticosum*.

Flowers paniculate.

Pedicels glabrous.

Pedicels in anthesis little if at all exceeding the calyx tube; calyx lobes lance-triangular-----3. *H. subtriplinervium*.

Pedicels in anthesis more than twice as long as the calyx tube; calyx lobes linear-----4. *H. laxiflorum*.

Pedicels setulose.

Calyx tube glandular-setulose.

Calyx lobes not ciliate-----5. *H. axillare*.

Calyx lobes usually conspicuously ciliate-----6. *H. mexicanum*.

Calyx tube without gland-tipped hairs.

Scales at apex of the ovary not ciliate.

Calyx tube 3 mm. long; leaves 1 to 2.5 cm. wide-----7. *H. roseum*.

Calyx tube 4 to 5 mm. long; leaves 2.5 to 3 cm. wide-----8. *H. occidentale*.

Scales setose-ciliate.

Branches conspicuously winged-----9. *H. alatum*.

Branches not winged-----10. *H. macrostachyum*.

1. **Heterocentron elegans** (Schlecht.) Kuntze, Rev. Gen. Pl. 1: 247. 1891.

Heeria elegans Schlecht. Linnaea 13: 432. 1839.

Heeria procumbens Naud. Ann. Sci. Nat. III. 14: 151. 1850.

Schizocentron elegans Meisn. Gen. Comm. 355. 1843.

Veracruz; type from Jalapa.

Stems prostrate, herbaceous or suffrutescent, appressed-setulose; leaves broadly ovate, 5 to 12 mm. long, obtuse or acute, crenulate, ciliate; flowers long-pedicellate; calyx tube densely glandular-setulose, the hairs with enlarged bases; petals 10 to 12 mm. long, bright crimson; scales at apex of ovary ciliate.

This plant has been cultivated in the United States under the names "crimson creeper," and *Heeria mexicana*.

2. **Heterocentron suffruticosum** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 57. 1914.

Type from Cerro del Boquerón, Chiapas.

Stems decumbent, suffrutescent, appressed-setulose, the roots tuberiferous; leaves broadly ovate or rounded, 3 to 5.5 cm. long, rounded or very obtuse at apex, entire, sparsely appressed-setulose; flowers long-pedicellate; petals pink or purple, 14 mm. long.

3. *Heterocentron subtriplinervium* (Link & Otto) A. Br. Ind. Sem. Hort. Berol. App. 3. 1851.

Melastoma subtriplinervia Link & Otto, Icon. Pl. Rar. pl. 24. 1841.

Heeria subtriplinervia Triana, Trans. Linn. Soc. Bot. 28: 34. 1871.

Veracruz and Oaxaca. Guatemala.

Stems erect or decumbent, chiefly herbaceous, sparsely setulose; leaves elliptic-oblong or oblong-lanceolate, 3 to 6 cm. long, acute, 9 to 13-nerved, attenuate at base; petals white, about 1 cm. long. "Caña de venado" (Veracruz).

Said to be employed in Veracruz as a remedy for gonorrhoea.

4. *Heterocentron laxiflorum* Standl., sp. nov.

Type from El Ocote, Cerro Pedregoso, Michoacán or Guerrero (*Langlassé* 536; U. S. Nat. Herb. no. 386019).

Stems suffrutescent, quadrangular, 1.5 meters high, sparsely appressed-setulose; leaves slender-petiolate, lance-oblong or ovate-oblong, 3 to 5 cm. long, 1 to 2 cm. wide, acute, attenuate at base, pinnate-nerved, thin, ciliate, sparsely appressed-setulose; panicles many-flowered, the branches very slender, glabrous, the pedicels filiform, curved, 7 to 10 mm. long; calyx tube 2.5 mm. long, glabrous or sparsely short-setulose with eglandular hairs, the lobes 4 to 5 mm. long, linear or nearly so, eciliate; petals white, 7 to 8 mm. long; capsule about 5 mm. long, the lobes eciliate.

5. *Heterocentron axillare* Naud. Ann. Sci. Nat. III. 14: 155. 1850.

Heterocentron alpestre Naud. Ann. Sci. Nat. III. 14: 156. 1850.

Heterocentron glandulosum Schenck in Regel, Gartenfl. 1856: 227. pl. 169. 1856.

Heeria axillaris Cogn. in DC. Monogr. Phan. 7: 138. 1891.

Veracruz and Oaxaca. Central America.

Stems herbaceous or suffrutescent, appressed-setulose; leaves elliptic-oblong or ovate-oblong, 3 to 6.5 cm. long, acute, entire, densely setulose; petals pink, 6 to 8 mm. long.

6. *Heterocentron mexicanum* Hook. & Arn. Bot. Beechey Voy. 290. 1840.

Heterocentron undulatum Naud. Ann. Sci. Nat. III. 14: 155. 1850.

Heeria undulata Triana, Trans. Linn. Soc. Bot. 28: 34. 1871.

Sinaloa, Durango, Tepic, Jalisco, and Guerrero; type from the Sierra Madre.

Stems chiefly herbaceous, erect, appressed-setulose; leaves oblong to elliptic, 3 to 7 cm. long, obtuse or acute, appressed-setulose; petals white or pink, 5 to 8 mm. long.

7. *Heterocentron roseum* A. Br. & Bouché, Ind. Sem. Hort. Berol. 14. 1851.

Heeria rosea Triana, Trans. Linn. Soc. Bot. 28: 34. 1871.

Veracruz, Oaxaca, and Chiapas. Honduras.

Stems appressed-setulose, acutely quadrangular; leaves oblong or oblong-ovate, 3 to 5 cm. long, acute, attenuate at base; petals white or pink, about 8 mm. long.

In Guanajuato, where the plant is cultivated, it is said to be known as "perla de Cuba."

8. *Heterocentron occidentale* Rose, Contr. U. S. Nat. Herb. 8: 327. 1905.

Type collected between Pedro Paulo and San Blasito, Tepic.

Stems suffrutescent, about 2 meters high, densely appressed-setulose; leaves ovate or oblong-ovate, 6 to 8 cm. long, acute, densely appressed-setulose; petals white, 8 to 10 mm. long.

9. *Heterocentron alatum* Rose & Standl., sp. nov.

Type collected near San Juan Guichicovi, Oaxaca (*Nelson* 2728; U. S. Nat. Herb. no. 842869).

Stems 4-angled, with a conspicuous green wing along each angle, appressed-setulose; leaves slender-petiolate, elliptic-oblong or oblong-ovate, 3.5 to 6 cm. long, 1.5 to 2.3 cm. wide, acute, attenuate at base, pinnate-nerved, appressed-setulose; panicles many-flowered, the flowers short-pedicellate; calyx tube 3 mm. long, with a few short stiff hairs, the lobes 4 to 5 mm. long, ovate-lanceolate, acuminate, obscurely ciliate; petals white, about 1 cm. long; capsule 6 mm. long, the apical scales setose-ciliate.

10. *Heterocentron macrostachyum* Naud. Ann. Sci. Nat. III. 14: 155. 1850.

Heeria macrostachya Triana, Trans. Linn. Soc. Bot. 28: 34. 1871.

Veracruz and Oaxaca. Guatemala and El Salvador.

Stems appressed-setulose, quadrangular; leaves elliptic-ovate or ovate-oblong, 3 to 7 cm. long, obtuse or acute, attenuate at base; petals white or lilac, 7 to 8 mm. long.

6. *ACIOTIS* D. Don, Mem. Wern. Soc. 4: 300. 1823.

1. *Aciotis rostellata* (Naud.) Triana, Trans. Linn. Soc. Bot. 29: 51. 1871.

Spennera rostellata Naud. Ann. Sci. Nat. III. 14: 143. 1850.

Tabasco. Guatemala and Nicaragua.

Stems herbaceous or suffrutescent, 30 to 60 cm. high, acutely tetragonous, shortly glandular-pilose above; leaves ovate-oblong, 7-nerved, 5 to 7 cm. long, acuminate, pilosulous, entire; flowers 4-parted, paniculate; calyx 1.5 mm. long; petals white, 2 mm. long; capsule 2.5 mm. thick.

7. *SCHWACKAEA* Cogn. in Durand, Ind. Gen. Phan. 132. 1888.

The genus consists of a single species.

1. *Schwackaea cupheoides* (Benth.) Cogn. in Durand, Ind. Gen. Phan. 132. 1888.

Heeria cupheoides Benth. Bot. Voy. Sulph. 93. pl. 33. 1844.

Pterogastra cupheoides Seem. Bot. Voy. Herald 122. 1854.

Aclisanthera simplex T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 57. 1914.

Oaxaca and Chiapas. Central America; type from Panama.

Slender annual, 10 to 30 cm. high, the branches setulose at the nodes, elsewhere glabrous; leaves petiolate, ovate, 3 to 6 cm. long, acute, 3-nerved, entire, pilosulous; flowers 4-parted, solitary or in terminal cymes; calyx in fruit 1 cm. long, the tube with 8 thick ribs, these setose-tuberculate; petals 6 to 7 mm. long. "Sulfatillo," "sulfato de la tierra," "pollito" (El Salvador).

8. *PTEROLEPIS* Miq. Comm. Phytogr. 73. 1840.

Herbs, rarely suffrutescent; leaves entire, 3 or 5-nerved; flowers 4-parted, small, axillary or terminal, solitary or glomerate; calyx lobes rigid, persistent, alternating with bristles; petals obovate, obtuse, ciliate; capsule 4-valvate.

Connective of the larger anthers much shorter than the anther---1. *P. exigua*.
Connective nearly as long as the anther.

Anthers linear-subulate; calyx tube 4 mm. long-----2. *P. trichotoma*.

Anthers oblong; calyx tube 2 to 2.5 mm. long-----3. *P. pumila*.

1. *Pterolepis exigua* (Naud.) Triana, Trans. Linn. Soc. Bot. 28: 39. 1871.

Arthrostemma exiguum Naud. Ann. Sci. Nat. III. 13: 355. 1850.

Oaxaca and Chiapas; type from mountains of Oaxaca. Costa Rica.

Stems sparsely branched or simple, appressed-setose; leaves lance-oblong, 1 to 3 cm. long, acute, setose; calyx tube 3 mm. long; petals pink, 5 to 6 mm. long.

2. *Pterolepis trichotoma* (Rottb.) Cogn. in Mart. Fl. Bras. 14³: 261. 1885.

Rhexia trichotoma Rottb. Descr. Pl. Surin. 9. pl. 5. 1776.

Rhexia ladanoides Rich. in Humb. & Bonpl. Monogr. Melast. 2: 72. pl. 27. 1823.

Pterolepis ladanoides Triana, Trans. Linn. Soc. Bot. 28: 39. 1871.

Veracruz and perhaps elsewhere. Central and South America.

Stems herbaceous, 20 to 30 cm. high, appressed-setose; leaves lanceolate or lance-oblong, 3 to 8 cm. long, short-petiolate; petals pink, 8 to 10 mm. long.

3. *Pterolepis pumila* (DC.) Cogn. in Mart. Fl. Bras. 14³: 263. 1885.

Osbeckia pumila DC. Prodr. 3: 141. 1828.

Reported from Oaxaca. Central and South America.

Leaves short-petiolate or subsessile, lanceolate or oblong-lanceolate, 1.5 to 2.5 cm. long, setose-pilose; petals pink, 5 to 6 mm. long.

9. TIBOUCHINA Aubl. Pl. Guian. 445. 1775.

Shrubs or rarely herbs; leaves 3 or 5-nerved, entire or serrulate; flowers 5-parted, solitary or in terminal panicles; calyx tube oblong or urceolate, the lobes narrow, persistent or deciduous; petals obovate; stamens unequal or subequal, the anthers similar, the connective produced below the cells but sometimes very shortly so; capsule 5-valvate.

Calyx with gland-tipped hairs.

Pubescence of the young branches widely spreading-----1. *T. purpusii*.

Pubescence of the young stems appressed.

Hairs on the upper surface of the leaf and on the stems long and slender.

2. *T. galeottiana*.

Hairs on the leaves and stems short, thickened at base--3. *T. durangensis*.

Calyx with eglandular hairs.

Connective of the larger anthers long-produced at the base (about 2 mm. or more).

Pubescence of the stems spreading-----4. *T. rufipilis*.

Pubescence of the stems appressed-----5. *T. mexicana*.

Connective very shortly produced (1 mm. or less).

Stamens equal in length or nearly so.

Lobes of the calyx shorter than the tube-----6. *T. bourgaeana*.

Lobes equaling or longer than the tube.

Hairs of the stem short, closely appressed; leaves serrulate.

7. *T. naudiniana*.

Hairs of the stem long, ascending, not closely appressed; leaves usually entire-----8. *T. longifolia*.

Stamens very unequal.

Hairs of the stem closely appressed-----9. *T. schiedeana*.

Hairs of the stem spreading or ascending, not appressed.

Lobes of the calyx equaling or longer than the tube.

Calyx lobes linear-----10. *T. scabriuscula*.

Calyx lobes linear-spatulate-----11. *T. spathulata*.

Lobes shorter than the tube.

Calyx tube 6 mm. long, the lobes 3 mm. long----12. *T. ferrariana*.

Calyx tube 5 mm. long, the lobes 3 to 4 mm. long--13. *T. monticola*.

1. *Tibouchina purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 378. 1913.
Hidalgo, Veracruz, and Oaxaca; type collected in the Sierra Madre between Misantla and Naolinco, Veracruz.

Branches densely setose; leaves ovate or oblong-ovate, 3 to 5 cm. long, acuminate, setose, serrulate; flowers in small panicles; calyx tube 5 mm. long, the lobes shorter, linear-lanceolate; petals pink, about 1 cm. long.

2. *Tibouchina galeottiana* (Naud.) Cogn. in DC. Monogr. Phan. 7: 258. 1891.
Oreocosmus galeottianus Naud. Ann. Sci. Nat. III. 13: 38. 1850.

Pleroma galeottianum Triana, Trans. Linn. Soc. Bot. 28: 46. 1871.

Type collected between Tampico, Tamaulipas, and Real del Monte, Hidalgo.

Stems chiefly herbaceous, 20 to 40 cm. high; leaves oblong-lanceolate, 5-nerved, 2 to 4 cm. long, serrulate, setulose beneath along the nerves; calyx tube 5 to 6 mm. long, the lobes 3 to 4 mm. long, subobtuse.

3. *Tibouchina durangensis* Standl., sp. nov.

Type from San Ramón, Durango (*Palmer* 163; U. S. Nat. Herb. no. 571184).

Stems quadrangular, when young covered with very short thick appressed hairs; leaves ovate or ovate-oblong, 3 to 7 cm. long, 1.2 to 3 cm. wide, acute or acuminate, rounded at base, 5-nerved, serrulate, setulose-scabrous, deep green above, pale beneath; flowers in few-flowered terminal panicles; calyx tube 7 mm. long, thinly glandular-setulose with short stout purplish hairs, the lobes oblong-triangular, acute or obtuse, 2.5 to 3 mm. long; petals purple, about 1 cm. long; stamens very unequal, the larger anthers subulate, 7 to 8 mm. long, the connective produced below into a stipe 5 mm. long, the smaller anthers 5 mm. long.

4. *Tibouchina rufipilis* (Schlecht.) Cogn. in DC. Monogr. Phan. 7: 259. 1891.
Rhexia rufipilis Schlecht. Linnaea 13: 430. 1839.

Pleroma rufipile Triana, Trans. Linn. Soc. Bot. 28: 46. 1871.

Veracruz; type from Monte Macultepec, Jalapa.

Slender shrub, the stems rufous-setose; leaves oblong-lanceolate, 3 to 8 cm. long, acuminate, 5-nerved, serrulate, setulose; flowers mostly in 3-flowered cymes; calyx tube 6 mm. long, setose, the lobes linear-spatulate, 8 to 9 mm. long; petals pink, 1.5 cm. long.

5. *Tibouchina mexicana* (D. Don) Cogn. in DC. Monogr. Phan. 7: 258. 1891.
Melastoma mexicana D. Don, Mem. Wern. Soc. 4: 290. 1823.

Rhexia tortuosa Humb. & Bonpl. Monogr. Melast. 2: 17. pl. 7. 1823.

Pleroma mexicanum DC. Prodr. 3: 152. 1828.

Sinaloa to Oaxaca and Veracruz.

Shrub, 1 meter high or less, the branches setose-strigose; leaves lanceolate or linear-lanceolate, 1 to 6 cm. long, attenuate, 3-nerved, entire or serrulate, setulose; flowers solitary or cymose; lobes of the calyx about as long as the tube; petals 1 cm. long, white or pink.

6. *Tibouchina bourgaeana* Cogn. in DC. Monogr. Phan. 7: 264. 1891.
Tibouchina aliena T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 58. 1914.

Tepic to Veracruz and Chiapas; type from Valley of Córdoba, Veracruz. Central America.

Shrub, 1.5 meters high or less, the branches setose-strigose; leaves lanceolate or lance-oblong, 4 to 11 cm. long, attenuate, 5-nerved, serrulate, appressed-setose; flowers numerous, in dense or lax cymes; calyx tube 2.5 to 4 mm. long,

the lobes linear-subulate, 1.5 to 2 mm. long (in anthesis; longer in fruit); petals 4 to 5 mm. long, white or pink. "Entrodelia" (Veracruz); "talchinol," "cirín," "largona," "hierba del tabardillo" (El Salvador).

7. *Tibouchina naudiniana* (Decaisne) Cogn. in DC. Monogr. Phan. 7: 264. 1891.

Chaetogastra naudiniana Decaisne, Rev. Hort. 1847: 86. 1847.

Pleroma naudinianum Triana, Trans. Linn. Soc. Bot. 28: 46. 1871.

Oaxaca.

Leaves narrowly lanceolate, 3 to 7 cm. long, serrulate, short-pilose; calyx sparsely setulose, the tube 2.5 mm. long, the lobes 2.5 to 3 mm. long; petals pink, 8 to 12 mm. long.

8. *Tibouchina longifolia* (Vahl) Baill. Adansonia 12: 74. 1877.

Rhexia longifolia Vahl, Eclóg. Amer. 1: 39. 1796.

Pleroma longifolium Triana, Trans. Linn. Soc. Bot. 28: 45. 1871.

Reported from Veracruz, Oaxaca, Tabasco, and Yucatán. West Indies; Central and South America.

Shrub, 1.5 meters high or less; leaves lanceolate or oblong, 5 to 10 cm. long, attenuate, appressed-pilose; flowers in lax or dense cymes; calyx setulose, the tube 3 mm. long, the lobes 3 to 4 mm. long; petals white or pink, 5 to 6 mm. long. "Mosqueta silvestre" (Guatemala); "entrodelia" (Veracruz).

9. *Tibouchina schiedeana* (Schlecht. & Cham.) Cogn. in DC. Monogr. Phan. 7: 261. 1891.

Rhexia schiedeana Schlecht. & Cham. Linnaea 5: 565. 1830.

Pleroma schideanum Triana, Trans. Linn. Soc. Bot. 28: 46. 1871.

Veracruz and Oaxaca; type from Río Talea. Guatemala.

Shrub; leaves lanceolate or ovate-oblong, 3 to 5 cm. long, acuminate, entire or serrulate, appressed-setose; cymes few-flowered, dense; calyx densely setose, the tube 4 mm. long, the lobes 2 to 3 mm. long, linear-subulate; petals white or pink, 4 to 7 mm. long.

10. *Tibouchina scabriuscula* (Schlecht.) Cogn. in DC. Monogr. Phan. 7: 262. 1891.

Rhexia scabriuscula Schlecht. Linnaea 13: 431. 1891.

Oaxaca and probably in Veracruz.

Branches spreading-pilose; leaves oblong-lanceolate, 5 to 8 cm. long, serrulate, setulose above, pilosulous beneath; panicles corymbiform; calyx appressed-setulose, the tube 4 to 5 mm. long; petals 15 to 18 mm. long.

11. *Tibouchina spathulata* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 58. 1914.

Chiapas; type from Cerro del Boquerón.

Branches densely setose; leaves ovate or oblong-ovate, 4 to 6 cm. long, acuminate, 5-nerved, serrulate, densely setulose; cymes few-flowered; calyx lobes in fruit sometimes 15 mm. long; petals purple, 1 cm. long.

12. *Tibouchina ferrariana* Cogn. in DC. Monogr. Phan. 7: 1176. 1891.

Type from Teziutlán, Puebla.

Stems pilose, long-setose at the nodes; leaves ovate-oblong, 2 to 3.5 cm. long, crenulate-denticulate, pilose above, setulose beneath along the nerves; flowers solitary; calyx spreading-pilose; petals purplish, 8 to 9 mm. long.

13. *Tibouchina monticola* (Naud.) Cogn. in DC. Monogr. Phan. 7: 263. 1891.

Oreocosmus monticola Naud. Ann. Sci. Nat. III. 13: 38. 1849.

Colima to Oaxaca. Costa Rica.

Shrub; leaves oblong or oblong-ovate, 2 to 6 cm. long, acuminate, serrulate or subentire, pilose; flowers solitary or cymose; calyx long-pilose; petals purplish, 1 cm. long.

10. **MONOCHAETUM** Naud. Ann. Sci. Nat. III. 4: 48. 1845.

Shrubs, variously pubescent; leaves entire, 3 to 7-nerved; flowers usually terminal, cymose or solitary, few, pink, purple, or violet, 4-parted; calyx hairy the lobes ovate or lanceolate, equaling or shorter than the tube; petals obovate; stamens unequal, the anthers elongate-linear or subulate, the larger ones with a porrect, usually elongate appendage at base, the connective not produced at base; capsule 4-celled; seeds curved or coiled.

Hairs of the stems finely plumose and spreading-----1. *M. pulchrum*.

Hairs not plumose or, if so, appressed.

Pubescence of the young stems appressed, or the stems glabrous.

Stems glabrous except at the nodes-----2. *M. pringlei*.

Stems with appressed hairs.

Leaves oblong-linear-----3. *M. angustifolium*.

Leaves lanceolate or ovate.

Leaves short-petiolate, appressed-setose on the upper surface; calyx lobes shorter than the tube-----4. *M. deppeanum*.

Leaves long-petiolate, mostly glabrous on the upper surface; calyx lobes equaling or longer than the tube-----5. *M. alpestre*.

Pubescence of the young stems spreading.

Pubescence of stems of gland-tipped hairs-----6. *M. bracteolatum*.

Pubescence of stems eglandular.

Lobes of the calyx longer than the tube-----7. *M. candollei*.

Lobes equaling or shorter than the tube.

Calyx with gland-tipped hairs-----8. *M. floribundum*.

Calyx with glandless hairs-----9. *M. calcaratum*.

1. *Monochaetum pulchrum* Decaisne, Rev. Hort. III. 2: 101. f. 6. 1848.

Monochaetum plumosum Naud. Ann. Sci. Nat. III. 14: 160. 1850.

Monochaetum pulchellum Naud Ann. Sci. Nat. III. 14: 161. 1850.

Veracruz and Oaxaca.

Branches stout, densely plumose-hirsute with brownish hairs; leaves short-petiolate, oblong or ovate, 3 to 6 cm. long, 5 or 7-nerved, acute, densely covered with stellate and with appressed plumose hairs; calyx lobes shorter than the tube; petals 1 cm. long.

2. *Monochaetum pringlei* Rose, Contr. U. S. Nat. Herb. 8: 327. pl. 72. 1905.

Morelos; type from Cuernavaca.

Shrub, a meter high or less, the branches setose only at the nodes; leaves linear-lanceolate, 2 to 4 cm. long, 3 to 6 mm. wide, attenuate, 3-nerved, ciliate, glabrous above, sparsely appressed-setose beneath along the nerves; flowers terminal, solitary; calyx appressed-setose with eglandular hairs; petals purplish, about 1.5 cm. long.

3. *Monochaetum angustifolium* Cogn. in DC. Monogr. Phan. 7: 1181. 1891.

Type collected between Piletas and San Miguel, near Jalapa, Veracruz, altitude 1,800 to 1,900 meters.

Branches slender, setose at the nodes, elsewhere appressed-setulose; leaves 2 to 3.5 mm. wide, appressed-setulose beneath along the nerves, 3-nerved;

flowers terminal, solitary; calyx appressed-setulose, the tube 8 mm. long, the lobes 5 to 6 mm. long; petals pink, 1 cm. long.

4. *Monochaetum deppeanum* (Schlecht. & Cham.) Naud. Ann. Sci. Nat. III. 4: 165. 1850.

Rhexia deppeana Schlecht. & Cham. Linnaea 5: 566. 1830.

Monochaetum triplinerve Naud. Ann. Sci. Nat. III. 4: 51. 1845.

Veracruz and Chiapas. Guatemala.

Slender shrub, 1.2 meters high or less, the branches densely appressed-setulose; leaves 1 to 2.5 cm. long, 3 to 6 mm. wide; flowers terminal, usually solitary; calyx appressed-setulose; petals about 1 cm. long, red-purple.

5. *Monochaetum alpestre* Naud. Ann. Sci. Nat. II. 4: 50. 1845.

Monochaetum naudinianum Neum. Rev. Hort. 1861: 211. 1861.

Oaxaca. Guatemala.

Slender shrub, the branches sparsely setulose, especially at the nodes; leaves ovate or ovate-oblong, 1 to 1.5 cm. long, 5 to 8 mm. wide, acute, pale beneath, ciliate; calyx sparsely setulose; petals 1.5 to 2 cm. long.

6. *Monochaetum bracteolatum* Triana, Trans. Linn. Soc. Bot. 28: 64. 1871.

Reported from Dos Puentes. Panama.

Branches sparsely glandular-hirtellous; leaves oblong-lanceolate, 5-nerved, 3 to 5 cm. long, sparsely setulose; calyx sparsely setulose; petals 7 to 8 mm. long.

7. *Monochaetum candollei* Cogn. in DC. Monogr. Phan. 7: 396. 1891.

Type from Mount Orizaba and Vaquería del Jacal, Veracruz, altitude 3,300 meters.

Branches subglabrate, setose at the nodes; leaves long-petiolate, oblong-lanceolate, 2 to 3.5 cm. long, 6 to 10 mm. wide, sparsely setose, ciliate, triplinerved; calyx glandular-setulose; petals pink, 12 to 14 mm. long.

8. *Monochaetum floribundum* (Schlecht.) Naud. Ann. Sci. Nat. III. 14: 165. 1850.

Rhexia floribunda Schlecht. Linnaea 13: 431. 1839.

Monochaetum rivulare Naud. Ann. Sci. Nat. III. 4: 50. 1845.

Veracruz, Oaxaca, and Chiapas. Central America.

Shrub, the branches densely hirsute; leaves short-petiolate, oblong, lance-oblong, or ovate-oblong, 1.5 to 5.5 cm. long, setose; flowers in few-flowered cymes; petals 7 to 8 mm. long, pink or white. "Entrodellia" (Veracruz).

9. *Monochaetum calcaratum* (DC.) Triana, Trans. Linn. Soc. Bot. 28: 63. 1871.

Arthrostemma calcaratum DC. Prodr. 3: 138. 1828.

Monochaetum ensiferum Naud. Ann. Sci. Nat. III. 4: 50. 1845.

Monochaetum candolleanum Naud. Ann. Sci. Nat. III. 4: 50. 1845.

Monochaetum oliganthum Naud. Ann. Sci. Nat. III. 14: 159. 1850.

Veracruz and Oaxaca, and perhaps elsewhere.

Branches sparsely setulose; leaves short-petiolate, lanceolate, 1.5 to 3 cm. long, 3 to 7 mm. wide, triplinerved, sparsely setulose; flowers solitary; calyx densely appressed-setulose; petals 1.5 cm. long, pink or purple.

12. **CALYPTRELLA** Naud. Ann. Sci. Nat. III. 18: 115. 1852.

1. *Calyptrella galeottii* Naud. Ann. Sci. Nat. III. 18: 115. 1852.

Type from mountains of Oaxaca. Costa Rica.

Tree (?); leaves ovate-oblong or elliptic, 10 to 20 cm. long, 6 to 10 cm. wide, shortly obtuse-acuminate, entire, 5 or 7-nerved, glabrous; flowers usually 6-parted, in open terminal panicles 10 to 30 cm. long, puberulent; limb of the calyx calyptriform, circumscissile; petals 4 mm. long.

13. TRIOLENA Naud. Ann. Sci. Nat. III. 15: 328. 1851.

1. Triolena scorpioides Naud. Ann. Sci. Nat. III. 15: 328. 1851.

Triolena radicans T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 379. 1913.
Veracruz and Chiapas.

Plants herbaceous, ascending, the stems simple; leaves long-petiolate, oblong or oblong-ovate, 5.5 to 13 cm. long, acute, undulate-dentate, 5 or 7-nerved, emarginate and unequal at base, setose above, hirtellous beneath along the nerves; flowers 5-parted, in long-pedunculate scorpioid racemes; calyx turbinate, furfuraceous-puberulent, the lobes short; petals pink, 5 to 6 mm. long; capsule 3-valvate, included in the finally 3-winged calyx.

It is possible that *T. radicans* is a distinct species, but the material at hand affords no basis for such a belief.

14. LEANDRA Raddi, Att. Soc. Ital. Sci. 18: 385. 1820.

Shrubs or small trees, sometimes glabrous; leaves petiolate, 3 to 9-nerved, entire or denticulate; flowers usually 5-parted, small, in terminal or rarely lateral panicles; calyx tube campanulate or urceolate, the limb dentate; petals narrow, acute; stamens subequal; fruit a small berry.

Leaves abruptly long-decurrent at base-----1. *L. multiplinervis*.

Leaves obtuse to subcordate at base.

Branches of the panicle secund; leaves very densely hirtellous.

2. *L. mexicana*.

Branches not secund; leaves thinly setulose or glabrate.

Panicles all terminal-----3. *L. melanodesma*.

Panicles terminal at first but becoming lateral-----4. *L. cornoides*.

1. Leandra multiplinervis (Naud.) Cogn. in Mart. Fl. Bras. 14⁴: 180. 1886.

Clidemia multiplinervis Naud. Ann. Sci. Nat. III. 17: 358. 1852.

Oxymeris multiplinervis Triana, Trans. Linn. Soc. Bot. 28: 94. 1871.

Type from Zacualpan (Chiapas?). Guatemala; Brazil.

Shrub or small tree, the branches short-setulose; leaves oblong-ovate, 10 to 20 cm. long, long-acuminate, 5 or 7-nerved, subentire, sparsely setulose above, hirtellous beneath; panicles narrow, becoming lateral; calyx setulose, the tube 4 mm. long; petals pink, 4 mm. long.

2. Leandra mexicana (Naud.) Cogn. in Mart. Fl. Bras. 14⁴: 77. 1886.

Clidemiastrum mexicanum Naud. Ann. Sci. Nat. III. 18: 87. 1852.

Tabasco and Oaxaca. Central America and Colombia.

Shrub, 2 meters high, the branches densely pilose; leaves ovate, 10 to 18 cm. long, acuminate, cordate at base, denticulate; panicles terminal, the flowers 7-parted, sessile; calyx tube 2 to 2.5 mm. long, the teeth 0.5 to 0.8 mm. long; fruit globose, 3 to 5 mm. in diameter.

This species was listed by Hemsley as *Oxymeris heterobasis* Triana.

3. Leandra melanodesma (Naud.) Cogn. in Mart. Fl. Bras. 14⁴: 73. 1886.

Clidemia melanodesma Naud. Ann. Sci. Nat. III. 17: 353. 1852.

Oxymeris melanodesma Triana, Trans. Linn. Soc. Bot. 28: 92. 1871.

Veracruz and Oaxaca. Guatemala to Ecuador.

Shrub, 2 to 4 meters high, the branches furfuraceous-puberulent; leaves ovate or ovate-oblong, 8 to 12 cm. long, acuminate, rounded or subcordate at base, 7-nerved, denticulate, setulose or scaberulous above, furfuraceous beneath; panicles many-flowered, the flowers short-pedicellate; calyx tube 2.5 to 3 mm. long, the lobes minute; petals white or pink, 3 to 4 mm. long. "Teshuate" (Veracruz.).

L. melanodesma sagittata (Naud.) Cogn.¹ is a form in which the basal lobes of the leaves are acute and auricle-like. It was described from Oaxaca and is reported also from Veracruz and Guatemala. It was listed by Hemsley as *Oxymeris subseriata* Triana.

4. *Leandra cornoides* (Schlecht. & Cham.) Cogn. in Mart. Fl. Bras. 14⁴: 76. 1886.

Melastoma cornoides Schlecht. & Cham. Linnaea 5: 563. 1830.

Cremanium aschenbornianum Schauer, Linnaea 20: 734. 1847.

Sagraea haeretica Naud. Ann. Sci. Nat. III. 18: 100. 1852.

Oxymeris cornoides Triana, Trans. Linn. Soc. Bot. 28: 93. 1871.

Veracruz, Oaxaca, and Morelos.

Slender shrub, 1 to 4.5 meters high, the branches furfuraceous-puberulent or glabrate; leaves lance-oblong 5 to 12 cm. long, acuminate, 5-nerved, obscurely denticulate, sparsely furfuraceous beneath or glabrous; panicles lax, few-flowered; calyx glabrous or nearly so, the tube 3 mm. long; petals white or pink, 5 to 6 mm. long; fruit violet or black, 4 to 5 mm. in diameter.

15. CONOSTEGIA D. Don, Mem. Wern. Soc. 4: 316. 1823.

Shrubs or small trees, glabrous or pubescent; leaves petiolate, entire or denticulate, 3 or 5-nerved; flowers 5 to 10-parted, small or of medium size, white or pink, in terminal panicles; calyx tube campanulate, the limb caplike, circumscissile at anthesis; petals obtuse; stamens equal; fruit a small berry.

Young branches and petioles setulose-hirsute.....1. *C. speciosa*.

Young branches and petioles glabrous or furfuraceous-tomentose.

Branches and petioles glabrous or obscurely furfuraceous.

Buds ovoid or conic.....2. *C. superba*.

Buds globose or subglobose, rounded at apex.....3. *C. sphaerica*.

Branches and petioles densely furfuraceous-tomentose.

Leaves entire or nearly so, green beneath; flowers 6 to 10-parted.

Buds 14 to 17 mm. long, long-rostrate.....4. *C. arborea*.

Buds 8 to 10 mm. long, rounded at apex, sometimes apiculate.

5. *C. subhirsuta*.

Leaves conspicuously denticulate; often densely stellate-tomentose beneath; flowers 5-parted.

Buds 9 to 11 mm. long, glabrous.....6. *C. mexicana*.

Buds 4 to 6 mm. long, tomentose.....7. *C. xalapensis*.

1. *Conostegia speciosa* Naud. Ann. Sci. Nat. III. 16: 109. 1851.

Reported from Veracruz. Central America, Colombia, and Venezuela.

Branches densely setulose; leaves ovate or oblong-ovate, 10 to 20 cm. long, short-acuminate, rounded or obtuse at base, denticulate, setulose above, stellate-tomentose beneath; buds densely hirsute, 5 to 6 mm. long; petals 6 to 7 mm. long, pink or violet.

¹ In Mart. Fl. Bras. 14⁴: 74. 1886; *Clidemia sagittata* Naud. Ann. Sci. Nat. III. 17: 359. 1852.

2. *Conostegia superba* D. Don, Mem. Wern. Soc. 4: 317. 1823.

Conostegia macrophylla Naud. Ann. Sci. Nat. III. 16: 112. 1851.

Conostegia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 57. 1914.

Veracruz and Chiapas. Central America; Jamaica.

Shrub or small tree, 4 to 5 meters high, the branches glabrous or nearly so; leaves ovate or elliptic-ovate, 15 to 30 cm. long, short-acuminate, rounded or obtuse at base, 5-nerved, entire or nearly so, puberulent beneath along the nerves but elsewhere glabrous; panicles 10 to 15 cm. long; buds glabrous, 6 to 7 mm. long; petals white, 5 to 6 mm. long.

3. *Conostegia sphaerica* Triana, Trans. Linn. Soc. Bot. 28: 98. 1871.

Michoacán to Chiapas; type from Teotalcingo.

Tree, 10 meters high or less, glabrous throughout; leaves lanceolate to oblong-elliptic, 5 to 17 cm. long, obtusely cuspidate-acuminate, attenuate or acute at base, triplinerved, entire; panicles 3 to 7 cm. long; buds 6 to 8 mm. long; petals white, 3 to 5 mm. long, erose.

4. *Conostegia arborea* (Schlecht.) Schauer, Linnaea 20: 733. 1847.

Melastoma arboreum Schlecht. Linnaea 13: 424. 1839.

Conostegia galeottii Naud. Ann. Sci. Nat. III. 16: 107. 1851.

Veracruz and Oaxaca; type collected between Tioselo and Jicochimalco.

Tree, 4.5 to 9 meters high; leaves ovate-oblong or elliptic, 10 to 25 cm. long, short-acuminate, obtuse or acute at base, green, thinly furfuraceous-puberulent beneath, 5-nerved; panicles few-flowered, 7 to 10 cm. long; buds thinly puberulent; petals white, 8 to 10 mm. long.

5. *Conostegia subhirsuta* DC. Prodr. 3: 174. 1828.

Veracruz and Oaxaca. West Indies; Central and South America; type from Havana, Cuba.

Shrub, 2 to 4 meters high; leaves elliptic-oblong, elliptic, or ovate-oblong, 8 to 20 cm. long, abruptly short-acuminate, rounded or obtuse at base, 5-nerved, green, furfuraceous beneath along the nerves; panicles few-flowered, 10 cm. long or less; buds furfuraceous or glabrate; petals white, 7 to 8 mm. long. "Teshuate" (Veracruz).

6. *Conostegia mexicana* Cogn. in DC. Monogr. Phan. 7: 707. 1891.

Veracruz and Oaxaca; type from Monte Pelado.

Branches furfuraceous or stellate-setulose with rufous hairs; leaves elliptic-oblong, 5 to 10 cm. long, short-acuminate, rounded to acute at base, setulose above, puberulent beneath, especially along the nerves; panicles few-flowered, 5 to 10 cm. long; petals 7 to 8 mm. long.

7. *Conostegia xalapensis* (Bonpl.) D. Don, Mem. Wern. Soc. 4: 317. 1823.

Melastoma xalapense Bonpl.; Humb. & Bonpl. Monogr. Melast. 1: 126. pl. 54. 1816.

Conostegia holosericea D. Don, Mem. Wern. Soc. 4: 317. 1823.

Conostegia minutiflora Rose, Contr. U. S. Nat. Herb. 8: 327. pl. 71. 1905.

Sinaloa to Tamaulipas, Veracruz, Tabasco, and Chiapas; type from Jalapa, Veracruz. Central America and Colombia; Cuba.

Shrub or small tree, 1 to 10 meters high; leaves oblong to lanceolate or ovate-oblong, 7 to 20 cm. long, acuminate, rounded to acute at base, stellate-tomentose above or rarely setulose, in age glabrous, pale beneath and covered with a dense stellate tomentum, or rarely glabrate, 5-nerved; panicles dense, 10 cm. long or less; petals pink, 3 mm. long. "Capulincillo" (Puebla, San Luis Potosí, Oaxaca); "nigua" (San Luis Potosí, Puebla); "capulín" (Veracruz, Puebla, Oaxaca); "serita" (Puebla, Oaxaca); "chicab" (Ta-

maulipas); "capiroto" (Nicaragua); "cirín" (El Salvador); "lengua de vaca," "pú," "purré," "escobillo" (Costa Rica); "guabón" (Guatemala); "mora" (Tepic); "pupu" (Sinaloa); "capulín de cotorro," "tecapulín," "teshuate" (Veracruz).

Judging from the number of herbarium specimens at hand, this is by far the most common Melastomaceous plant of Mexico. The form with narrow leaves is *C. lanceolata* Cogn.¹ and *C. minutiflora* Rose, but it grades imperceptibly into the typical form. Some specimens of *C. xalapensis* exhibit a truly remarkable diversity in leaf pubescence. Some of the leaves are, when young, finely tomentose upon the upper surface, and these leaves, even in age, are densely tomentose beneath. Other leaves upon the same branch are thinly setose upon the upper surface, without any trace of tomentum, while the lower surface is green and soon glabrate. Unless one had seen both kinds of leaves upon the same specimen, it would be hard to believe that they belonged to the same species.

The dark blue or purple fruits are edible and of good flavor. They somewhat resemble blueberries (*Vaccinium*) in appearance and are often seen in the markets of Central America.

16. MICONIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 60. 1794.

Shrubs or small trees; leaves entire or denticulate; inflorescence terminal; flowers small, 4 to 8-parted, white, red, or yellow; calyx urceolate or campanulate, the lobes short; petals oblong or obovate; stamens equal or nearly so; fruit a small berry.

The largest genus of the family, including over 500 species. The fruit, like that of other genera, is edible, and some species yield dyes.

Anthers short, obovoid, oblong, or cuneiform.

Anthers oblong, with a single minute pore at apex.

Flowers secund upon the panicle branches.

Branches long-hirsute-----1. *M. lacera*.

Branches glabrous-----2. *M. ciliata*.

Flowers not secund.

Branches glabrous or furfuraceous-puberulent; leaves acute or rounded at base.

Leaves acute at base; branches glabrate-----3. *M. glabrata*.

Leaves rounded at base; branches densely furfuraceous-puberulent.

4. *M. madrensis*.

Branches hispid or densely tomentulose; leaves cordate at base.

Branches hispid-----5. *M. phaeotricha*.

Branches stellate-tomentulose-----6. *M. tepicana*.

Anthers cuneiform, truncate at apex and with 2 large pores.

Leaves stellate-furfuraceous beneath along the nerves.

7. *M. hemenostigma*.

Leaves glabrous beneath.

Leaves triplinerved, the lateral nerves arising above the base of the blade-----8. *M. rubens*.

Leaves 3-nerved, the lateral nerves arising at the base of the blade.

Stigma not dilated-----9. *M. oligotricha*.

Stigma capitate.

Calyx 1.5 mm. long-----10. *M. glaberrima*.

Calyx 2.5 to 3 mm. long-----11. *M. pinetorum*.

¹ In DC. Monogr. Phan. 7: 708. 1891.

Anthers elongate, linear or subulate.

Anthers subulate, mostly 4 to 5 mm. long.

Calyx limb closed in bud, breaking up into irregular lobes.

Leaves long-acuminate.....12. *M. mexicana*.

Leaves acute or short-acuminate.....13. *M. lauriformis*.

Calyx limb open, truncate or regularly dentate.

Calyx oblong or oblong-cylindric.

Filaments hirtellous; leaves serrulate.....14. *M. leucocephala*.

Filaments glabrous; leaves entire.....15. *M. dodecandra*.

Calyx campanulate.

Calyx lobes subulate.

Calyx tube 2.5 mm. long.....16. *M. anisotricha*.

Calyx tube 5 to 6 mm. long.....19. *M. saxicola*.

Calyx lobes rounded.

Petals about 3 mm. long.....17. *M. guatemalensis*.

Petals 5 to 8 mm. long.....18. *M. erythrantha*.

Anthers linear, usually 3 mm. long or less.

Anthers truncate at apex, the connective not appendaged anteriorly.

20. *M. minutiflora*.

Anthers narrowed at apex or at least not truncate, the connective appendaged or tuberculate anteriorly.

Flowers spicate.....21. *M. triplinervis*.

Flowers paniculate.

Branches of the panicle simple, spikelike.

Leaves petiolate.....22. *M. bourgaeana*.

Leaves sessile or nearly so.....23. *M. impetolaris*.

Branches of the panicle usually branched, not spikelike.

Leaves densely whitish-tomentulose beneath.

Leaves mostly 7 to 15 cm. wide, usually denticulate.

24. *M. argentea*.

Leaves mostly 3 to 7 cm. wide, entire or nearly so.

Leaves shallowly cordate at base.....25. *M. albicans*.

Leaves rounded or obtuse at base.....26. *M. stenostachya*.

Leaves green beneath, never whitish-tomentulose.

Flowers secund upon the branches.

Leaves quintuplinerved.....27. *M. scorpioides*.

Leaves 5-nerved.....28. *M. ambigua*.

Flowers not secund.

Leaves glabrous or glabrate beneath in age, when young often minutely stellate-pubescent.

Leaves 3 or 5-nerved.

Leaves large, 7 to 40 cm. wide, subemarginate at base.

29. *M. calvescens*.

Leaves smaller, 4 to 10 cm. wide, acute to rounded at base.

Flowers mostly pedicellate.....30. *M. hyperprasina*.

Flowers all sessile or nearly so.....31. *M. laevigata*.

Leaves triplinerved or quintuplinerved.

Leaves sessile, or the petioles marginate almost to the base, the blades 7 to 10.5 cm. wide.....32. *M. langlassel*.

Leaves conspicuously petiolate, the petioles not winged, the blades mostly 5 cm. wide or less.

Leaves 1.5 to 3 cm. wide, the transverse nerves very prominent-----33. *M. schlechtendalii*.

Leaves mostly 4 to 6 cm. wide, the transverse nerves slender and not very prominent---34. *M. prasina*.

Leaves pilosulous or hirsutulous beneath.

Leaves stellate-tomentose beneath-----35. *M. globulifera*.

Leaves pilose or hirsute beneath with simple hairs.

Leaves very densely hirsute beneath, attenuate at base.

36. *M. nervosa*.

Leaves thinly setulose beneath, rounded to subacute at base.

Young branches appressed-setulose---37. *M. chrysoneura*.

Young branches spreading-setulose---38. *M. ibaguensis*.

1. *Miconia lacera* (Humb. & Bonpl.) Naud. Ann. Sci. Nat. III. 16: 152. 1851.

Melastoma lacerum Humb. & Bonpl. Monogr. Melast. 1: 9. pl. 5. 1816.

Reported from southern Mexico. Central America to Brazil; Martinique.

Shrub, 1 to 2 meters high, the branches covered with very long spreading brown hairs; leaves ovate to oblong-lanceolate, 6 to 15 cm. long, acuminate, rounded or obtuse at base, 3 or 5-nerved, denticulate, setulose; panicles narrow; calyx tube 2 mm. long; petals pink, 3 to 4 mm. long. "Sirín" (Guatemala, Honduras).

2. *Miconia ciliata* (L. Rich.) DC. Prodr. 3: 179. 1828.

Melastoma ciliatum L. Rich. Act. Soc. Hist. Nat. Paris 1792: 109. 1792.

Melastoma decussatum Vahl, Eclog. Amer. 1: 42. 1796.

Miconia decussata D. Don; Triana, Trans. Linn. Soc. Bot. 28: 121. 1871.

Reported from southern Mexico. Panama to Brazil; West Indies.

Shrub, 3 to 5 meters high; leaves oblong or oblong-lanceolate, 8 to 20 cm. long, short-acuminate, 3-nerved, subserrulate, long-ciliate, glabrous; calyx 2 mm. long; petals pink, 2 to 2.5 mm. long.

3. *Miconia glabrata* Cogn. in DC. Monogr. Phan. 7: 875. 1891.

Oaxaca and Chiapas; type from Pinotepa, Oaxaca.

Slender shrub; leaves ovate-lanceolate or lance-oblong, 3 to 9 cm. long, long-acuminate, quintuplinerved, entire, glabrous; panicles many-flowered, 3 to 8 cm. long; calyx 1.5 mm. long; petals 2 mm. long.

4. *Miconia madrensis* Standl., sp. nov.

Tepic and Jalisco; type collected near Santa Teresa, in the Sierra Madre, Tepic (*Rose* 2226; U. S. Nat. Herb. no. 301140).

Young branches densely furfuraceous-puberulent with rufous pubescence, in age glabrate; petioles 0.8 to 1.7 cm. long; leaf blades ovate to ovate-oblong, 4.5 to 7.5 cm. long, 1.5 to 4 cm. wide, acute or short-acuminate, rounded at base, quintuplinerved, entire or remotely and minutely serrulate, glabrate above, minutely and sparsely stellate-puberulent beneath or finally glabrate; panicles 6 to 9 cm. long, many-flowered, the flowers pedicellate, 5-parted; calyx 2 mm. long, sparsely puberulent, the lobes minute, rounded; petals 2 mm. long; anthers oblong, curved; fruit 4 mm. thick.

Pringle 2369, collected near Guadalajara, belongs to this species.

5. *Miconia phaeotricha* Naud. Ann. Sci. Nat. III. 16: 193. 1851.

Type from mountains of Oaxaca.

Leaves ovate-cordate, 12 to 18 cm. long, 5 or 7-nerved, setose above, hirtellous beneath; panicles 10 to 15 cm. long, the flowers pedicellate; calyx 2.5 to 3 mm. long, hispid; petals pink, 1.5 mm. long.

6. *Miconia tepicana* Standl., sp. nov.

Type collected between Dolores and Santa Gertrudis, Tepic (*Rose* 2058; U. S. Nat. Herb. no. 300958).

Branches subterete, densely stellate-tomentulose; petioles 3 to 5 cm. long; leaf blades cordate-ovate, 13 to 15.5 cm. long, 8 to 8.5 cm. wide, acute, deeply cordate at base, quintuplinerved, entire, glabrous above or nearly so, densely and finely stellate-tomentulose beneath; panicles many flowered, about 14 cm. long, the flowers mostly short-pedicellate; calyx 2.5 mm. long, tomentulose, the lobes minute, obtuse; petals 1.5 mm. long; anthers 1 to 1.5 mm. long.

7. *Miconia hemenostigma* Naud. Ann. Sci. Nat. III. 16: 230. 1851.

Oaxaca. Guatemala.

Branches furfuraceous-puberulent; leaves oblong to ovate, 12 to 20 cm. long, acuminate, rounded at base, 5-nerved, subentire, green and glabrous above; panicles 8 to 12 cm. long; calyx 2 mm. long, puberulent or glabrate; petals white, 1.5 mm. long.

8. *Miconia rubens* (Swartz) Naud. Ann. Sci. Nat. III. 16: 169. 1851.

Melastoma rubens Swartz, Prodr. Veg. Ind. Occ. 71. 1788.

Chiapas. Costa Rica and Venezuela; type from Jamaica.

Glabrous shrub, 3 to 4 meters high; leaves oblong or elliptic-oblong, 6 to 16 cm. long, acuminate or abruptly acuminate, acute or obtuse at base, subentire; panicles 4 to 7 cm. long, the flowers short-pedicellate; calyx 2 mm. long; petals white, about 1 mm. long.

9. *Miconia oligotricha* (DC.) Naud. Ann. Sci. Nat. III. 16: 245. 1851.

Cremanium oligotrichum DC. Prodr. 3: 193. 1828.

Melastoma glaucocarpum Schlecht. Linnaea 13: 421. 1839.

Veracruz and perhaps elsewhere.

Leaves broadly oblong, 6 to 10 cm. long, acuminate, rounded at base, minutely denticulate; panicles pyramidal, 5 to 8 cm. long, the flowers pedicellate; calyx 2 mm. long; petals 1 mm. long; fruit blue, 4 mm. in diameter.

10. *Miconia glaberrima* (Schlecht.) Naud. Ann. Sci. Nat. III. 16: 243. 1851.

Melastoma glaberrimum Schlecht. Linnaea 13: 421. 1839.

Miconia brachystyla Naud. Ann. Sci. Nat. III. 16: 230. 1851.

Miconia myriocarpa Naud. Ann. Sci. Nat. III. 16: 231. 1851.

Veracruz, Oaxaca, and Chiapas; type from Barranca de Tioselo. Central America.

Slender glabrous shrub; leaves lance-oblong or elliptic-oblong, 8 to 12 cm. long, acuminate, obtuse or acute at base, entire or nearly so; panicles pyramidal, 5 to 7 cm. long, the flowers pedicellate; petals white or pink, 1 mm. long; fruit white.

11. *Miconia pinetorum* Naud. Ann. Sci. Nat. III. 16: 229. 1851.

Morelos, Oaxaca, and Chiapas; type from mountains of Oaxaca.

Shrub or small tree, 2 to 4.5 meters high; leaves elliptic or oblong, 7 to 14 cm. long, acuminate, obtuse or acute at base, obscurely serrulate; panicles 4 to 10 cm. long, the flowers pedicellate; petals white, 1 to 1.5 mm. long.

12. *Miconia mexicana* (Humb. & Bonpl.) Naud. Ann. Sci. Nat. III. 16: 244. 1851.

Melastoma mexicanum Humb. & Bonpl. Monogr. Melast. 1: 128. pl. 55. 1816.

Miconia tococoides Naud. Ann. Sci. Nat. III. 16: 127. 1851.

Miconia conostegioides Naud. Ann. Sci. Nat. III. 16: 127. 1851.

Veracruz and Oaxaca. Guatemala.

Shrub, 2 to 3 meters high; leaves oblong-lanceolate, 8 to 18 cm. long, rounded to acute at base, triplinerved, entire or nearly so, glabrous above, puberulent beneath along the nerves; panicles 10 to 15 cm. long, the flowers pedicellate; calyx 3 to 4 mm. long; petals white or pink, 5 mm. long. "Teshuate" (Veracruz).

13. *Miconia lauriformis* Naud. Ann. Sci. Nat. III. 16: 189. 1851.

Type collected between San Bartolo and Pueblo Nuevo, Chiapas.

Leaves ovate-oblong, 6 to 19 cm. long, rounded or subacute at base, triplinerved, entire, puberulent beneath along the nerves; panicles 5 to 7 cm. long, the flowers short-pedicellate; calyx 3 mm. long; petals pink, 5 to 6 mm. long.

14. *Miconia leucocephala* (DC.) Naud. Ann. Sci. Nat. III. 16: 244. 1851.

Chitonia macrophylla D. Don, Mem. Wern. Soc. 4: 319. 1823.

Diplochita leucocephala DC. Prodr. 3: 177. 1828.

Miconia macrophylla Triana, Trans. Linn. Soc. Bot. 28: 103. 1871. Not

M. macrophylla Steud. 1844.

Oaxaca and Chiapas. West Indies and South America.

Shrub or tree, 3 to 12 meters high, the branches densely tomentose; leaves broadly elliptic to oblong-ovate, 20 to 30 cm. long, rounded or obtuse and short-acuminate at apex, emarginate at base, 5 or 7-nerved, glabrate above, densely stellate-tomentose beneath; panicles 10 to 30 cm. long; calyx 7 mm. long, tomentose; petals white or pink, 6 to 8 mm. long; fruit about 6 mm. in diameter.

15. *Miconia dodecandra* (Desr.) Cogn. in Mart. Fl. Bras. 14⁴: 243. 1886.

Melastoma dodecandrum Desr. in Lam. Encycl. 4: 46. 1797.

Veracruz, Oaxaca, and Chiapas. West Indies; Central and South America.

Shrub or small tree, sometimes 5 meters high, the branches densely furfuraceous-puberulent; leaves ovate to lance-oblong, 10 to 18 cm. long, acuminate, rounded at base, usually 5-nerved, glabrate above, densely stellate-tomentulose beneath; panicles 10 to 20 cm. long, the flowers pedicellate; calyx 4 to 6 mm. long, canescent-tomentulose; petals white or pink, 5 to 8 mm. long; fruit about 5 mm. in diameter.

Reported by Hemsley as *M. fothergilla* (Humb. & Bonpl.) Naud.

16. *Miconia anisotricha* (Schlecht.) Triana, Trans. Linn. Soc. Bot. 28: 102. 1871.

Melastoma anisotrichon Schlecht. Linnaea 13: 427. 1839.

Crèmanium berghesianum Schauer, Linnaea 20: 735. 1847.

Clidemia urticaefolia Naud. Ann. Sci. Nat. III. 17: 354. 1852.

Veracruz and Oaxaca; type collected between San Miguel del Soldado and La Joya; a closely related but probably distinct plant occurs in Michoacán or Guerrero.

Branches densely furfuraceous-puberulent and short-hirtellous; leaves ovate-oblong, 6 to 12 cm. long, acuminate, subcordate at base, hirtellous beneath, setulose above, 5 or 7-nerved; panicles 4 to 7 cm. long, the flowers pedicellate; calyx hirtellous, 2.5 mm. long, the teeth 1 mm. long; petals 4 mm. long; fruit black, 4 mm. thick.

17. *Miconia guatemalensis* Cogn. in DC. Monogr. Phan. 7: 758. 1891.

Chiapas. Guatemala; type from Tactic.

Branches densely stellate-puberulent; leaves ovate or ovate-oblong, 6 to 16 cm. long, acuminate, rounded or subcordate at base, 5-nerved, entire or minutely serrulate, hirtellous above, stellate-puberulent beneath; panicles 4 to 8 cm. long, the flowers sessile or nearly so; calyx 2 mm. long, puberulent.

18. *Miconia erythrantha* Naud. Ann. Sci. Nat. III. 16: 119. 1851.

Clidemia monticola Naud. Ann. Sci. Nat. III. 17: 341. 1852.

Oaxaca.

Branches furfuraceous; leaves narrowly ovate, 4 to 6 cm. long, acute or subacuminate, rounded or subcordate at base, 5-nerved, entire or undulate-denticulate, setulose above, hirtellous beneath along the nerves; panicles 3 to 5 cm. long, the flowers pedicellate; petals red or pink, 5 mm. long.

19. *Miconia saxicola* T. S. Brandeg. Zoe 5: 215. 1905.

Sinaloa and Tepic; type from Cerro Colorado, Sinaloa.

Young branches densely furfuraceous-puberulent and glandular-hirtellous; leaves rounded-ovate, 6 to 14 cm. long, 4.5 to 6.5 cm. wide, obtuse or rounded at apex and abruptly short-acuminate, cordate at base, 7-nerved, duplicate-serulate, densely setulose above, hirtellous beneath; panicles few-flowered, 3 to 4.5 cm. long, the flowers pedicellate; calyx 5 to 6 mm. long, densely fulvous-hirtellous with partly gland-tipped hairs, the teeth 1 to 1.5 mm. long; petals 6, 8 to 11 mm. long.

20. *Miconia minutiflora* (Humb. & Bonpl.) DC. Prodr. 3: 189. 1828.

Melastoma minutiflorum Humb. & Bonpl. Monogr. Mélast. 1: 50. pl. 22. 1816.

Veracruz, Oaxaca, Chiapas, and Tabasco. West Indies; Central and South America.

Shrub or tree, 2 to 4 meters high; leaves oblong-lanceolate, 8 to 12 cm. long, long-acuminate, rounded to acute at base, 3-nerved, sparsely furfuraceous when young but soon glabrous, usually blackish when dry, entire; panicles 5 to 15 cm. long, the flowers numerous, short-pedicellate, sweet-scented; calyx 1.5 mm. long; petals white, 2 to 2.5 mm. long; fruit 2 to 2.5 mm. in diameter. "Resino" (Costa Rica).

21. *Miconia triplinervis* Ruiz & Pav. Syst. Veg. Peruv. Chil. 1: 105. 1798.

Reported from Tabasco. Jamaica; Peru.

Leaves broadly lanceolate, 15 to 25 cm. long, long-acuminate, long-attenuate at base, 3-nerved, entire; spikes 10 to 15 cm. long; calyx 2.5 to 3 mm. long; petals white, 2 mm. long.

22. *Miconia bourgaeana* Cogn. in DC. Monogr. Phan. 7: 772. 1891.

Veracruz; type from Tuspango, near Córdoba.

Shrub, 1 to 2 meters high, the branches furfuraceous; leaves broadly ovate to lance-oblong, 10 to 20 cm. long, long-acuminate, rounded or subcordate at base, 5 or 7-nerved, obscurely denticulate, sparsely setulose above, hirtellous beneath; panicles 6 to 15 cm. long; calyx 2 mm. long, stellate-furfuraceous; petals 2 mm. long.

23. *Miconia impetiolearis* (Swartz) D. Don, Mem. Wern. Soc. 4: 316. 1823.

Melastoma impetioleare Swartz, Prodr. Veg. Ind. Occ. 70. 1788.

Veracruz. West Indies; Central and South America.

Large shrub or tree, 5 to 8 meters high, the branches tomentose; leaves oblong to broadly obovate, 20 to 50 cm. long, short-acuminate, auriculate at base, 3-nerved or quintuplinerved, undulate-denticulate, glabrate above, stellate-hirtellous beneath; panicles 15 to 25 cm. long, the flowers sessile; calyx 2.5 to 3 mm. long; petals white or pink, 2 mm. long; fruit blue or black, 4 mm. in diameter. "Hoja de pasmo" (Costa Rica); "camasey," "camasey de costilla" (Porto Rico).

24. *Miconia argentea* (Swartz) DC. Prodr. 3: 182. 1828.*Melastoma argenteum* Swartz, Fl. Ind. Occ. 779. 1800.

Veracruz, Oaxaca, and Tabasco. Guatemala to Panama; type from the Mosquito Coast.

Shrub or tree, 3 to 20 meters high, the trunk sometimes 30 cm. in diameter; bark gray; leaves ovate to rounded-elliptic, 10 to 25 cm. long, acute or rounded at apex and abruptly short-acuminate, rounded at base, usually denticulate but sometimes entire, green and glabrate above; panicles 10 to 25 cm. long, the flowers sessile; calyx 1.5 to 2 mm. long; petals 2 mm. long. "Cenizo," "sabano" (Tabasco); "María," "Santa María," "María colorada," "capirote" (Costa Rica); "capirote blanco" (Nicaragua); "sirín cacal" (Guatemala, *Seler*); "cainillo," "canillo," "dos-caras," "papelillo," "manchamancha" (Panama); "sirinón" (El Salvador).

The sapwood is described as thick and light brown and the heartwood as slightly darker; the wood is said to be moderately hard, durable, fine-grained, and susceptible of a fair polish.

25. *Miconia albicans* (Swartz) Triana, Trans. Linn. Soc. Bot. 28: 116. 1871.*Melastoma albicans* Swartz, Fl. Ind. Occ. 786. 1800.

Guerrero and Oaxaca. West Indies; Central and South America; type from Jamaica.

Shrub, 1 to 5 meters high, the branches whitish-tomentulose; leaves ovate-oblong, 6 to 13 cm. long, obtuse or acute, 5-nerved, emarginate at base, glabrate above, coriaceous; panicles thyrsiform, 5 to 15 cm. long, the flowers secund; calyx 2.5 to 3 mm. long; petals white, 2.5 mm. long; fruit blue, 4 mm. thick. "Mortifio" (Colombia).

26. *Miconia stenostachya* DC. Prodr. 3: 181. 1828.

Oaxaca and perhaps elsewhere. Central and South America; type from Brazil.

Shrub, 1 to 3 meters high, the branches whitish-tomentulose; leaves oblong or lance-oblong, 10 to 15 cm. long, acute, 5-nerved, glabrate above; panicles 5 to 15 cm. long, the flowers secund; calyx 3.5 to 4 mm. long; petals white or pink, 3 to 3.5 mm. long; fruit blackish, 5 mm. thick.

27. *Miconia scorpioides* (Schlecht. & Cham.) Naud. Ann. Sci. Nat. III. 16: 243. 1851.*Melastoma scorpioides* Schlecht. & Cham. Linnaea 5: 564. 1830.*Miconia anceps* Naud. Ann. Sci. Nat. III. 16: 150. 1851.

Veracruz and Chiapas; type from Cuesta Grande de Chiconquilaco, Veracruz. Central and South America.

Shrub or small tree, sometimes 6 meters high, the branches minutely stellate-puberulent; leaves ovate-oblong to oblong-elliptic, 12 to 25 cm. long, acuminate, attenuate at base, entire, glabrous above, very sparsely and minutely stellate-puberulent beneath; panicles 10 to 25 cm. long; calyx 2 mm. long; petals 2.5 mm. long.

28. *Miconia ambigua* (Humb. & Bonpl.) DC. Prodr. 3: 189. 1828.*Melastoma ambiguum* Humb. & Bonpl. Monogr. Melast. 1: 55. pl. 25. 1816.

Veracruz, Puebla, and Chiapas. West Indies; Central and South America; type from Caripe, Venezuela.

Shrub, 2 to 3 meters high, the branches obscurely stellate-puberulent; leaves oblong or oblong-lanceolate, 10 to 20 cm. long, long-acuminate, obtuse or acute at base, glabrate, entire or nearly so; panicles 5 to 14 cm. long; calyx 1.5 to 2 mm. long; petals white, 2.5 to 3 mm. long. "Cirín" (El Salvador).

29. *Miconia calvescens* DC. Prodr. 3: 185. 1828.

Chiapas. Central and South America; type from Brazil.

Tree, 4 to 6 meters high; the young branches minutely stellate-canescens; leaves oblong to broadly ovate or obovate, 15 to 50 cm. long, 7 to 40 cm. wide, acute or short-acuminate, 5-nerved, entire, glabrate; panicles 20 to 50 cm. long, the flowers sessile; calyx 3 mm. long; petals white, 2 to 2.5 mm. long; fruit 4 mm. thick.

30. *Miconia hyperprasina* Naud. Ann. Sci. Nat. III. 16: 186. 1851.

Type from Teapa, Tabasco. Central America.

Shrub or small tree, the branches sparsely furfuraceous or glabrate; leaves oblong-lanceolate or oblong-elliptic, 15 to 30 cm. long, acuminate, acute at base, thin, glabrate, repand-crenate or subentire; panicles 7 to 10 cm. long; calyx 3 mm. long; petals white, 2 mm. long.

31. *Miconia laevigata* (L.) DC. Prodr. 3: 188. 1828.

Melastoma laevigatum L. Sp. Pl. ed. 2. 390. 1762.

Melastoma sylvaticum Schlecht. Linnaea 13: 422. 1839.

Miconia sylvatica Naud. Ann. Sci. Nat. III. 16: 243. 1851.

Guerrero, Oaxaca, Morelos, and Veracruz. West Indies; Central and South America.

Shrub, 1 to 4.5 meters high, the young branches stellate-furfuraceous; leaves oblong or oblong-ovate, 8 to 25 cm. long, acuminate, obtuse or rounded at base, entire or nearly so, glabrate; panicles 5 to 15 cm. long; calyx 3 to 3.5 mm. long, furfuraceous; petals white or pink, 3 to 4 mm. long; fruit blue or blackish, 3 mm. thick. "Totopozole," "tezhuate" (Oaxaca, *Reko*); "camasey" (Porto Rico); "teshuate," "ojo de gato" (Veracruz); "cirín" (El Salvador).

32. *Miconia langlassei* Standl., sp. nov.

Type from the Sierra Madre of Michoacán or Guerrero (*Langlassé* 845; U. S. Nat. Herb. no. 386227).

Tree, 5 to 6 meters high, the young branches glabrate; leaves elliptic-oblong or ovate-oblong, 17 to 23 cm. long, 8 to 10.5 cm. wide, apiculate, abruptly decurrent nearly to the base of the petiole, thin, glabrate, triplinerved, the lateral nerves remote from the margin; panicles about 20 cm. long, broadly pyramidal, the branches arcuate-ascending, the flowers 5-parted, mostly sessile; calyx 2 mm. long, minutely puberulent, repand-dentate; petals white, 2 mm. long; style 6 to 7 mm. long.

To this species may be referred, for the present, *Goldman* 731, from Jaltipám, Veracruz. The specimen is in every way like the type of *M. langlassei* except that the leaf blades are rounded and auriculate at base. Similar variation is exhibited by *M. pteropoda* Benth., a closely related species.

33. *Miconia schlechtendalii* Cogn. in DC. Monogr. Phan. 7: 804. 1891.

Veracruz: type material from Hacienda de la Laguna and Misantla.

Young branches furfuraceous-puberulent; leaves narrowly lanceolate, 6 to 14 cm. long, acute or acuminate, acute at base, obscurely denticulate, glabrate; panicles 3 to 7 cm. long, narrow, dense, the flowers sessile; calyx 2.5 mm. long; petals white, 2 mm. long; fruit black.

This was listed by Hemsley as *M. maximiliana* DC. It is probably not distinct from *M. prasina*.

34. *Miconia prasina* (Swartz) DC. Prodr. 3: 188. 1828.*Melastoma prasinum* Swartz, Prodr. Veg. Ind. Occ. 69. 1788.

Oaxaca and Chiapas. West Indies; Central and South America.

Shrub, 3 to 5 meters high, the branches puberulent; leaves oblong or lance-oblong, 7 to 20 cm. long, acute or acuminate, acute or obtuse at base, entire or nearly so, glabrate; panicles 5 to 15 cm. long, the flowers sessile; calyx 2.5 to 3.5 mm. long; petals white or pale pink, 2 to 3 mm. long; fruit black-purple, 4 mm. thick. "Camasey" (Porto Rico).

The plant is said to yield a black dye.

35. *Miconia globulifera* Naud. Ann. Sci. Nat. III. 16: 139. 1851.*Melastoma globuliflorum* Schlecht. & Cham. Linnaea 5: 564. 1830. Not *M. globuliflora* L. Rich. 1792.

Veracruz, Oaxaca, and Chiapas; type from Jalapa, Veracruz.

Shrub, 1 to 2 meters high, the branches densely furfuraceous-tomentose; leaves ovate to ovate-oblong, 10 to 15 cm. long, long-acuminate, rounded or obtuse at base and often oblique, setulose above, densely stellate-tomentose beneath; panicles 5 to 8 cm. long, the flowers sessile, clustered at the ends of the branches; calyx 3 mm. long; petals yellow, 3 mm. long; fruit 5 mm. thick.

The writer has seen no material of *M. liebmannii* Cogn.,¹ which, judging from the description, must be very closely related if not identical. It was described from Oaxaca.

36. *Miconia nervosa* (Smith) Triana, Trans. Linn. Soc. 28: 111. 1871.*Melastoma nervosum* Smith in Rees, Cycl. 23. 1822.

Reported from southern Mexico. Central and South America.

Shrub, 2 meters high, the branches appressed-setulose; leaves ovate or ovate-lanceolate, 10 to 30 cm. long, long-acuminate, setulose above; panicles spiciform, 5 to 15 cm. long, the flowers sessile, densely congested; calyx 4 mm. long; petals red, 3.5 to 4 mm. long.

37. *Miconia chrysoneura* Triana, Trans. Linn. Soc. Bot. 28: 111. 1871.

Veracruz and Oaxaca; type from Jalapa, Veracruz.

Leaves ovate or ovate-lanceolate, 7 to 20 cm. long, acute or acuminate, acute to rounded at base, appressed-setulose or hirtellous with yellowish hairs, entire or nearly so, septemplinerved; panicles 5 to 10 cm. long, the flowers sessile, clustered at the ends of the branches; calyx 3 mm. long; petals 3 mm. long.

38. *Miconia ibaguensis* (Humb. & Bonpl.) Triana, Trans. Linn. Soc. Bot. 28: 110. 1871.*Melastoma ibaguense* Humb. & Bonpl. Monogr. Melast. 1: 105. pl. 45. 1816.*Melastoma lineatum* Schlecht. Linnaea 13: 423. 1839.

Veracruz and Oaxaca. Cuba; Central and South America.

Shrub, 1 to 5 meters high; leaves oblong or lance-oblong, 8 to 15 cm. long, acute or acuminate, rounded or obtuse at base, quintuplinerved, minutely serrulate or entire, setulose or glabrate above; panicles 5 to 10 cm. long, the flowers sessile; calyx 3 mm. long; petals white or yellow, 2.5 to 3 mm. long.

DOUBTFUL SPECIES

MICONIA MAGNIFICA Triana, Trans. Linn. Soc. Bot. 28: 131. 1871. Described from cultivated plants which were believed to be of Mexican origin.

¹ In DC. Monogr. Phan. 7: 821. 1891.

17. *HETEROTRICHUM* DC. Prodr. 3: 173. 1828.

Shrubs with hispid-setose stems; leaves large, petiolate, usually 7-nerved, entire or serrulate; flowers 4 to 9-parted, chiefly in terminal panicles; calyx tube campanulate; petals obovate, obtuse, white or pink; stamens equal; fruit baccate.

Leaves densely stellate-pubescent beneath; flowers 8-parted, the panicles few-flowered.....1. *H. octonum*.

Leaves without stellate pubescence; flowers 4 or 5-parted, the panicles many-flowered.....2. *H. scopulinum*.

1. *Heterotrichum octonum* (Humb. & Bonpl.) DC. Prodr. 3: 173. 1828.

Melastoma octonum Humb. & Bonpl. Monogr. Melast. 1: 7. pl. 4. 1816.

Oaxaca, Chiapas, and Tabasco. Cuba; Central and South America.

Shrub, 2 to 3 meters high, the branches long-setose and stellate-tomentulose; leaves broadly ovate, 7 or 9-nerved, 10 to 20 cm. long, acuminate, cordate at base, denticulate, setose above; calyx tube 4 to 5 mm. long, the lobes 2 to 3 mm. long; petals white, 8 to 9 mm. long; fruit 7 to 8 mm. long.

Many of the inflorescences are axillary or lateral in this species.

2. *Heterotrichum scopulinum* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 187. 1915.

Type from Cerro del Boquerón, Chiapas.

Shrub, 1 meter high, the branches setose; leaves very broadly ovate, 10 to 18 cm. long, 7-nerved, acuminate, cordate at base, denticulate, setose above, furfuraceous-villosulous beneath along the nerves; calyx tube 2.5 mm. long, hirtellous; petals pink, 3 mm. long; fruit 4 to 5 mm. in diameter.

18. *OSSAEA* DC. Prodr. 3: 168. 1828.1. *Ossaea micrantha* (Swartz) Macfad. Fl. Jam. 2: 49. 1850.

Melastoma micranthum Swartz, Prodr. Fl. Ind. Occ. 71. 1788.

Chiapas. Central and South America; type from Jamaica.

Slender shrub, 2 to 3 meters high, the branches stellate-puberulent or glabrate; leaves petiolate, oblong or lance-oblong, acuminate, acute at base, quintuplinerved, entire, glabrate; flowers 4-parted, in lax axillary panicles; calyx 2 mm. long, minutely denticulate; petals white, lanceolate, acute, 3 mm. long; fruit baccate, subglobose, 8-costate.

19. *MAIETA* Aubl. Pl. Guian. 1: 443. 1775.1. *Maieta setosa* (Triana) Cogn. in Mart. Fl. Bras. 14⁴: 462. 1888.

Calophysa setosa Triana in Seem. Journ. Bot. 5: 209. 1867.

Veracruz, Oaxaca, and Chiapas. Central America; type from Chontales, Nicaragua.

Shrub, 2 meters high, the stems densely covered with long stiff retrorse or spreading bristles; leaves petiolate, the petiole bearing at the apex a large bladderlike bilobate appendage; leaf blades oblong-ovate or broadly elliptic-ovate, 7 or 9-nerved, 10 to 25 cm. long, acute, subcordate at base, long-setose; flowers 3 or 4-parted, in slender-pedunculate axillary cymes; calyx tube 2 mm. long, furfuraceous, the limb shallowly lobate, long-setose; buds bright red; petals pink, oblong, 3 mm. long; fruit baccate, 3 mm. in diameter.

There is little doubt that *Tococa vesiculosa* DC. is the same plant, and that the proper name for this species is *Maieta vesiculosa* (DC.) Cogn.¹ DeCan-

¹ In Mart. Fl. Bras. 14⁴: 463. 1888; *Tococa vesiculosa* DC. Prodr. 3: 166. 1828; *Calophysa vesiculosa* Triana, Trans. Linn. Soc. Bot. 28: 140. 1871.

dolle's description was based upon one of Sessé and Mocino's plates,¹ which illustrates a plant agreeing well with *Maieta setosa* except that the bristles of the stem are ascending rather than recurved.

20. CLIDEMIA D. Don, Mem. Wern. Soc. 4: 306. 1823.

Shrubs, densely hairy; leaves petiolate, 3 to 7-nerved; entire or dentate; flowers 4 to 6-parted, small, variously arranged; calyx tube urceolate, the lobes short or elongate, interior lobes often developed within the outer lobes; petals oblong or obovate, obtuse; stamens equal or nearly so; fruit a small berry.

Flowers 4-parted, glomerate in the axils and sessile-----1. *C. rubra*.

Flowers 5-parted, spicate, cymose, or paniculate, usually pedicellate.

Flowers spicate-----2. *C. dependens*.

Flowers cymose or paniculate.

Interior calyx lobes well developed, 1 mm. long or longer.

3. *C. chinantlana*.

Interior calyx lobes obsolete.

Lobes of the calyx much shorter than the tube-----4. *C. deppeana*.

Lobes of the calyx about as long as the tube.

Hairs of the calyx conspicuously dilated below and stellate; cymes long-pedunculate-----5. *C. laxiflora*.

Hairs of the calyx slender, simple; cymes usually sessile or short-pedunculate.

Leaves broadly rounded or subcordate at base-----6. *C. hirta*.

Leaves merely obtuse at base.

Leaves entire or obscurely crenulate-----7. *C. dentata*.

Leaves duplicate-serrulate-----8. *C. naudiniana*.

1. *Clidemia rubra* (Aubl.) Mart. Nov. Gen. & Sp. 3: 152. 1832.

Melastoma rubrum Aubl. Pl. Guian. 416. pl. 161. 1775.

Sagraea rubra Triana, Trans. Linn. Soc. Bot. 28: 137. 1871.

Guerrero to Oaxaca and Veracruz. Central and South America.

Shrub, 1 meter high; leaves elliptic to ovate-oblong, 5 to 10 cm. long, acute, rounded at base, densely setose-pilose, 5-nerved; calyx tube 3 to 4 mm. long, the lobes 1.5 mm. long; petals red or pink, 3 to 5 mm. long; fruit black, 4 to 5 mm. in diameter.

2. *Clidemia dependens* D. Don, Mem. Wern. Soc. 4: 307. 1823.

Melastoma spicatum Aubl. Pl. Guian. 423. pl. 165. 1775.

Clidemia spicata DC. Prodr. 3: 159. 1828. Not *C. spicata* D. Don, 1823.

Michoacán to Oaxaca and Veracruz. West Indies; Central and South America.

Shrub, 0.5 to 2 meters high, densely setose and stellate-tomentose; leaves ovate or oblong-ovate, 6 to 18 cm. long, acuminate, rounded or subcordate at base, duplicate-dentate, 5 or 7-nerved, setulose; flowers verticillate in the spikes; calyx tube 3 mm. long, the outer lobes 3 to 4 mm. long; petals 4 mm. long, greenish white or pink; fruit blue-black, edible.

3. *Clidemia chinantlana* (Naud.) Triana, Trans. Linn. Soc. Bot. 28: 135. 1871.

Staphidium chinantlanum Naud. Ann. Sci. Nat. III. 17: 318. 1852.

Type from Chinantla, Oaxaca.

Leaves ovate, 10 to 15 cm. long, 5 to 8 cm. wide, acuminate, rounded or subcordate at base, 7-nerved, denticulate, hirtellous above; panicles pyramidal,

¹ DC. Calq. Dess. Fl. Mex. pl. 336.

4 to 5 cm. wide; calyx tube 3 to 4 mm. long, the outer lobes 2 mm. long; petals white, 3 mm. long.

4. *Clidemia deppeana* Steud. Nom. Bot. ed. 2. 384. 1840.

Melastoma petiolare Schlecht. & Cham. Linnaea 5: 562. 1830. Not *M. petiolare* Mill. 1768.

Staphidium lindenianum Naud. Ann. Sci. Nat. III. 17: 314. 1852.

Staphidium gracile Naud. Ann. Sci. Nat. III. 17: 314. 1852.

Clidemia petiolaris Triana, Trans. Linn. Soc. 28: 135. 1871.

Veracruz, Oaxaca, Tabasco, and Yucatán; type from Hacienda de la Laguna, Veracruz. Central America.

Slender shrub, the branches setose; leaves 5-nerved, ovate or ovate-oblong, 6 to 15 cm. long, acuminate, rounded or subcordate at base, crenate-denticulate, setose-pillose; cymes lax, few-flowered; calyx glandular-hirsute, the tube 3 mm. long, the lobes 1 to 1.5 mm. long; petals pink, 4 to 5 mm. long; fruit 5 to 6 mm. in diameter.

5. *Clidemia laxiflora* (Schlecht.) Walp.; Naud. Ann. Sci. Nat. III. 17: 376. 1852.

Melastoma laxiflorum Schlecht. Linnaea 13: 426. 1839.

Tepic to Veracruz; type from Hacienda de la Laguna, Veracruz. Central America.

Branches densely spreading-setulose; leaves slender-petiolate, ovate or elliptic-ovate, 8 to 13 cm. long, acuminate, rounded at base, 5-nerved, densely setose with long slender fulvous hairs, denticulate or subentire; cymes 3 to 9-flowered, long-pedunculate, the flowers all or chiefly sessile; calyx densely covered with long yellow subulate hairs, the tube 3 to 4 mm. long, the lobes linear, 3 to 5 mm. long; petals 6 to 8 mm. long; fruit black.

6. *Clidemia hirta* (L.) D. Don, Mem. Wern. Soc. 4: 309. 1823.

Melastoma hirtum L. Sp. Pl. 390. 1753.

Staphidium chrysanthum Naud. Ann. Sci. Nat. III. 17: 310. 1852.

Veracruz, Oaxaca, and Tabasco. West Indies; Central and South America.

Shrub, 0.5 to 1.5 meters high, the stems setose and stellate-puberulent; leaves ovate or broadly ovate, 5 to 10 cm. long, acuminate, entire or crenulate, 5 or 7-nerved, setose; calyx tube 5 mm. long, the lobes about 4 mm. long; petals white, pink, or yellow, 8 to 10 mm. long; fruit blackish, 6 to 7 mm. long. "Camacey," "camacey peludo" (Porto Rico); "grosella azulada" (Nicaragua); "mortiño" (Colombia), "peluda" (El Salvador).

The fruit is sweet and edible.

Clidemia serrulata (Schlecht.) Triana,¹ the type of which came from Huitamalco, although maintained as distinct by Cogniaux, appears scarcely distinguishable from *C. hirta* and *C. naudiniana*, which are closely related to each other. It is doubtful, also, whether *C. dentata* is a distinct species.

7. *Clidemia dentata* D. Don, Mem. Wern. Soc. 4: 308. 1823.

Oaxaca and Chiapas. Central America to Peru.

Shrub, 4 meters high or less, the branches setose-hirsute; leaves oblong to oblong-ovate, 6 to 17 cm. long, long-acuminate, 5-nerved, unequal at base, setulose; cymes few-flowered; calyx tube 4 mm. long, the lobes 4 to 6 mm. long; petals 6 mm. long, pink or purple; fruit 6 to 7 mm. long.

¹Trans. Linn. Soc. Bot. 28: 135. 1871; *Melastoma serrulatum* Schlecht. Linnaea 13: 425. 1839; *Staphidium divaricatum* Naud. Ann. Sci. Nat. III. 17: 315. 1852.

8. *Clidemia naudiniana* Cogn. in DC. Monogr. Phan. 7: 990. 1891.

Staphidium dependens Naud. Ann. Sci. Nat. III. 17: 319. 1852. Not *Clidemia dependens* D. Don, 1823.

Veracruz, Oaxaca, and Tabasco.

Branches setose-hirsute; leaves ovate or lance-oblong, 6 to 15 cm. long, long-acuminate, 5-nerved, setulose; cymes few-flowered; calyx setose, the tube 3 mm. long, the lobes 3 to 4 mm. long; petals white, 4 to 5 mm. long. "Colación" (Tabasco).

21. *BELLUCIA* Neck. Elem. Bot. 2: 143. 1790.1. *Bellucia macrophylla* (D. Don) Triana, Trans. Linn. Soc. Bot. 28: 142. 1871.

Blakea macrophylla D. Don, Mem. Wern. Soc. 4: 326. 1823.

Bellucia superba Naud. Ann. Sci. Nat. III. 16: 104. 1851.

Reported from Tabasco; type from Mexico. Guatemala.

Tree; leaves petiolate, ovate or broadly elliptic, 20 to 30 cm. long, abruptly acute, 5-nerved, coriaceous, when young densely tomentulose beneath but soon glabrous, entire; flowers axillary, solitary or fasciculate, long-pedicellate, 8-parted; calyx about 2 cm. broad, the limb divided into several lobes; petals oblong, 2 cm. long; fruit baccate.

A related species, *B. costaricensis* Cogn., is known in Costa Rica as "coronillo."

22. *BLAKEA* L. Syst. Nat. ed. 10. 1044. 1759.1. *Blakea purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 58. 1914.

Type from Cerro del Boquerón, Chiapas.

Shrub, the branches terete, glabrate; leaves petiolate, broadly elliptic, about 14 cm. long and 9 cm. wide, obtuse or abruptly short-acuminate, 5-nerved, entire, when young densely furfuraceous-tomentose beneath; flowers axillary, long-pedicellate, the calyx subtended by 4 bracts about 1.5 cm. long; calyx tomentose, 6-dentate.

23. *TOPOBEA* Aubl. Pl. Guian. 476. 1775.

Shrubs, erect or scandent, often epiphytic; leaves petiolate, 3 to 7-nerved, entire, with numerous transverse parallel nerves; flowers 6-parted, axillary or lateral, solitary or fasciculate, pink or white; subtended at base by 4 free or connate bracts; calyx campanulate, truncate or dentate; stamens equal or nearly so, the anthers subulate; fruit baccate,

Leaves 5-nerved; pedicels mostly 5 mm. long or less-----1. *T. calycularis*.

Leaves 3-nerved; pedicels mostly 10 to 15 mm. long-----2. *T. laevigata*.

1. *Topobea calycularis* Naud. Ann. Sci. Nat. III. 18: 149. 1852.

Type from Zuluzu, Chiapas. Central America.

Tree, sometimes 12 meters high, the branchlets tetragonous; leaves oblong-elliptic, 8 to 13 cm. long, abruptly caudate-acuminate, acute at base, coriaceous, glabrous; bracts coriaceous, appressed, rounded, 3 to 5 mm. long; calyx 7 to 8 mm. long, truncate and minutely 6-dentate; petals white or pink, ovate, acutish, 8 mm. long.

2. *Topobea laevigata* (Don) Naud. Ann. Sci. Nat. III. 18: 150. 1852.

Blakea laevigata D. Don, Mem. Wern. Soc. 4: 323. 1823.

Melastoma laevigatum Schlecht. Linnaea 13: 428. 1839.

Topobea fragrans Naud. Ann. Sci. Nat. III. 18: 149. 1852.

Veracruz. Guatemala.

Erect shrub, 3.5 meters high, or epiphytic; leaves elliptic-obovate or oblong-obovate, 7 to 13 cm. long, abruptly short-acuminate, attenuate at base, coriaceous, glabrous; bracts rounded, 4 to 5 mm. long; calyx truncate, 7 to 8 mm. long; petals pink, 8 to 10 mm. long, obtuse.

24. *MOURIRIA* Aubl. Pl. Guian. 452. 1775.

Shrubs or small trees, glabrous throughout; leaves sessile, entire, coriaceous, 1-nerved or pinnate-nerved; flowers small, fasciculate in the axils, 5-parted; calyx limb cupular; petals acute or acuminate; stamens 10, equal; fruit baccate, globose, 1 to 4-seeded.

Leaves conspicuously pinnate-nerved, subcordate at base-----1. *M. muelleri*.
Leaves 1-nerved, the lateral nerves obsolete, rounded at base--2. *M. parvifolia*.

1. *Mouriria muelleri* Cogn. in DC. Monogr. Phan. 7: 1118. 1891.

Oaxaca; type from Trapiche de la Concepción.

Leaves oblong or oblong-ovate, 5.5 to 10 cm. long, acute; peduncles solitary or geminate, 1 or 3-flowered, the pedicels 3 to 10 mm. long; calyx 4 to 5 mm. long, the lobes very short, deltoid; petals ovate, 2 to 3 mm. long; fruit about 1 cm. in diameter. "Yaglacito amarillo" (Oaxaca, *Reko*).

2. *Mouriria parvifolia* Benth. Bot. Voy. Sulph. 97. pl. 36. 1844.

Tres Marias Islands, Tepic. Guatemala to Panama.

Leaves ovate-lanceolate to broadly ovate, 1.5 to 6 cm. long, acute or acuminate; flowers solitary or fasciculate, the pedicels 1 to 4 mm. long; calyx 3 mm. long, the lobes linear-subulate, 3 mm. long; petals 5 mm. long; fruit globose, 8 mm. in diameter. "Camarón," "capulín verde" (El Salvador).

DOUBTFUL SPECIES.

MOURIRIA MEXICANA DC. Prodr. 3: 8. 1828. Description based upon one of Sessé and Mocino's plates.¹ The leaves are shown as petiolate, and the plant probably does not belong to this genus and perhaps not to the family.

124. *ONAGRACEAE*. Evening-primrose Family.

Shrubs or small trees, or often herbs; leaves opposite or alternate, entire or dentate, estipulate; flowers commonly perfect, mostly axillary, regular or irregular; calyx tube adnate to the ovary and produced beyond it, the limb usually 4-lobate; petals commonly 4, contorted; stamens 1 to 8, the anthers oblong or linear; style filiform, the stigma entire or 4-lobate; fruit dry or fleshy.

Numerous herbaceous plants of the family, representing several genera, occur in Mexico.

Stamens 1 or 2.

Fertile stamens 2-----1. *DIPLANDRA*.

Fertile stamen 1.

Petals subulate, not clawed-----2. *SEMEIANDRA*.

Petals clawed-----3. *JEHLIA*.

¹ DC. Calq. Dess. Fl. Mex. pl. 361.

Stamens 8.

Seeds 1 in each cell of the fruit; ovary imbedded in the flowering branch.
4. BURRAGEA.

Seeds few or numerous in each cell; ovary free from the flowering branch.
 Fruit capsular; seeds winged or hairy.

Seeds each with a tuft of hairs at apex-----**5. ZAUSCHNERIA.**

Seeds winged, not hairy.

Seeds in 2 rows in each cell; flowers large-----**6. HAUYA.**

Seeds in a single row; flowers small-----**7. XYLONAGRA.**

Fruit baccate; seeds neither winged nor hairy-----**8. FUCHSIA.**

1. DIPLANDRA Hook. & Arn. Bot. Beechey Voy. 291. 1839.

A single species is known.

1. Diplandra lopezioides Hook. & Arn. Bot. Beechey Voy. 291. *pl.* 60. 1839.
 Tepic.

Shrub, about 2 meters high, the stems covered with brown flaky bark; leaves opposite, short-petiolate, oblong or oblong-lanceolate, 5 to 9 cm. long, serrate, acute, scabrous-hispidulous; flowers red, in terminal racemes, long-pedicellate, about 1 cm. long; calyx tube very short, the 4 lobes oblong-linear; petals short, obovate; stamens 2; fruit a 4-celled capsule, about 8 mm. long.

2. SEMEIANDBRA Hook. & Arn. Bot. Beechey Voy. 291. 1839.

Only the following species is known.

1. Semeiandra grandiflora Hook. & Arn. Bot. Beechey Voy. 291. *pl.* 59. 1839.
 Durango, Sinaloa, Tepic, and Jalisco; type from Tepic.

Slender shrub, about 2 meters high, the branches finely puberulent; leaves opposite, petiolate, ovate or lanceolate, 3 to 10 cm. long, acute or obtuse, serrulate, puberulent; flowers bright red, 3 to 4.5 cm. long, axillary, forming leafy racemes, long-pedicellate; calyx tube ventricose, the 4 lobes linear, 3 of them reflexed, the other erect; petals linear-subulate, half as long as the sepals or shorter; stamens 2; fruit a globose capsule, about 6 mm. long.

3. JEHLIA Rose, Contr. U. S. Nat. Herb. 12: 297. 1909.

A single species is known.

1. Jehlia grandiflora (Zucc.) Rose, Contr. U. S. Nat. Herb. 12: 297. 1909.

Lopezia grandiflora Zucc. Flora 15: Beibl. 101. 1832.

Lopezia macrophylla Benth. Pl. Hartw. 83. 1841.

Oaxaca and Chiapas; type from "Santiago." Guatemala.

Plants fruticose; leaves opposite, petiolate, oblong-ovate or lance-oblong, 6 to 13 cm. long, acuminate, attenuate or acute at base, serrulate, puberulent or glabrate; flowers bright red, about 2 cm. long, long-pedicellate, axillary, forming dense leafy racemes; calyx tube very short, the 4 lobes lanceolate; petals 4, unequal; stamens 2, one of them sterile; fruit a subglobose capsule, 4-celled, about 8 mm. long.

4. BURRAGEA Donn. Smith & Rose, Contr. U. S. Herb. 16: 297. 1913.

Low shrubs; leaves alternate, entire, petiolate; flowers axillary, sessile; calyx tube very slender, elongate, the 4 sepals reflexed; petals 4; stamens 8, unequal; stigma capitate; ovary imbedded in the stem, 2-celled; capsule

2-celled, 2-seeded, imbedded in the flowering branch and tardily separating from it.

Only two species are known.

Stems puberulent.....1. *B. fruticulosa*.
Stems glabrous.....2. *B. frutescens*.

1. *Burragea fruticulosa* (Benth.) Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 298. 1913.

Gaura fruticulosa Benth. Bot. Voy. Sulph. 15. 1844.

Gongylocarpus fruticosus T. S. Brandeg. Proc. Calif. Acad. II. 2: 158. 1889. Baja California; type from Magdalena Bay.

Plants 30 to 60 cm. high; leaves linear or oblanceolate-linear, 1.5 to 3 cm. long, 1 to 4 mm. wide, acute; calyx tube about 1.5 cm. long; petals 1 cm. long, rose-purple.

2. *Burragea frutescens* (Curran) Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 298. 1913.

Gongylocarpus frutescens Curran, Proc. Calif. Acad. II. 1: 231. 1888.

Baja California; type from Magdalena Bay.

Shrub, 30 to 60 cm. high, glabrous throughout, the branches usually purple; leaves narrowly oblanceolate, 2 to 3 cm. long, 7 mm. wide or less; calyx tube 2 to 2.5 cm. long; petals 12 mm. long.

5. *ZAUSCHNERIA* Presl, Rel. Haenk. 2: 28. 1831.

1. *Zauschneria californica* Presl, Rel. Haenk. 2: 28. pl. 52. 1831.

Zauschneria mexicana Presl, Rel. Haenk. 2: 29. 1831.

Baja California and Sonora. California to New Mexico; type from Monterey, California.

Plants herbaceous or shrubby, 1.5 meters high or less; leaves sessile, the lower opposite, the upper alternate, lanceolate to ovate, 1.5 to 4 cm. long, acute, entire or denticulate, densely pilose or glabrate; flowers bright red, 2 to 3 cm. long, in leafy spikes; calyx tube funnelform, the limb 4-lobate; petals 4; stamens 8, exserted; fruit a linear 4-celled capsule; seeds each with a tuft of hairs at apex.

A showy plant, sometimes known as "California fuchsia." The species is a variable one, of which several segregates have been described.

6. *HAUYA* DC. Prodr. 3: 36. 1828.

REFERENCE: J. D. Smith and J. N. Rose, Contr. U. S. Nat. Herb. 16: 288-296. 1913.

Shrubs or trees; leaves large, entire; flowers large, axillary, solitary; calyx tube elongate, the lobes narrow; petals 4, sessile; stamens 8; fruit a woody capsule.

Flowers pedicellate.

Calyx lobes short-appendaged at apex.....1. *H. rusbyi*.

Calyx lobes not appendaged.....2. *H. barcenae*.

Flowers sessile.

Calyx lobes not appendaged.....3. *H. elegans*.

Calyx lobes appendaged.....4. *H. microcerata*.

1. *Hauya rusbyi* Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 291. f. 48. 1913.

Guerrero; type from Monte Llmón, altitude 1,350 meters.

Small tree; leaves oval-ovate or elliptic-ovate, 6.5 to 12 cm. long, abruptly short-acuminate, rounded at base, pilosulous; calyx tube 3 cm. long, the lobes 4 to 5 cm. long; capsule 3.5 to 4 cm. long, about 8 mm. thick.

2. *Hauya barcenae* Hemsl. Diag. Pl. Mex. 13. 1878.

Type from Huajuapán, Oaxaca.

Tree, 12 meters high; leaves ovate-rounded, 5 to 6.5 cm. long, acute, rounded at base, puberulent; calyx tube 3.5 cm. long, the lobes of the same length; capsule 5 cm. long.

3. *Hauya elegans* DC. Prodr. 3: 36. 1828.

Described from Mexico, the locality not known; reported from Hidalgo by Hemsley.

Shrub or tree, sometimes 12 meters high; leaves lanceolate to rounded-ovate, 3.5 to 6 cm. long, acuminate, grayish-velutinous beneath; flowers about 12.5 cm. long; calyx lobes half as long as the tube; petals pink; capsule 3.5 cm. long.

4. *Hauya microcerata* Donn. Smith & Rose, Bot. Gaz. 52: 46. 1911.

Chiapas. Guatemala; type from Santa Rosa.

Leaves oblong to rounded, 7 to 11 cm. long, obtuse or subacute, velutinous-pilose; calyx tube 8 to 10 cm. long, the lobes 3.5 to 4 cm. long; petals 3 cm. long; capsule 5 cm. long.

7. **XYLONAGRA** Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 294. 1913.

The genus consists of a single species.

1. *Xylonagra arborea* (Kellogg) Donn. Smith & Rose, Contr. U. S. Nat. Herb. 16: 294. 1913.

Oenothera arborea Kellogg, Proc. Calif. Acad. 2: 32. 1859.

Hauya californica S. Wats. Proc. Amer. Acad. 20: 366. 1885.

Hauya arborea Curran, Proc. Calif. Acad. II. 1: 253. 1888.

Dry hillsides, Baja California and the adjacent islands; type from Cedros Island.

Shrub, 0.5 to 1.5 meters high, the branches brown, puberulent when young; leaves alternate, short-petiolate, lanceolate or oblong, 8 to 15 mm. long, entire, puberulent, gland-tipped; flowers racemose, 2 to 2.5 cm. long, bright red; calyx lobes about half as long as the tube; petals red, 5 mm. long; capsule 10 to 12 mm. long, 4-celled.

The shrub is abundant in some localities, forming small thickets. The racemes vary greatly in length, some of them consisting of only two or three flowers and others of as many as a hundred. After fruiting the racemes sometimes develop terminal leafy shoots.

8. **FUCHSIA** L. Sp. Pl. 1191. 1753.

Shrubs or small trees; leaves mostly opposite or verticillate, entire or dentate; flowers small or large, pink, red, or purple, perfect or unisexual, axillary, racemose, or paniculate; calyx tube short or elongate, the limb 4-lobate; petals 4; stamens 8; fruit baccate, 4-celled, few or many-seeded.

Most of the cultivated fuchsias are of South American origin, and some of the South American ones are grown in Mexican gardens, where they are known as "arete," "Adelaida," "flor de arete," "aretillo," "fusia," or "flusia." The fruits are edible, and those of *F. splendens* are said to be used in Guatemala for preserves. Some of the species are reported to have tonic, astringent, and febrifuge properties.

Stamens longer than the petals; flowers large, 3 to 7.5 cm. long.

Flowers 5 to 7.5 cm. long-----1. *F. fulgens*.

Flowers (excluding the ovary) 3 to 3.8 cm. long.

Calyx tube glabrous within, not ventricose above the ovary; petals ovate-rounded-----2. *F. intermedia*.

Calyx tube villosulous within, ventricose above the ovary; petals lance-ovate-----3. *F. splendens*.

Stamens shorter than the petals; flowers small, less than 2 cm. long.

Flowers in terminal panicles, erect-----4. *F. arborescens*.

Flowers axillary, drooping.

Young branches glabrous-----5. *F. bacillaris*.

Young branches variously pubescent.

Calyx tube and ovary glabrous-----6. *F. microphylla*.

Calyx tube and ovary puberulent or pilose (sometimes very inconspicuously so).

Lobes of the calyx nearly or quite as long as the tube.

Lobes longer than the tube; flowers about 6 mm. long; leaves serrulate-----7. *F. minimiflora*.

Lobes equaling or slightly shorter than the tube; flowers 8 to 12 mm. long; leaves mostly entire-----8. *F. thymifolia*.

Lobes of the calyx much shorter than the tube.

Calyx tube obconic-----9. *F. pringlei*.

Calyx tube cylindric.

Calyx hirsute or pilosulous-----10. *F. chiapensis*.

Calyx puberulent.

Leaves serrulate-----11. *F. minutiflora*.

Leaves mostly entire-----12. *F. parviflora*.

1. *Fuchsia fulgens* DC. Prodr. 3: 39. 1828.

Michoacán.

Shrub, 0.3 to 1.2 meters high, with tuberous-thickened roots; leaves long-petiolate, broadly ovate or rounded-ovate, 8 to 17 cm. long, abruptly short-acuminate, rounded or cordate at base, serrulate, thinly pubescent or glabrate; flowers in short racemes, glabrate; calyx lobes 12 to 14 mm. long; petals half as long as the calyx lobes; fruit ellipsoid, 2 cm. long or larger. "Adelaida," "aretillo," "flor de arete."

2. *Fuchsia intermedia* Hemsl. Diag. Pl. Mex. 14. 1878.

Type from Cumbre de Totontepeque, Oaxaca, altitude 3,000 meters. Guatemala.

Shrub, the branchlets puberulent; leaves ovate or cordate-ovate, 10 to 12.5 cm. long, acuminate, obscurely denticulate; flowers axillary, pedicellate, nodding; calyx sparsely puberulent outside, the lobes half as long as the tube; petals a third as long as the calyx lobes.

3. *Fuchsia splendens* Zucc. Flora 1832²: Beibl. 102. 1832.

Chiapas. Guatemala.

Shrub, the branchlets pubescent; leaves broadly ovate or ovate-cordate, 5 to 12.5 cm. long, acuminate, denticulate, pubescent; flowers axillary, nodding; calyx pilosulous, the lobes half as long as the tube; fruit 3.5 cm. long or even larger.

4. *Fuchsia arborescens* Sims in Curtis's Bot. Mag. pl. 2620. 1826.

Fuchsia paniculata Lindl. Gard. Chron. 1856: 301. 1856.

Fuchsia liebmanni Léveillé, Bull. Geogr. Bot. 22: 24. 1912.

Michoacán to Veracruz and Chiapas. Central America.

Shrub or tree, 1.5 to 6 meters high, glabrous or nearly so; leaves opposite or ternate, oblanceolate or oblanceolate-oblong, 7 to 20 cm. long, acute or acuminate, attenuate at base, entire or serrulate; flowers very numerous, pink or purplish, about 12 mm. long; lobes of the calyx about as long as the tube; fruit subglobose, 1 cm. in diameter. "Don Diego de día," "atexúchil" (Mexico, *Urbina*); "Adelaida" (Veracruz, Oaxaca, *Ramírez*); "aretillo" (Michoacán, *Ramírez*); "chorros" (Jalisco, *Villada*); "flor de arete" (Veracruz, *Ramírez*).

5. *Fuchsia bacillaris* Lindl. Bot. Reg. pl. 1480. 1832.

Michoacán to Chiapas; described from cultivated plants of Mexican origin. Guatemala.

Shrub. 1 to 3 meters high, glabrous throughout; leaves slender-petiolate, lanceolate to elliptic, 1.5 to 5 cm. long, obtuse or acute, callous-serrulate, thick; flowers 10 to 12 mm. long; lobes of the calyx equaling or shorter than the tube.

6. *Fuchsia microphylla* H. B. K. Nov. Gen. & Sp. 6: 103. pl. 534. 1823.

Fuchsia mixta Hemsl. Diag. Pl. Mex. 15. 1878.

Jalisco to Mexico and Oaxaca; type from Volcán de Jorullo. Central America.

Shrub, 2 meters high or less, the branches puberulent; leaves ovate to rounded, 5 to 20 mm. long, obtuse or acute, serrulate, glabrous or nearly so; flowers 10 to 14 mm. long; lobes of the calyx less than half as long as the tube.

7. *Fuchsia minimiflora* Hemsl. Diag. Pl. Mex. 14. 1878.

Morelos and Chiapas; type from Chiapas.

Shrub, 1.5 to 4.5 meters high; leaves slender-petiolate, ovate, 2.5 to 6.5 cm. long, acuminate, acute at base, sparsely pubescent; flowers puberulent, the calyx lobes with long slender tips.

8. *Fuchsia thymifolia* H. B. K. Nov. Gen. & Sp. 6: 104. pl. 535. 1823.

Jalisco to Mexico and Oaxaca; type from Pátzcuaro, Michoacán.

Slender shrub, about a meter high, with puberulent branches; leaves ovate-lanceolate to orbicular, 1 to 5 cm. long, acute to rounded at apex; flowers purplish red, the calyx tube obconic.

9. *Fuchsia pringlei* Robins. & Seat. Proc. Amer. Acad. 28: 106. 1893.

Tepic and Jalisco to Mexico; type from mountains near Pátzcuaro, Michoacán.

Slender shrub, 1 to 2 meters high, the branches puberulent; leaves ovate to rounded, 5 to 25 mm. long, acute to rounded at apex, serrulate or entire, puberulent or glabrate; flowers purplish, 6 to 8 mm. long.

Probably not distinct from *F. thymifolia*.

10. *Fuchsia chiapensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 59. 1914.

Oaxaca and Chiapas; type from Cerro del Boquerón, Chiapas.

Branches pilose or hirsutulous; leaves ovate to rounded-ovate, 1.5 to 3.5 cm. long, obtuse or acute, pilose or pilosulous beneath, serrulate or entire; flowers about 1 cm. long.

11. *Fuchsia minutiflora* Hemsl. Diag. Pl. Mex. 15. 1878.

Michoacán to Chiapas and Veracruz; type from Orizaba. Central America.

Slender shrub, the branches puberulent; leaves ovate-lanceolate to rounded, 8 to 20 mm. long, obtuse or acute, serrulate, glabrous or puberulent; flowers purplish red, 6 to 10 mm. long.

12. *Fuchsia parviflora* Zucc. Abh. Akad. Wiss. München 2: 337. 1831-36.
 Michoacán to Mexico and Chiapas. Central America.

Shrub, the branches puberulent; leaves ovate-lanceolate to broadly elliptic, 1 to 5 cm. long, obtuse or acute; flowers polygamous or dioecious, 8 to 15 mm. long. "Sacatinta" (El Salvador).

125. ARALIACEAE. Ginseng Family.

Shrubs or trees, rarely herbs, sometimes epiphytic, the pubescence, if any, chiefly of branched hairs; leaves alternate, simple or compound, stipulate; flowers perfect or unisexual, umbellate or capitate, small, greenish; calyx tube adnate to the ovary, the limb short, truncate or dentate; petals usually 5; stamens as many as the petals; styles as many as the ovary cells; fruit baccate, containing 2 to 7 1-seeded nutlets.

One of the best-known plants of the family is ginseng, *Panax quinquefolium* L., a native of the United States. The fleshy roots are exported to China, where they are highly valued for their supposed medicinal virtues, and the plant has been cultivated rather extensively in the United States to obtain the roots for export.

The English ivy ("hiedra extranjera"), *Hedera helix* L., a slender vine with handsome, dark green, simple leaves, is sometimes cultivated in Mexico.

Petals imbricate; leaves pinnate or bipinnate.....1. **ARALIA**.
 Petals valvate; leaves simple or digitately compound.

Endosperm ruminant; flowers capitate; leaves simple or compound.

2. **OREOPANAX**.

Endosperm not ruminant; flowers umbellate; leaves entire or lobate.

3. **GILIBERTIA**.

1. **ARALIA** L. Sp. Pl. 273. 1753.

Shrubs, small trees, or herbs; leaves pinnate or bipinnate, the leaflets toothed; flowers in umbels, these racemose or paniculate, the bracts small; calyx 5-dentate; petals 5, imbricate, greenish; stamens 5; fruit fleshy, composed of usually 5 carpels.

The Mexican species are unarmed, but some of those of other regions are furnished with prickles.

Leaflets glabrous beneath.

Leaves once pinnate; leaflets subcordate at base.....1. **A. scopulorum**.

Leaves mostly bipinnate; leaflets obtuse or acute at base....2. **A. regelliana**.
 Leaflets pubescent beneath.

Pedicels glabrous.....3. **A. humilis**.

Pedicels pubescent

Leaves usually once pinnate; leaflets serrulate, densely pubescent beneath.....4. **A. pubescens**.

Leaves bipinnate; leaflets sharply serrate, green and very sparsely pubescent beneath.....5. **A. racemosa**.

1. *Aralia scopulorum* T. S. Brandeg. Proc. Calif. Acad. II. 2: 165. pl. 8. 1889.
 Mountains of Baja California; type from Comondú Canyon.

Shrub, 1 to 4.5 meters high; leaflets 5 or 7, broadly ovate or elliptic, 3 to 6 cm. long, acuminate, usually subcordate at base, coarsely crenate; umbels few, racemose, the pedicels puberulent; petals 3 mm. long; stylopodium conic.

2. *Aralia regelliana* Marchal, Bull. Acad. Brux. II. 47: 73. 1879.

Tamaulipas and San Luis Potosí; type from Victoria, Tamaulipas.

Shrub or small tree; leaflets long-petiolulate, ovate to narrowly lanceolate, 4 to 7 cm. long, long-acuminate, crenate-serrate or subentire, thin; umbels few, long-pedunculate, racemose, the pedicels glabrous; fruit about 5 mm. in diameter.

3. *Aralia humilis* Cav. Icon. Pl. 4: 7. pl. 313. 1797.

?*Aralia brevifolia* Marchal, Bull. Acad. Brux. II. 47: 74. 1879.

?*Aralia pinnata* Sessé & Moc. Pl. Nov. Hisp. 48. 1887.

Chihuahua and Sonora to Morelos and Oaxaca. Southern Arizona.

Shrub, 1 to 2.5 meters high, with brown branches; leaves (except the uppermost) bipinnate, the leaflets oblong-ovate to broadly ovate, 2 to 5 cm. long, acuminate, rounded or shallowly cordate at base, serrate or crenate, coarsely pubescent; umbels numerous, paniculate; fruit 4 to 5 mm. in diameter, 5-sulcate.

4. *Aralia pubescens* DC. Cat. Hort. Monsp. 80. 1813.

Sonora to Oaxaca.

Shrub or small tree, with thick corky bark; leaflets 5 to 11, ovate to broadly elliptic, 3 to 6 cm. long, acute or abruptly acuminate, rounded at base, densely and coarsely pubescent; umbels numerous, racemose-paniculate; petals 2 mm. long; fruit about 5 mm. in diameter; styles united to form a slender beak. "Cuajilotillo" (Sinaloa).

It is not certain that the plant described here is the one described by De Candolle as *Aralia pubescens*, but it is a species quite distinct from *A. humilis*. *Aralia pubescens* may be a synonym of *A. humilis*.

5. *Aralia racemosa* L. Sp. Pl. 273. 1753.

Mountains of Chihuahua and Durango. Widely distributed in the United States and Canada.

Plants herbaceous or sometimes woody, 1 to 2 meters high; leaflets broadly ovate, 5 to 15 cm. long, abruptly acuminate, rounded or cordate at base, thin, sharply serrate, the teeth cuspidate-apiculate; umbels numerous, racemose-paniculate; fruit 5 to 6 mm. in diameter, dark purple.

In the United States the plant is known as "American spikenard." The roots are fragrant and have an aromatic sweetish flavor. They have been much used medicinally, chiefly in domestic practice, for their gently stimulant, diaphoretic, and alterative action, particularly in rheumatic, syphilitic, and cutaneous affections. In their properties they resemble sarsaparilla.

DOUBTFUL SPECIES

ARALIA CHILAPENSIS Sessé & Moc. Pl. Nov. Hisp. 48. 1887. Type from Chilapa, Guerrero. The leaflets are said to be glabrous.

2. *OREOPANAX* Decaisne & Planch. Rev. Hort. 1854: 107. 1854.

Shrubs or trees, sometimes epiphytic; leaves long-petiolate, entire, lobed, or digitately compound; flowers capitate, polygamo-dioecious, the heads racemose or paniculate; calyx entire or nearly so; petals 4 to 7, usually 5, valvate; fruit 2 to 7-celled.

Leaves simple, entire or with a few low teeth.

Flower heads sessile-----1. *O. platyphyllum*.

Flower heads pedunculate.

Staminate heads 5 to 7-flowered; pistillate heads usually 2-flowered.

2. *O. liebmanni*.

Staminate heads 20 to 50-flowered; pistillate heads 5 to 12-flowered.

Leaves glabrous-----3. *O. capitatum*.

Leaves stellate-pubescent, densely so beneath-----4. *O. flaccidum*.

Leaves deeply lobed or digitately compound.

Leaves deeply lobed-----5. *O. salvinii*.

Leaves digitately compound.

Leaflets sessile; bractlets densely pale-tomentose with long soft hairs, concealing the flowers; leaflets 4.5 to 12 cm. wide, covered with stalked stellate hairs-----6. *O. echinops*.

Leaflets petiolulate; bractlets glabrate or puberulent, not concealing the flowers; leaflets mostly 2.5 to 4.5 cm. wide, rarely wider, glabrous, or the pubescence of the upper surface, at least, of sessile stellate hairs.

Leaflets densely stellate-pubescent beneath, the hairs stalked.

7. *O. langlassel*.

Leaflets glabrous beneath, or the pubescence of minute sessile stellate hairs-----8. *O. xalapense*.

1. *Oreopanax platyphyllum* Marchal, Bull. Acad. Brux. II. 47: 88. 1879.
Type from Jocotepec (Oaxaca ?).

Plants glabrous throughout; leaves long-petiolate, suborbicular or rounded-ovate, 10 to 20 cm. wide, with 2 or 3 triangular teeth or entire, thin; panicles 8 to 12 cm. long, the heads 1 cm. in diameter, the pistillate ones 5 to 8-flowered; fruit 7-sulcate.

2. *Oreopanax liebmanni* Marchal, Bull. Acad. Brux. II. 47: 87. 1879.

Veracruz and probably elsewhere; type from "Alpatlahua." Guatemala.

Plants glabrous throughout; leaves long-petiolate, elliptic or elliptic-oblong, 10 to 18 cm. long, 4 to 8 cm. wide, abruptly acuminate, cuneate or obtuse at base, entire, coriaceous; panicles 8 to 20 cm. long; fruit 5-seeded.

3. *Oreopanax capitatum* (Jacq.) Planch. & Decaisne, Rev. Hort. 1854: 108. 1854.

Aralia capitata Jacq. Stirp. Amer. 89. pl. 61. 1763.

Veracruz. West Indies; Central and South America.

Shrub, usually epiphytic, sparsely puberulent in the inflorescence, otherwise glabrous; leaves ovate, elliptic, or rounded, 10 to 25 cm. long or larger, acute to rounded at apex and abruptly short-acuminate, obtuse to subcordate at base, coriaceous; panicles 10 to 30 cm. long, the staminate heads about 5 mm. in diameter; fruit 4 to 6 mm. in diameter.

4. *Oreopanax flaccidum*, Marchal, Bull. Acad. Brux. II. 47: 84. 1879.

Veracruz and Puebla, and perhaps elsewhere; type from Huitamalco.

Tree; leaves long-petiolate, ovate or ovate-elliptic, 13 to 30 cm. long, short-acuminate, rounded or obtuse at base, entire, coarsely stellate-pubescent or finally glabrate; panicles large, the heads numerous; fruit about 5 mm. in diameter.

5. *Oreopanax salvinii* Hemsl. Diag. Pl. Mex. 16. 1878.

Oreopanax jaliscoanum S. Wats. Proc. Amer. Acad. 25: 151. 1890.

Aralia lobata Sessé & Moc. Fl. Mex. 86. 1894.

Sonora to Oaxaca and Puebla. Guatemala; type from Volcán de Fuego.

Tree, 12 meters high or less; leaves long-petiolate, 15 to 50 cm. wide, deeply cordate at base, deeply 5 or 7-lobate, the lobes broad or narrow, obtuse to acuminate, sinuate-lobate, when young densely stellate-tomentose beneath but in age often glabrous; panicles very large, the heads small, numerous, long-stalked; fruit black, 2-celled, about 6 mm. in diameter. "Mano de león" (Sinaloa).

The leaves vary greatly in shape and pubescence, but there is no apparent reason for recognizing more than a single species.

6. *Oreopanax echinops* (Schlecht. & Cham.) Planch. & Decaisne, Rev. Hort. 1854: 108. 1854.

Aralia echinops Schlecht. & Cham. Linnaea 5: 400 1830.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Shrub or tree, densely and coarsely stellate-pubescent throughout; leaflets 5 (some of the leaves occasionally only lobed), obovate or oblong-obovate, 9 to 26 cm. long, sessile, abruptly cuspidate-acuminate, thin, remotely sinuate-dentate or subentire; heads 1.5 to 2.5 cm. long, on stout peduncles, in long simple racemes, very dense and many-flowered, the bractlets cuspidate-acuminate.

7. *Oreopanax langlassei* Standl., sp. nov.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,750 meters (*Langlassé* 796; U. S. Nat. Herb. no. 386193).

Shrub or small tree, 4 to 5 meters high; leaves (only one seen) long-petiolate, the leaflets 7, slender-petiolulate, narrowly lance-oblong, 10 to 14 cm. long, 2.5 to 3 cm. wide, long-acuminate, cuneate at base, entire, finely pubescent above with sessile stellate hairs, coarsely pubescent beneath with stipitate stellate hairs; racemes very long (40 cm. or more) and slender, densely stellate-pubescent, the peduncles slender, about 2.5 cm. long; staminate heads 5 to 6 mm. in diameter, dense, many-flowered.

8. *Oreopanax xalapense* (H. B. K.) Decaisne & Planch. Rev. Hort. 1854: 108. 1854.

Aralia xalapensis H. B. K. Nov. Gen. & Sp. 5: 8. 1821.

Monopanax ghiesbreghtii Regel, Gartenflora 18: 35. pl. 606. 1869.

Oreopanax thibautii Hook. f. in Curtis's Bot. Mag. 104: pl. 6340. 1878.

Oreopanax taubertianum Donn. Smith, Bot. Gaz. 19: 4. 1894.

Oreopanax loesenerianum Harms, Bot. Jahrb. Engler 23: 127. 1896.

Jalisco to Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Shrub or small tree, sometimes epiphytic; leaflets 5 to 9, narrowly oblong to obovate, 8 to 30 cm. long, acute to long-acuminate, entire or serrate toward the apex, when young usually minutely stellate-pubescent beneath but soon glabrate; heads 5 to 15 mm. in diameter, in long racemes; fruit black. "Higuera" (Costa Rica); "brasil" (El Salvador).

The rather ample material available exhibits notable diversity in size and shape of leaflets and size of heads, and it may be that more than a single species is represented. Much more material is necessary, however, before this can be determined, and it seems probable to the writer that all the specimens represent a single variable species. *O. taubertianum* is a form with serrate leaflets, *O. loesenerianum* is noteworthy for the small staminate heads, which are only 5 mm. in diameter.

3. GILIBERTIA Ruiz & Pav. Fl. Peruv. Chil. Prodr. 50. 1794.

Glabrous shrubs or trees; leaves simple, entire or 3-lobate, long-petiolate; umbels paniculate or umbellate, the bracts minute or none; flowers perfect; calyx entire or 5 or 6-denticulate; petals 5 or 6; fruit fleshy, 5 or 6-celled.

Lateral nerves of the leaves ascending at an acute angle.-----1. *G. arborea*.
Lateral nerves divaricate horizontally-----2. *G. juergenseni*.

1. *Gilibertia arborea* (L.) Marchal, Bull. Soc. Bot. Belg. 30: 281. 1891.

Aralia arborea L. Syst. Nat. ed. 10. 967. 1759.

Hedera alaris Schlecht. Linnaea 9: 605. 1834.

Dendropanax arboreum Planch. & Decaisne, Rev. Hort. 1854: 107. 1854.

Dendropanax alare Planch. & Decaisne, Rev. Hort. 1854: 107. 1854.

?*Gilibertia populifolia* Marchal, Bull. Acad. Brux. II. 47: 77. 1879.

?*Dendropanax langeanum* Marchal, Bull. Acad. Brux. II. 47: 79. 1879.

Gilibertia insularis Rose, U. S. Dept. Agr. N. Amer. Fauna 14: 83. 1899.

Tepic to Tamaulipas, Veracruz, and Chiapas. West Indies; Central and South America.

Tree, 8 to 20 meters high, the branches whorled; leaves oblong to broadly ovate, 10 to 20 cm. long, acute or acuminate, rounded to acute at base, entire, those on young shoots often 3 or 5-lobate; umbels few, the pedicels 5 to 10 mm. long; fruit black, about 6 mm. in diameter. "Palo santo" (Tamaulipas); "palo de danta," "mano de danta" (Oaxaca); "mano de león" (Durango, Sinaloa, El Salvador); "cacho de venado" (Costa Rica); "vibona" (Cuba, Porto Rico); "palo cachimba," "bfbona," "ramón de vaca," "ahorca jíbaro" (Cuba); "pana," "palo cachumba," "muñeca" (Porto Rico); "vaquero" (Panama).

The wood is said to be fibrous, rather heavy, yellow, with reddish heartwood. It is little used except for fuel. The leaves are employed in Tamaulipas as a remedy for fever.

The writer has seen no authentic material of Marchal's species, but the descriptions do not suggest any important differences. *Gilibertia populifolia* was made the type of a new subgenus because of its 6-parted (rather than 5-parted) flowers, but the flowers of *G. arborea* appear to be variable in the number of their parts.

Aralia fruticosa, *A. tuxtlensis*, and *A. longifolia* of Sessé and Mocino¹ are probably synonyms of this species.

2. *Gilibertia juergenseni* (Seem.) Standl.

Dendropanax juergenseni Seem. Journ. Bot. Brit. & For. 2: 301. 1864.

Type from Sierra San Pedro Nolasco, Oaxaca.

Leaves ovate-oblong or oblong, 18 cm. long and 10 cm. wide or smaller, acuminate, entire, attenuate at base; umbels compound.

Known to the writer only from the original description; perhaps only a form of *G. arborea*.

DOUBTFUL SPECIES.

DENDROPANAX CITRIFOLIUM Planch. & Decaisne, Rev. Hort. 1854: 107. 1854.
A nomen nudum. Hemsley, under this name, cites a specimen from Oaxaca.

126. CORNACEAE. Dogwood Family.

REFERENCE: Wangerin in Engl. Pflanzenreich IV. 56a, 229. 1910.

Shrubs or small trees; leaves opposite, entire, deciduous or persistent, estipulate; flowers small, perfect or dioecious; calyx 4 or 5-toothed; petals 4 or 5, valvate; stamens 4 or 5; fruit a drupe or berry.

Flowers dioecious, in ament-like racemes.....1. **GARRYA**.
Flowers perfect, in heads or cymes.....2. **CORNUS**.

1. **GARRYA** Dougl. in Lindl. Bot. Reg. 20: pl. 1686. 1834.

Shrubs or small trees; leaves persistent, opposite, petiolate, entire, coriaceous; flowers small, dioecious, in ament-like racemes, the staminate pedicellate, the pistillate sessile or nearly so; staminate flowers with 4 valvate sepals, without petals, the stamens 4; pistillate flowers without perianth; fruit baccate, 1 or 2-seeded.

¹ Fl. Mex. 86, 87. 1894.

Garrya fremontii Torr., of Oregon and California, is known as "feverbush," "skunkbush," or "quinine-bush." The bitter leaves contain an alkaloid, garryine, and are used in California as a tonic and antiperiodic.

Inflorescences simple; flowers usually 3 in each bract-----1. *G. veatchii*.

Inflorescences all or mostly branched; flowers solitary in the bracts.

Plants glabrous throughout-----2. *G. glaberrima*.

Plants variously pubescent.

Leaves all or mostly less than twice as long as broad, elliptic or ovate-elliptic.

Leaves glabrous beneath or sparsely sericeous-----3. *G. wrightii*.

Leaves, at least when young, covered beneath with loose curled hairs-----4. *G. ovata*.

Leaves mostly two and one-half to four times as long as broad, oblong, elliptic-oblong, or lanceolate.

Bracts of the fruiting racemes linear or linear-lanceolate; leaves acute or acuminate.

Leaves glabrous beneath or with sparse appressed hairs.

5. *G. salicifolia*.

Leaves with short curved hairs beneath-----6. *G. longifolia*.

Bracts, at least the lower ones, large and resembling the leaves; leaves mostly rounded or obtuse at apex-----7. *G. laurifolia*.

1. *Garrya veatchii* Kellogg, Proc. Calif. Acad. 5: 40. 1873.

Garrya flavescens palmeri S. Wats.; Brew. & Wats. Bot. Calif. 1: 276. 1880.

Garrya veatchii palmeri Eastw. Bot. Gaz. 36: 458. 1903.

Baja California; type from Cedros Island. Southern California.

Shrub, 1.5 to 2.5 meters high, the young shoots sericeous; leaves ovate-lanceolate or elliptic-ovate, 2.5 to 7.5 cm. long, acute or acuminate, glabrate and lustrous above, tomentulose beneath; fruiting racemes 2.5 to 5 cm. long; fruit 6 to 8 mm. in diameter.

2. *Garrya glaberrima* Wang. in Engl. Pflanzenreich IV. 56a: 12. 1910.

Type from Encarnación, Jalisco.

Glabrous shrub; leaves elliptic or ovate-elliptic, 5 to 6 cm. long, mucronulate, lustrous above; pistillate racemes few-flowered, 4.5 cm. long or less; fruit 7 to 8 mm. in diameter.

3. *Garrya wrightii* Torr. U. S. Rep. Expl. Miss. Pacif. 4: 136. 1856.

Chihuahua and Sonora. Western Texas to southern Arizona; type from Santa Rita, New Mexico.

Shrub, 1 to 3 meters high, the branchlets sericeous; leaves elliptic-oblong to broadly elliptic, 3.5 to 5 cm. long, mucronulate, in age glabrous or nearly so; pistillate racemes 3 to 7 cm. long, the lower bracts foliaceous; fruit dark blue, 4 to 7 mm. in diameter.

4. *Garrya ovata* Benth. Pl. Hartw. 14. 1839.

Garrya goldmanii Woot. & Standl. Contr. U. S. Nat. Herb. 16: 157. 1913.

Chihuahua to San Luis Potosí and Puebla; type from Guanajuato. Western Texas and southern New Mexico.

Shrub, 0.5 to 3 meters high, the branchlets tomentulose; leaves 2.5 to 5 cm. long, obtuse or subacute, when young usually densely tomentulose on both surfaces, in age glabrate and lustrous above; fruit dark blue, 4 to 8 mm. in diameter.

Wangerin gives as a vernacular name "jaraskigo," which must be a corruption of some Mexican word.

5. *Garrya salicifolia* Eastw. Bot. Gaz. 36: 463. 1903.

Mountains of Baja California; type from Sierra de la Laguna.

Shrub, 3.5 to 5.5 meters high, the branchlets sericeous; leaves lanceolate or oblong-lanceolate, 3 to 6 cm. long, soon glabrate; fruit globose, 5 to 6 mm. in diameter.

6. *Garrya longifolia* Rose, Contr. U. S. Nat. Herb. 8: 55. 1903.

Morelos; type from Sierra de Tepoxtlán, altitude 2,500 meters.

Small tree, the branchlets cinereous-pubescent; leaves lanceolate, 6 to 10.5 cm. long, glabrate on the upper surface; fruit about 7 mm. in diameter.

7. *Garrya laurifolia* Hartw.; Benth. Pl. Hartw. 14. 1839.

Garrya macrophylla Hartw.; Benth. Pl. Hartw. 50. 1840.

Garrya oblonga Benth. Pl. Hartw. 51. 1840.

Garrya racemosa Ramírez, Anal. Inst. Méd. Nac. Méx. 1: 298. 1895.

Garrya gracilis Wang. in Engl. Pflanzenreich IV. 56a: 16. 1910.

Chihuahua to Veracruz, Chiapas, and Jalisco; type from Guanajuato, Guatemala.

Shrub or small tree, sometimes 6 meters high, the branchlets cinereous-tomentulose; leaves mostly oblong, lance-oblong, or oblanceolate-oblong, 6 to 15 cm. long, soon glabrate; fruit dark blue, glabrous, 5 to 8 mm. in diameter. "Cuauchichic," "chichicuahuitl," "quauhchichic" (Mexico, Hidalgo, etc.); "cuahuchichi" (Morelos); "zapotillo"; "ovitano"; "guachichi" (Oaxaca, Reko; from the Nahuatl *cuauchichic*, "bitter-tree").

The bark is very bitter and is said to contain an active principle, garryine. It is much used in Mexico as a remedy for diarrhoea.

This species is slightly variable, and several varieties are recognized by Wangerin, but none of them appear to be of systematic importance. One collection reported from Chihuahua by Wangerin as *G. ovata lindheimeri* (Torr.) Coult. & Evans is referable to *G. laurifolia*.

2. CORNUS L. Sp. Pl. 117. 1753.

Shrubs or trees; leaves opposite, entire; flowers small, perfect, cymose or capitate, the heads sometimes involucrate; calyx limb turbinate or campanulate, 4-dentate; petals 4, valvate; stamens 4; fruit drupaceous.

Flowers in cymes.

Stone of the fruit compressed; leaves usually with 5 or 6 pairs of nerves.

1. *C. stolonifera*.

Stone not compressed, terete; leaves usually with 2 to 4 pairs of nerves.

2. *C. excelsa*.

Flowers capitate.

Head surrounded by 4 large petal-like bracts.....3. *C. urbiniana*.

Head surrounded by small green bracts.....4. *C. disciflora*.

1. *Cornus stolonifera* Michx. Fl. Bor. Amer. 1: 92. 1803.

Cornus nelsoni Rose, Contr. U. S. Nat. Herb. 5: 54. 1903.

Chihuahua. Widely distributed in the United States and Canada.

Shrub, 1 to 3 meters high, the stems reddish purple, the young branches strigose-sericeous; leaves ovate or elliptic-ovate, 3 to 10 cm. long, acute, pale beneath and sparsely sericeous; cymes 2.5 to 5 cm. wide; petals white, 4 mm. long; fruit white or bluish, 5 to 7 mm. in diameter.

The red-osier dogwood is common along streams in the United States, especially in the West. The branches were often employed by the Indians in making baskets. This is one of the plants to which the name kinnikinnick has been given, the leaves and inner bark having been smoked, either alone or mixed with tobacco, by the Indians.

2. *Cornus excelsa* H. B. K. Nov. Gen. & Sp. 3: 430. 1818.*Cornus tolucensis* H. B. K. Nov. Gen. & Sp. 3: 430. 1818.*Cornus declinata* Sessé & Moc. Fl. Mex. 29. 1893.*Cornus lanceolata* Rose, Contr. U. S. Nat. Herb. 8: 55. 1903.

Tepic to San Luis Potosí, Veracruz, and Chiapas; type collected between Chalco and the City of Mexico. Guatemala.

Shrub or small tree, 7.5 meters high or less, the branches purplish or brown, puberulent at first; leaves ovate or lance-ovate, 5 to 10 cm. long, long-acuminate, thinly strigillose or pilosulous beneath or glabrate; cymes rather few-flowered; petals white, 3.5 to 4.5 mm. long; fruit pale blue, 5 to 6 mm. in diameter. "Palo de membrillo" (San Luis Potosí); "topoza" (Mexico, Veracruz); "tepeacuilotl," "tepecuilo," "tepecullote" (Valley of Mexico); "aceitunillo" (Nueva Farmacopea Mexicana); "jasmín cimarrón" (Mexico).

The bark is employed locally as a tonic and astringent. Palmer reports that in San Luis Potosí the tough branches are used for fastening down the roofs of houses.

This species was reported by Sessé and Mocíño as *C. alba*.

3. *Cornus urbiniana* Rose, Contr. U. S. Nat. Herb. 8: 53. 1903.*Cornus florida urbiniana* Wang. in Engl. Pflanzenreich IV. 229: 87. 1910.

Veracruz; type from Cerro de San Cristóbal, near Orizaba.

Large shrub or small tree; leaves ovate-elliptic, 7 to 14 cm. long, acuminate, glabrate above, pale beneath and sericeous-strigillose; flower heads pedunculate, the bracts white and petal-like, oblong or narrowly obovate, 5 cm. long or less; fruit red. "Corona de Montezuma," "corona de San Pedro."

This is very closely related to *C. florida* L., the flowering dogwood, one of the handsomest trees of the United States. The Mexican plant differs chiefly in its narrower bracts, and it is doubtful whether it is more than a mere form of *Cornus florida*, under which name it was reported by Hemsley.

Cornus florida, as found in the United States, is a tree, sometimes 15 meters high, with hard, tough, close-grained, red-brown wood, with a specific gravity of about 0.81. The wood is much used for wheel hubs, tool handles, and other articles, and has been used as a source of charcoal for gunpowder. The bark is reputed to be tonic, astringent, and febrifuge, and was formerly employed in the southern states as a substitute for quinine. The berries were used in the same way. From the roots the Indians obtained a scarlet dye. The flowering dogwood is frequently cultivated. The most showy form is *Cornus florida rubra* Rehder, in which the bracts are red or pink.

4. *Cornus disciflora* DC. Prodr. 4: 273. 1830.*Cornus grandis* Schlecht. & Cham. Linnaea 5: 171. 1830.*Cornus capitata* Sessé & Moc. Fl. Mex. 28. 1893. Not *C. capitata* Wall. 1820.*Cornus floccosa* Wang. Repert. Nov. Sp. Fedde 6: 101. 1908.

Tepic to Zacatecas, Mexico, Morelos, and Oaxaca. Central America.

Shrub or small tree; leaves lanceolate or oblong-elliptic, 6 to 15 cm. long, acute or acuminate, acute at base, pale beneath and sericeous-strigillose or tomentulose; flower heads pedunculate, 12 to 25-flowered; petals whitish, 3 to 3.5 mm. long; fruit ellipsoid, 12 to 14 mm. long, purplish. "Xochilcorona" (Michoacán, Veracruz, Oaxaca).

Cornus floccosa is a form in which the leaves are floccose-villosulous beneath, while in the typical form all the hairs are straight and closely appressed. The extremes appear distinct, but there are intermediate forms, and in some specimens in the National Herbarium both forms of pubescence occur upon separate leaves of the same branch.

127. CLETHRACEAE. Clethra Family.

1. CLETHRA L.

Shrubs or trees; leaves alternate, petiolate, entire or toothed; flowers perfect, in terminal, simple or branched racemes; calyx 5-cleft, the lobes imbricate, persistent; petals 5, white, imbricate, deciduous; stamens 10, the anthers sagittate, opening by apical pores; fruit a 3-lobed, loculicidally 3-valvate capsule.

Leaves glabrous beneath.....1. *C. suaveolens*.

Leaves finely or coarsely tomentose beneath.

Pedicels shorter than the calyx, very stout.

Leaves covered beneath with a minute, very close tomentum.

2. *C. alcoceri*.

Leaves covered beneath with a coarse loose tomentum....3. *C. mexicana*.

Pedicels all or mostly as long as the calyx, comparatively slender.

Calyx 2.5 to 3 mm. long; leaves with a fine close tomentum beneath.

Pedicels mostly 7 to 12 mm. long.....4. *C. pringlei*.

Pedicels mostly 2 to 4 mm. long.....5. *C. macrophylla*.

Calyx 3 to 5 mm. long; leaves with a coarse loose tomentum beneath.

Leaves coarsely and sharply serrate.....6. *C. rosei*.

Leaves entire, undulate-dentate, or serrulate.

Leaves oblong.....7. *C. hartwegi*.

Leaves mostly obovate.....8. *C. lanata*.

1. *Clethra suaveolens* Turcz. Bull. Soc. Nat. Moscou 36²: 230. 1863.

Type from Chiapas, at an altitude of 2,100 meters. Guatemala.

Branches glabrous or nearly so; leaves mostly oblong, 6 to 12 cm. long, acute or acuminate, entire; racemes 10 to 16 cm. long, the slender pedicels 3 to 8 mm. long; calyx tomentose, about 4 mm. long; petals 5 mm. long.

2. *Clethra alcoceri* Greenm. Proc. Amer. Acad. 41: 240. 1905.

Known only from the type locality, Trinidad Iron Works, Hidalgo, altitude 1,590 meters.

Small tree, the branchlets brown-tomentulose; leaves obovate-oblong or elliptic-lanceolate, 10 to 14 cm. long, acute or short-acuminate, serrate, glabrate above; racemes 10 to 20 cm. long, the pedicels 1 to 3 mm. long; calyx 3 mm. long; petals erose-fimbriate.

3. *Clethra mexicana* DC. Prodr. 7: 590. 1839.

Clethra obovata Hook. & Arn. Bot. Beechey Voy. 302. 1837. Not *C. obovata* Ruiz & Pav. 1834.

Clethra quercifolia Lindl. Bot. Reg. 28: pl. 23. 1842.

?*Kowalewskia serrulata* Turcz. Bull. Soc. Nat. Moscou 32¹: 264. 1859.

?*Clethra serrulata* Turcz. Bull. Soc. Nat. Moscou 36²: 233. 1863.

Clethra palmeri Britton, N. Amer. Fl. 29: 8. 1914.

Clethra schlechtendalii Briq. Ann. Cons. Jard. Genève 20: 370. 1919.

Durango to Veracruz, Morelos, Guerrero, and Michoacán.

Shrub or small tree, 9 meters high or less, the branchlets brownish-tomentose; leaves obovate to oval, 6 to 20 cm. long, 4 to 10 cm. wide, acute or obtuse, serrate or entire, densely tomentose beneath; racemes dense, 10 to 20 cm. long; pedicels 1.5 to 4 mm. long; calyx 3.5 to 4.5 mm. long. "Jaboncillo" (Durango).

The flowers, as in other species, are very fragrant.

4. *Clethra pringlei* S. Wats. Proc. Amer. Acad. 25: 157. 1890.

San Luis Potosí; type from Tamasopo Canyon.

Tree, 9 to 15 meters high, the trunk 30 to 45 cm. in diameter; leaves obovate or oblong, 4 to 11 cm. long, acute or acuminate, entire, glabrous above; racemes lax, 10 to 25 cm. long; petals short-fimbriate; capsule tomentulose, 3 to 4 mm. broad.

5. *Clethra macrophylla* Mart. & Gal. Bull. Acad. Brux. 9¹: 539. 1842.

Veracruz; type material collected near Totutla and Mirador.

Small tree, the branchlets closely brownish-tomentulose; leaves obovate or oblong-elliptic, 12 to 20 cm. long, acute or subacuminate, green and glabrate above; racemes 10 to 15 cm. long, lax; pedicels 2 to 4 mm. long.

6. *Clethra rosei* Britton, N. Amer. Fl. 29: 6. 1914.

Known only from the type locality, near Colomas, Sinaloa.

Branchlets brown-tomentulose; leaves oblong, 6 to 11 cm. long, acute or obtuse, pubescent above, densely tomentulose beneath; racemes 10 to 12 cm. long, the pedicels 3 to 5 mm. long; capsule 3 mm. broad.

7. *Clethra hartwegi* Britton, N. Amer. Fl. 29: 6. 1914.

Known only from the type locality, Bolaños, Jalisco.

Branchlets tomentulose; leaves 10 to 12 cm. long, obtuse or acutish, entire or undulate, dentate, pubescent above or glabrate, tomentulose beneath; racemes 8 to 12 cm. long.

8. *Clethra lanata* Mart. & Gal. Bull. Acad. Brux. 9¹: 538. 1842.

Kowalewschia integerrima Turcz. Bull. Soc. Nat. Moscou 32¹: 264. 1859.

Clethra kowalewskii Turcz. Bull. Soc. Nat. Moscou 36¹: 233. 1863.

Clethra galeottiana Briq. Ann. Cons. Jard. Genève 20: 371. 1919.

Clethra confusa Briq. Ann. Cons. Jard. Genève 20: 372. 1919.

Clethra guadalajarensis Briq. Ann. Cons. Jard. Genève 20: 373. 1919.

Sinaloa and Jalisco to Veracruz and Oaxaca; type from Oaxaca. Central America.

Tree, 6 to 12 meters high, the branchlets brown-tomentulose; leaves 6 to 15 cm. long, rounded to subacute at apex, usually cuneate at base, thick, entire or sparsely dentate, glabrate above; racemes 8 to 20 cm. long, dense; capsule 4 mm. broad. "Mameyito negro" (Oaxaca, *Reko*); "mama malhuaztill" (*Altamirano & Ramírez*); "nance" (Costa Rica); "tepezapote," "terciopelo," "zapotillo de montaña" (El Salvador).

128. PYROLACEAE. Pyrola Family.

REFERENCE: Rydb. N. Amer. Fl. 29: 21-32. 1914.

Several species of *Pyrola* occur in Mexico.

1. CHIMAPHILA Pursh, Fl. Amer. Sept. 279. 1814.

Plants low, suffrutescent, with creeping rootstocks; leaves opposite or subverticillate, leathery, persistent, serrate; flowers perfect, in few-flowered terminal umbels or racemes; sepals 5; petals 5; stamens 10, the anthers opening by terminal tubes; style nearly obsolete, the stigma peltate, 5-radiate; fruit a 5-celled capsule.

Dilated portion of the filament glabrous or ciliolate; leaves mostly oblanceolate, green, not mottled-----1. *C. umbellata*.

Dilated portion of the filament villous; leaves lanceolate or ovate, mottled with light and dark green-----2. *C. maculata*.

1. *Chimaphila umbellata* (L.) Barton, Veg. Nat. Med. 1: 17. 1817.*Pyrola umbellata* L. Sp. Pl. 396. 1753.*Chimaphila umbellata mexicana* DC. Prodr. 7: 775. 1839.*Chimaphila mexicana* Rydb. N. Amer. Fl. 29: 31. 1914.

In mountain forests, Veracruz, Mexico, Oaxaca, and Chiapas. Widely distributed in the United States, Canada, and Europe.

Plants 10 to 40 cm. high, the stems simple or branched; leaves in whorls of 4 to 7, 3 to 10 cm. long, acute or obtuse, sharply serrate, short-petiolate, glabrous; flowers long-pedicellate; sepals broadly ovate; petals pink, 7 mm. long, oval; capsule 6 to 10 mm. in diameter.

The Mexican form is *C. umbellata mexicana* DC., but it differs only slightly from the European plant, and scarcely seems worthy of special designation.

2. *Chimaphila maculata* (L.) Pursh, Fl. Amer. Sept. 300. 1814.*Pyrola maculata* L. Sp. Pl. 396. 1753.*Chimaphila maculata acuminata* Lange, Nat. For. Kjöbenhavn Vid. Medd. 1867: 112. 1868.*Chimaphila acuminata* Rydb. N. Amer. Fl. 29: 31. 1914.*Chimaphila guatemalensis* Rydb. N. Amer. Fl. 29: 32. 1914.*Chimaphila dasystemma* Torr.; Rydb. N. Amer. Fl. 29: 32. 1914.

In mountain forests, Chihuahua and Sonora to Veracruz and Oaxaca. Central America; eastern United States.

Stems 10 to 20 cm. high; leaves in few whorls, oblong-lanceolate to broadly ovate, 2 to 7 cm. long, acute or acuminate, glabrous; inflorescence 1 to 4-flowered, the flowers long-pedicellate; sepals rounded-ovate, ciliolate; petals oval or orbicular, 6 to 8 mm. long, white or pink; capsule 6 to 8 mm. in diameter.

The Mexican material varies appreciably in leaf shape, but the forms do not appear to differ constantly from typical *C. maculata*.

129. ERICACEAE. Heath Family.

REFERENCE: Small, N. Amer. Fl. 29: 33-102. 1914.

Shrubs or trees; leaves alternate or rarely opposite, estipulate, persistent, leathery, entire or serrate; flowers perfect, usually in racemes or panicles; calyx of 4 to 7 distinct or partially united sepals; corolla of 4 to 7 distinct or united petals; stamens as many or twice as many as the corolla lobes, the anthers 2-celled, often appendaged; style compound, the stigma minute, discoid; fruit a capsule, drupe, or berry.

Corolla of distinct petals. Fruit a capsule-----1. **BEFARIA.**

Corolla of united petals.

Fruit a capsule, the calyx dry, not accrescent.

Calyx lobes imbricate in bud; pubescence not lepidote---2. **LEUCOTHOE.**

Calyx lobes valvate or separated in bud; pubescence of scales.

3. **XOLISMA.**

Fruit baccate or drupaceous, or capsular but surrounded by the fleshy accrescent calyx.

Fruit capsular, surrounded by the fleshy accrescent calyx.

4. **GAULTHERIA.**

Fruit baccate or drupaceous.

Fruit drupaceous; cells of the ovary 1-ovulate.

5. **ARCTOSTAPHYLOS.**

Fruit baccate; cells of the ovary few or many-ovulate.

Fruit papillose; large shrubs or trees-----6. **ARBUTUS.**

Fruit smooth; low shrubs-----7. **PERNETTIA.**

1. **BEFARIA** Mutis; L. Mant. Pl. 152. 1771.

Shrubs; leaves alternate, short-petiolate, persistent, entire; flowers in terminal panicles; calyx campanulate, 6 or 7-lobate; petals 6 or 7, ascending or spreading, narrow; stamens 12 or 14, the anthers opening by apical pores; capsule depressed, shallowly 6 or 7-lobate, septicidal.

Branches of the inflorescence glabrous or nearly so-----1. *B. laevis*.

Branches of the inflorescence densely viscid-pilose.

Petals 1.5 to 2 cm. long-----2. *B. discolor*.

Petals 2.5 to 4 cm. long-----3. *B. mexicana*.

1. *Befaria laevis* Benth. Pl. Hartw. 65. 1840.

Befaria glabra Mart. & Gal. Bull. Acad. Brux. 9¹: 543. 1842.

Puebla and Oaxaca; type from Talea, Oaxaca.

Branches glabrous or nearly so; leaves oblong-lanceolate or linear-lanceolate, 3 to 8 cm. long, acuminate, glabrous, bright green above, glaucous beneath; flowers long-pedicellate; petals pink, 12 to 20 mm. long. "Cruz de Mayo" (Puebla).

2. *Befaria discolor* Benth. Pl. Hartw. 65. 1840.

Befaria floribunda Mart. & Gal. Bull. Acad. Brux. 9¹: 543. 1842.

Jurgensia mexicana Turcz. Bull. Soc. Nat. Moscou 20¹: 151. 1847.

Guerrero and Oaxaca; type from Talea, Oaxaca.

Branches viscid-hispid; leaves ovate or oblong-elliptic, 3 to 6.5 cm. long, obtuse or acute, glabrous above, glaucous beneath and pubescent or glabrate; petals spatulate, pink.

3. *Befaria mexicana* Benth. Pl. Hartw. 15. 1839.

Zacatecas to Sinaloa and Oaxaca; type from Zacatecas.

Branches hispid; leaves oblong to oblong-elliptic, 2 to 5.5 cm. long, obtuse or acute, glabrous above, glaucous beneath and pubescent, at least along the costa. "Rosa del monte" (Oaxaca).

2. **LEUCOTHOE** D. Don, Edinb. New Phil. Journ. 17: 159. 1834.1. *Leucothoe mexicana* (Hemsl.) Small, N. Amer. Fl. 29: 57. 1914.

Andromeda mexicana Hemsl. Biol. Centr. Amer. Bot. 2: 282. 1881.

Oaxaca; type from Sierra San Pedro Nolasco. Guatemala.

Shrub; leaves alternate, petiolate, persistent, lanceolate or oblong-lanceolate to ovate, 2.5 to 7 cm. long, long-acuminate, rounded at base, entire, glabrous; flowers in small axillary corymb-like panicles, the branches puberulent; calyx 4 mm. broad, the 5 lobes broadly ovate; corolla cylindric-urceolate, 8 to 12 mm. long, white, minutely 5-dentate; stamens 10; fruit a 5-lobed septicidal capsule.

3. **XOLISMA** Raf. Amer. Month. Mag. 4: 193. 1819.1. *Xolisma squamulosa* (Mart. & Gal.) Small, N. Amer. Fl. 29: 66. 1914.

Lyonia squamulosa Mart. & Gal. Bull. Acad. Brux. 9¹: 542. 1842.

San Luis Potosí, Veracruz, Puebla, and Oaxaca; type from Cofre de Perote, Veracruz.

Shrub, 2 meters high or less; leaves alternate, petiolate, persistent, elliptic, oval, or obovate-elliptic, 2 to 4 cm. long, rounded to acute at apex, leathery, entire, lepidote beneath; flowers in small dense axillary clusters; calyx lobes ovate, acute; corolla white, urceolate, 3 to 4 mm. long, lepidote; capsule 3.5 to 4 mm. long, subglobose, septicidal.

This is very closely related to *X. ferruginea* (Walt.) Heller (*Andromeda ferruginea* Walt.), of the southern United States, and has been referred to that species by Hemsley and others. The Mexican plant differs only in its slightly shorter capsules and it is doubtful whether it represents a distinct species.

4. GAULTHERIA L. Sp. Pl. 395. 1753.

Shrubs; leaves alternate, persistent, usually toothed; flowers racemose or paniculate; calyx persistent, the lobes longer than the tube; corolla campanulate or urceolate, with 5 spreading or recurved lobes; stamens 10, the anthers 2-awned, opening by terminal pores; fruit berry-like, fleshy, the capsule inclosed in the accrescent calyx.

Gaultheria procumbens L., of the United States and Canada, is the winter-green or checkerberry, from which wintergreen oil is obtained. The fruits of some of the species are edible.

The names "ajocopaque," "axocopaque," and "axocaponi" are applied in southern Mexico to various species. The leaves are aromatic, and Hernández relates that they were used for flavoring chocolate and other beverages, and that they were laid among clothing to impart an agreeable odor and to keep away insects. The branches are even now employed as perfume in churches. The plants are said to have diuretic and laxative properties, and are used in domestic medicine.

Rachis of the inflorescence glabrous or finely pubescent, never hirsute or with gland-tipped hairs; rachis rarely with a few gland-tipped hairs, the corolla then glabrous.

Calyx lobes acute, about as wide as long-----1. *G. acuminata*.

Calyx lobes acuminate, much longer than wide.

Branches of the inflorescence pubescent-----2. *G. nitida*.

Branches of the inflorescence glabrous.

Leaves green, serrulate-----3. *G. nelsonii*.

Leaves glaucous, entire-----4. *G. glaucifolia*.

Rachis of the inflorescence glandular-pilose or hirsute; corolla never glabrous.

Pubescence of the corolla of eglandular hairs.

Leaves narrowly oblong-lanceolate-----5. *G. angustifolia*.

Leaves ovate-oblong or ovate-----6. *G. parvifolia*.

Pubescence of the corolla of gland-tipped hairs.

Filaments equaling or shorter than the anthers----7. *G. trichocalycina*.

Filaments longer than the anthers.

Leaf blades truncate to obtuse at base-----8. *G. hidalgensis*.

Leaf blades evidently cordate at base.

Pedicels twice as long as the corollas or longer----9. *G. longipes*.

Pedicels little if at all longer than the corollas.

Leaves ovate or ovate-oblong; branches sparsely short-hirsute or puberulent-----10. *G. odorata*.

Leaves mostly deltoid-ovate; branches densely hirsute.

11. *G. hirtiflora*.

1. *Gaultheria acuminata* Schlecht. & Cham. Linnaea 5: 126. 1830.

Veracruz and Puebla; type from Cerro Colorado, near Jalapa, Veracruz.

Shrub, 1 to 2.5 meters high, the branches glabrous or puberulent; leaves oblong to ovate, 4 to 11 cm. long, acuminate, rounded at base, serrulate; racemes 4 to 10 cm. long, finely pubescent; corolla 7 to 8 mm. long. "Axocopaconi" (Puebla), "arrayán" (*Conzatti*).

2. *Gaultheria nitida* Benth. Pl. Hartw. 45. 1840.*Gaultheria laevigata* Mart. & Gal. Bull. Acad. Brux. 9¹: 541. 1842.

Veracruz, Puebla, Hidalgo, and Oaxaca; type from El Banco, Hidalgo.

Shrub or small tree, the branchlets glabrous or nearly so; leaves oblong to oblong-ovate, 3 to 11 cm. long, acute or acuminate, rounded at base, serrulate, glabrate; racemes 4 to 8 cm. long; corolla pink, 7 to 8 mm. long.

3. *Gaultheria nelsonii* Small, N. Amer. Fl. 29: 77. 1914.

Known only from the type locality, Totontepec, Oaxaca.

Leaves oblong, 5 to 11 cm. long, short-acuminate, subcordate at base, serrulate, glabrous; racemes 5 to 8 cm. long; corolla pink, 4.5 to 5.5 mm. long.

Probably only a form of *G. nitida*.4. *Gaultheria glaucifolia* Hemsl. Biol. Centr. Amer. Bot. 2: 281. 1881.

Type from the Sierra Madre of western Mexico.

Branchlets glabrous; leaves ovate or oblong-ovate, 2.5 to 5 cm. long, acute, glabrous, rounded or subcordate at base; racemes few-flowered.

5. *Gaultheria angustifolia* T. S. Brandeg. Zoe 5: 251. 1908.

Type from Mount Ixtaccihuatl.

Branches pubescent; leaves 2 to 5 cm. long, 8 to 14 mm. wide, long-acuminate, serrulate, glabrous; racemes 2 to 4 cm. long; corolla 6 to 7 mm. long.

6. *Gaultheria parvifolia* Small, N. Amer. Fl. 29: 78. 1914.

Puebla and Oaxaca; type from mountains of Oaxaca.

Branches hirsute or glabrate; leaves oblong to oval-ovate, 2 to 6 cm. long, acute or obtuse, rounded or subcordate at base, serrulate, glabrate; racemes 2 to 6 cm. long; corolla pink, 6 to 7 mm. long.

7. *Gaultheria trichocalycina* DC. Prodr. 7: 595. 1839.

Type collected between Pueblo Viejo, Veracruz, and Real del Monte, Hidalgo; reported from Jalisco.

Branchlets glandular-pubescent; leaves ovate, 1 to 3 cm. long, acute, deeply cordate at base, serrulate; racemes 4 to 8 cm. long; corolla 6 to 7 mm. long.

8. *Gaultheria hidalgensis* Loesener, Bull. Herb. Boiss. 2: 552. 1894.*Gaultheria lancifolia* Small, N. Amer. Fl. 29: 78. 1914.*Gaultheria rosei* Small, N. Amer. Fl. 29: 79. 1914.

Tepic to Morelos and Chiapas; type from Othamalacatle, Hidalgo; specimens from Chihuahua probably are conspecific. Guatemala.

Small or large shrub, the branchlets pubescent, hirsute, or glabrate; leaves oblong to ovate or oval, 3 to 9 cm. long, acute or acuminate, serrulate, glabrous or nearly so; racemes 4 to 8 cm. long; corolla pink, 5 to 7.5 mm. long; fruit 4 to 6 mm. in diameter. "Arrayán" (*Seler*).9. *Gaultheria longipes* Small, N. Amer. Fl. 29: 76. 1914.

Type from Sierra de Tepoxtlán, Morelos, altitude 2,250 meters.

Slender shrub, the branchlets hirsute or glabrate; leaves oblong or ovate, 2 to 6 cm. long, acute, serrulate, glabrate; racemes 4 to 6 cm. long; pedicels 1 to 2 cm. long; corolla pink, 6.5 to 7.5 mm. long; capsule 3 to 4 mm. in diameter.

10. *Gaultheria odorata* Willd. Ges. Naturf. Freund. Berlin Mag. Neu. Schrift. 3: 425. 1801.*Gaultheria odorata mexicana* DC. Prodr. 7: 595. 1839.*Gaultheria hartwegiana* Loesener, Bull. Herb. Boiss. II. 3: 217. 1903.

Puebla and Oaxaca; imperfect specimens from Chihuahua may belong here. Central America and northern South America; type from Caracas, Venezuela.

Shrub; leaves 2 to 8 cm. long, acuminate, serrulate, sparsely pubescent or glabrate, short-petiolate; racemes 3 to 9 cm. long, lax; corolla pink, 6 to 7 mm. long; capsule about 5 mm. in diameter.

11. *Gaultheria hirtiflora* Benth. Pl. Hartw. 66. 1840.

Gaultheria cordata Mart. & Gal. Bull. Acad. Brux. 9¹: 540. 1842.

Puebla, Oaxaca, and Chiapas; type from Carmen, Oaxaca. Guatemala.

Leaves 3 to 9 cm. long, acute or obtuse, often deeply cordate at base, serrulate, pubescent or glabrate; racemes 3 to 6 cm. long; corolla pink or red, 6 to 7 mm. long; capsule 4 to 5 mm. in diameter.

This is not strikingly different from *G. odorata*, and is perhaps only a form of that species.

DOUBTFUL SPECIES.

GAULTHERIA OVATA DC. Prodr. 7: 596. 1839. Type collected between Tampico and Real del Monte. Probably the same as *G. nitida* Benth.

GAULTHERIA INSIPIDA Benth., placed by Small among the doubtful North American species, was described from Ecuador.

5. *ARCTOSTAPHYLOS* Adans. Fam. Pl. 2: 165. 1763.

Shrubs or small trees; leaves alternate, rarely opposite, persistent, petiolate, entire or serrate; flowers in terminal racemes or panicles, small, white or pink; calyx 5-lobed; corolla urceolate, with 5 short lobes; stamens 10, the anthers each with 2 dorsal awns; fruit drupaceous, globose, smooth or papillose, containing 10 or fewer seedlike nutlets.

The following names are reported for species whose identity is uncertain: "Guie-yana," "yaga-nita," "yaga-yana" (Oaxaca, Zapotec, *Reko*); "niño en cuero," "verdis" (Oaxaca, *Reko*); "tepetomate" (*Robelo*); "frutilla" (Mexico, *Ramírez*).

Leaves opposite or verticillate-----1. *A. oppositifolia*.

Leaves alternate.

Leaves conspicuously serrate.

Leaves glabrous, even when young.

Leaves green beneath; fruit 4 to 5 mm. in diameter-----2. *A. lucida*.

Leaves glaucous beneath; fruit 7 to 8 mm. in diameter----3. *A. arguta*.

Leaves tomentose beneath, at least when young.

Ovary pubescent.

Calyx glandular-pubescent-----4. *A. nochistlanensis*.

Calyx grayish-tomentulose-----5. *A. diversifolia*.

Ovary glabrous.

Leaves broadly oblong to obovate or elliptic, 2 to 5 cm. long.

6. *A. conzattii*.

Leaves narrowly oblong, usually larger.

Leaves remotely and inconspicuously serrate----7. *A. angustifolia*.

Leaves closely and conspicuously serrate.

Inflorescence glandular-hirsute-----8. *A. longifolia*.

Inflorescence tomentulose-----9. *A. rupestris*.

Leaves entire.

Fruit papillose or warty; leaves narrow, mostly oblong to linear, narrow at base.

Filaments glabrous-----10. *A. glaucescens*.

Filaments pubescent.

Ovary glabrous-----11. *A. minor*.

Ovary pubescent.

Leaves densely whitish-tomentose beneath; filaments sparsely pubescent-----12. *A. lanata*.

Leaves thinly tomentose or glabrate beneath; filaments densely pubescent.

Leaves mostly oblong-elliptic, less than 3 times as long as broad.-----13. *A. caeciliana*.

Leaves linear to narrowly oblong, more than 3 times as long as broad-----14. *A. polifolia*.

Fruit smooth; leaves broad, usually ovate to oval, obtuse or rounded at base.

Leaves whitish-tomentulose beneath, the margins revolute.

-----15. *A. bicolor*.

Leaves not tomentulose beneath, the margins not revolute.

Branchlets glabrous-----16. *A. glauca*.

Branchlets pubescent.

Branchlets glandular-pilose-----17. *A. drupacea*.

Branchlets without glandular hairs.

Pedicels and ovary pubescent-----18. *A. tomentosa*.

Pedicels and ovary glabrous-----19. *A. pungens*.

1. *Arctostaphylos oppositifolia* Parry, Proc. Davenport Acad. 4: 36. 1884.

Ornithostaphylos oppositifolia Small, N. Amer. Fl. 29: 101. 1914.

Mountains of northern Baja California.

Shrub, 4.5 meters high or less; leaves linear, 3 to 8 cm. long, obtuse or acute, entire, the margins revolute, glabrous above, minutely whitish-pubescent beneath; corolla 3 to 3.5 mm. long; fruit 4 to 6 mm. in diameter, smooth.

2. *Arctostaphylos lucida* (Small) Standl.

Comarostaphylis lucida Small, N. Amer. Fl. 29: 89. 1914.

Veracruz and Oaxaca; type from Orizaba.

Branches glabrous; leaves oblong to narrowly elliptic, 3 to 7 cm. long, acute, green, short-petiolate; inflorescence closely pubescent.

3. *Arctostaphylos arguta* (Zucc.) DC. Prodr. 7: 585. 1839.

Comarostaphylis arguta Zucc. Abh. Akad. München 2: 332. 1837.

Arbutus discolor Hook. Icon. Pl. pl. 29. 1837.

Arctostaphylos discolor DC. Prodr. 7: 585. 1839.

Arctostaphylos nitida Benth. Pl. Hartw. 66. 1840.

Arctostaphylos spinulosa Mart. & Gal. Bull. Acad. Brux. 9¹: 537. 1842.

Jalisco to Mexico and Oaxaca.

Shrub, 1.5 to 3 meters high, the branches glabrous; leaves narrowly oblong or oblong-lanceolate, 6 to 15 cm. long, acute, sharply serrulate, bright green above; inflorescence finely pubescent or glabrate; corolla 7 to 8 mm. long, white; fruit granular, dark red. "Garambullo" (Hidalgo, Mexico); "madroño borracho" (Mexico).

The fruit of this plant, or a decoction of the leaves, has narcotic properties. Children have been severely poisoned by eating the fruit, and the plant has been administered by Mexican physicians for the purpose of inducing sleep. The fruit is more active when fresh, and it also has mild purgative properties. The leaves are said to be astringent.

4. *Arctostaphylos nochistlanensis* Loesener, Bull. Herb. Boiss. II. 3: 220. 1903.

Oaxaca; type collected near Tillantongo, Nochistlán.

Branches finely pubescent; leaves oblong or lanceolate, 3 to 5.5 cm. long, obtuse, glabrous above, pale and minutely pubescent beneath; corolla 6 mm. long; fruit 4 to 5 mm. in diameter.

5. *Arctostaphylos diversifolia* Parry; A. Gray, Syn. Fl. ed. 2. 2¹: 397. 1886.
Arctostaphylos arguta diversifolia Parry, Proc. Davenport Acad. 4: 35. 1884.
Comarostaphylis diversifolia Greene, Bull. Calif. Acad. 2: 406. 1887.

Northern Baja California. Southern California; type from Jamul Valley.

Shrub, the branchlets tomentulose; leaves elliptic or oval, 2 to 9 cm. long, obtuse or acutish, revolute, glabrous above; corolla 5 to 7 mm. long; fruit 4 mm. in diameter.

6. *Arctostaphylos konzattii* Fernald, Proc. Amer. Acad. 36: 497. 1901.

Arctostaphylos glabrata Fernald, Proc. Amer. Acad. 36: 497. 1901.

Comarostaphylis glabrata Small, N. Amer. Fl. 29: 90. 1914.

Comarostaphylis konzattii Small, N. Amer. Fl. 29: 91. 1914.

Puebla, Oaxaca, and Chiapas; type from Cerro de San Felipe, Oaxaca.

Spreading shrub, 0.3 to 1 meter high, the branchlets puberulent; leaves obtuse or acute, glabrous above, thinly tomentose or glabrate beneath, short-petiolate; corolla 4 to 6 mm. long; fruit 6 to 7 mm. in diameter.

7. *Arctostaphylos angustifolia* (Klotzsch) Hemsl. Biol. Centr. Amer. Bot. 2: 278. 1881.

Comarostaphylis angustifolia Klotzsch, Linnaea 24: 74. 1851.

Described from Mexico; specimens from Michoacán probably belong here.

Branchlets finely pubescent; leaves short-petiolate, linear-oblong or narrowly oblong, 3 to 8 cm. long, obtuse or acute, glabrous above, tomentulose beneath; corolla 6 to 7 mm. long; fruit 4 to 6 mm. in diameter.

8. *Arctostaphylos longifolia* Benth. Pl. Hartw. 44. 1840.

Comarostaphylis longifolia Klotzsch, Linnaea 24: 75. 1851.

Comarostaphylis attenuata Klotzsch, Linnaea 24: 75. 1851.

Arctostaphylos attenuata Hemsl. Biol. Centr. Amer. Bot. 2: 278. 1881.

Michoacán and Mexico; type from Anganguero, Michoacán.

Branchlets glandular-hirsute; leaves oblong or narrowly oblong, 5 to 9.5 cm. long, acute or obtuse, glabrate above, tomentose or glabrate beneath; panicles large and dense; corolla 6 to 7 mm. long.

9. *Arctostaphylos rupestris* Robins. & Seat. Proc. Amer. Acad. 28: 112. 1893.

Comarostaphylis rupestris Small, N. Amer. Fl. 29: 90. 1914.

Michoacán and Mexico; type from Pátzcuaro, Michoacán.

Shrub, 1.5 to 4.5 meters high, the branches tomentulose; leaves narrowly oblong, 7 to 16 cm. long, acute, green and glabrate above, pale-tomentulose beneath; panicles lax, equaling or shorter than the leaves; corolla 6 to 7 mm. long.

10. *Arctostaphylos glaucescens* H. B. K. Nov. Gen. & Sp. 3: 278. 1819.

Comarostaphylis glaucescens Zucc.; Klotzsch, Linnaea 24: 76. 1851.

Type collected between Guanajuato and Valenciana.

Branchlets puberulent; leaves oblong-lanceolate, 10 cm. long or less, mucronate, glabrous and lustrous above, pubescent and glaucous beneath.

11. *Arctostaphylos minor* (Small) Standl.*Comarostaphylis minor* Small, N. Amer. Fl. **29**: 89. 1914.

Type collected near Miquihuana, Tamaulipas.

Branchlets glabrous or nearly so; leaves linear-oblong, 1.5 to 3 cm. long, obtuse, glabrous above, paler and minutely puberulent beneath; corolla 4 to 5 mm. long; fruit 3 to 4 mm. in diameter.

12. *Arctostaphylos lanata* (Small) Standl.*Comarostaphylis lanata* Small, N. Amer. Fl. **29**: 88. 1914.

San Luis Potosí; type from Buena Vista.

Branchlets glandular-hirsutulous, densely leafy; leaves oblong or elliptic-oblong, 4 to 6.5 cm. long, acute or mucronate, the margins strongly revolute, hirtellous above; corolla 6 mm. long; fruit 4 to 5 mm. in diameter.

13. *Arctostaphylos caeciliana* Loesener, Bull. Herb. Boiss. **2: 553. 1894.***Comarostaphylis caeciliana* Small, N. Amer. Fl. **29**: 88. 1914.

Oaxaca; type from Huitzo.

Branchlets tomentulose; leaves 3 to 6 cm. long, obtuse or acute, the margins subrevolute, green and glabrate above, densely tomentulose beneath; corolla 5 mm. long; fruit 4 to 5 mm. in diameter.

14. *Arctostaphylos polifolia* H. B. K. Nov. Gen. & Sp. **3: 277. 1819.***Arctostaphylos oaxacana* DC. Prodr. **7**: 585. 1839.*Arctostaphylos mucronifera* DC. Prodr. **7**: 585. 1839.*Arctostaphylos ledifolia* Mart. & Gal. Bull. Acad. Brux. **9**¹: 536. 1842.*Arctostaphylos latifolia* Mart. & Gal.; Walp. Repert. Bot. **2**: 726. 1843.*Comarostaphylis mucronifera* Klotzsch, Linnaea **24**: 76. 1851.*Comarostaphylis mucronata* Klotzsch, Linnaea **24**: 76. 1851.*Comarostaphylis polifolia* Klotzsch, Linnaea **24**: 77. 1851.*Comarostaphylis hartwegiana* Klotzsch, Linnaea **24**: 77. 1851.*Arctostaphylos hartwegiana* Hemsl. Biol. Centr. Amer. Bot. **2**: 278. 1881.*Arctostaphylos mucronata* Hemsl. Biol. Centr. Amer. Bot. **2**: 279. 1881.*Comarostaphylis microcarpa* Small, N. Amer. Fl. **29**: 88. 1914.

Sinaloa to San Luis Potosí, Tlaxcala, and Oaxaca; type from Villapando.

Shrub or tree, 1 to 6 meters high, the branchlets puberulent or glandular-hirtellous; leaves linear to narrowly oblong, 3 to 7 cm. long, obtuse or acute, glabrous above, tomentulose or glabrate beneath, the margins often revolute; corolla 7 to 9 mm. long; fruit 3 to 6 mm. in diameter. "Madroño" (Oaxaca, Sinaloa); "madroño chino" (Sinaloa); "pingüeca," "pingüica" (Morelos, Oaxaca); "tnu-tqué" (Oaxaca, *Seler*).

The species is somewhat variable and several segregates were recognized by Small. The key characters which he used to distinguish them are, however, utterly worthless.

15. *Arctostaphylos bicolor* (Nutt.) A. Gray, Proc. Amer. Acad. **7: 366. 1868.***Xylococcus bicolor* Nutt. Trans. Amer. Phil. Soc. II. **8**: 259. 1843.*Arctostaphylos veatchii* Kellogg, Proc. Calif. Acad. **2**: 19. 1863.

Northern Baja California; Cedros Island. Southern California.

Shrub with grayish branches; leaves ovate to oval, 2 to 6 cm. long, obtuse, green and glabrate above; corolla white or pink, 8 to 9 mm. long; fruit 6 to 8 mm. in diameter.

16. *Arctostaphylos glauca* Lindl. Bot. Reg. **21: pl. 1791. 1836.**

Mountains of Baja California. California.

Shrub or small tree, sometimes 7.5 meters high, with a trunk 30 cm. in diameter, glabrous throughout; leaves oval, rounded, or broadly ovate, 2 to 5 cm. long, rounded at apex and base, pale green, very thick; corolla white,

7 mm. long; fruit 1 to 1.8 cm. in diameter, dull red. "Manzanita" (California).

The fruit was much eaten by the California Indians, either raw or dried, ground, and made into atole. The leaves were often mixed with smoking tobacco. The leaves contain arbutin and about 9.8 per cent of tannin. A decoction of them has been employed for catarrhal affections, diarrhea, and gonorrhoea.

17. *Arctostaphylos drupacea* (Parry) Standl.

Arctostaphylos pringlei drupacea Parry, Bull. Calif. Acad. 2: 495. 1887.

Mountains of Baja California. Southern California; type from Cuyamaca Mountains.

Shrub, 1.5 to 2 meters high, with smooth red-brown bark; leaves broadly ovate to oblong, 2.5 to 4.5 cm. long, acute to rounded at base, glandular-pilose; corolla 7 to 8 mm. long; fruit glandular-pubescent.

This has been reported from Baja California as *A. pringlei* Parry, a species of Arizona.

18. *Arctostaphylos tomentosa* Pursh, Fl. Amer. Sept. 282. 1814.

Northern Baja California. California to British Columbia.

Shrub or small tree, sometimes 6 meters high, with a trunk 20 cm. in diameter; bark smooth, red-brown; leaves broadly ovate to oblong-lanceolate, 3 to 6 cm. long, acute or obtuse, pubescent or glabrate; corolla white or pink, 6 to 7 mm. long; fruit 6 to 8 mm. in diameter, brown, glabrous or pubescent; wood hard, tough, close-grained, reddish or dark brown, heavy, taking a fine polish. "Manzanita" (California).

The wood has been employed in the United States for fine cabinet work. This and other related species are known upon the Pacific Coast as "manzanita." The fruit is edible, having an agreeable acid flavor, but it is dry, mealy, and full of seeds. It was an important article of food among the California Indians, being eaten fresh, or dried and ground and stirred into water to form pinole, or cooked as a mush. Death from intestinal stoppage is said to have resulted from eating too much of the raw fruit. Manzanita cider is sometimes made by scalding the ripe fruit until the seeds are soft, then crushing it and straining the resultant liquid, which is allowed to stand and settle. The beverage so obtained is spicy and acid. It is sometimes made from the dried berries. The leaves of the various species were smoked by the Indians.

19. *Arctostaphylos pungens* H. B. K. Nov. Gen. & Sp. 3: 278. 1819.

Baja California to Chihuahua, Coahuila, Veracruz, and Oaxaca; type collected near the City of Mexico. New Mexico to California.

Shrub, 1 to 3.5 meters high, the bark smooth, red-brown, the branchlets tomentulose; leaves broadly ovate to lanceolate or rounded, 1.5 to 3.5 cm. long, obtuse or acute, tomentulose when young; racemes very short and dense; corolla 7 mm. long; fruit brown, 5 to 8 mm. in diameter. "Manzanita" (California); "manzanilla" (Durango, Sinaloa, Guanajuato); "pingüica" (Guanajuato, Morelos, Durango, Hidalgo, Jalisco); "palo de pingüica" (San Luis Potosí, Hidalgo, Sinaloa, Guanajuato, Oaxaca); "manzana," "tnu-ndido" (Oaxaca, *Seler*); "gayuba del país" (Hidalgo); "tepezquite," "tepelzquitl," "tepesquisuchil" (Nahuatl, from *tepe-izqui-xochitl*=mountain+toasted maize+flower); "pinquiqua" (Tarascan); "leño colorado" (Sonora, San Luis Potosí, Hidalgo).

The fruit is often eaten by people, and it is a favorite food of bear. It is often sold in the markets. Both the fruit and leaves are reputed to have astringent and diuretic properties, and they are employed as a remedy for dropsy, bronchitis, venereal diseases, and other affections.

6. **ARBUTUS** L. Sp. Pl. 395. 1753.

Shrubs or trees, the bark smooth, thin, peeling off in sheets; leaves alternate, persistent, petiolate, entire or serrate; flowers white or pink, in terminal panicles; calyx 5-lobate; corolla urceolate, with 5 small lobes; stamens 10, the anthers 2-awned; fruit baccate, globose, granular, 5-celled.

The Mexican plants of this genus are extremely variable and seem not to possess a single constant character. It appears probable that ultimately all of them will have to be considered mere forms of *A. xalapensis*. No confidence can be placed in the characters used in the following key. Of the species listed, the one most clearly distinct from *A. xalapensis* is *A. glandulosa*, but even the characters by which it can be recognized are far from constant.

Arbutus unedo L., a European species, has been erroneously reported in certain Mexican publications.

Petioles glandular-hirsute-----1. *A. glandulosa*.

Petioles glabrous or tomentose.

Ovary glabrous.

Leaves soon glabrous beneath-----2. *A. arizonica*.

Leaves persistently tomentose beneath.

Pubescence of the inflorescence eglandular-----3. *A. laurina*.

Pubescence of the inflorescence partly of gland-tipped hairs.

Calyx glabrous-----4. *A. peninsularis*.

Calyx tomentulose-----5. *A. donnell-smithii*.

Ovary pubescent.

Calyx lobes triangular, acute or acuminate-----6. *A. spinulosa*.

Calyx lobes broadly ovate or orbicular, obtuse-----7. *A. xalapensis*.

1. *Arbutus glandulosa* Mart. & Gal. Bull. Acad. Brux. 9¹: 533. 1842.

Arbutus villosa Willd.; Klotzsch, Linnaea 24: 72. 1851.

Chihuahua to Veracruz, Chiapas, and Sinaloa; type from Ejutla, Oaxaca.

Shrub or tree, 3 to 8 meters high, with red-brown bark; leaves oblong to ovate or oval, 4 to 13 cm. long, acute or obtuse, acute to cordate at base, entire or serrate, tomentose or glabrate beneath; panicles 2 to 10 cm. long, glandular-hirsute; corolla 8 mm. long. "Nuzu-ndu" (Oaxaca, Seler); "madroño" (Oaxaca, Sinaloa); "aile" (Sinaloa).

2. *Arbutus arizonica* (A. Gray) Sarg. Gard. & For. 4: 317. 1891.

Arbutus xalapensis arizonica A. Gray, Syn. Fl. ed. 2. 2¹: 396. 1886.

Chihuahua and Sonora to Jalisco and San Luis Potosí. Southern Arizona (type locality) and New Mexico.

Tree, 5 to 15 meters high, the trunk sometimes 60 cm. in diameter; bark thin, peeling off in red-brown papery sheets; leaves long-petiolate, oblong to ovate, 4 to 10 cm. long, obtuse or acute, pale beneath and glabrous, at least in age, usually entire; corolla white or pink, 8 mm. long; fruit 6 to 8 mm. in diameter, orange-red; wood soft, close-grained, reddish brown, its specific gravity about 0.71. "Madroño" (Chihuahua).

3. *Arbutus laurina* Mart. & Gal. Bull. Acad. Brux. 9¹: 535. 1842.

Type from Yavezia, Oaxaca.

Tree with red-brown branches; leaves oblong or ovate-oblong, 3 to 9 cm. long, obtuse or acutish, narrowed or rounded at base, serrate, pubescent beneath; panicles 4 to 8 cm. long; corolla 6 to 7 mm. long.

4. *Arbutus peninsularis* Rose & Goldm. Contr. U. S. Nat. Herb. 13: 312. 1911.
Type from Sierra de la Laguna, Baja California.

Tree; leaves short-petiolate, oval or oval-ovate, 5 to 11 cm. long, obtuse, rounded at base, entire or serrulate, lustrous above; corolla 6 to 7 mm. long.

Probably only a form of *A. arizonica*.

5. *Arbutus donnell-smithii* Small, N. Amer. Fl. 29: 85. 1914.

Chiapas. Guatemala; type from San Lucas.

Tree, 4.5 to 6 meters high; leaves long-petiolate, oblong to ovate, 5 to 10 cm. long, obtuse or acute, rounded or obtuse at base, entire or serrulate; corolla 6 to 7 mm. long; fruit about 1 cm. in diameter.

6. *Arbutus spinulosa* Mart. & Gal. Bull. Acad. Brux. 9¹: 532. 1842.

Type from Monte Tancitaro, Michoacán.

Leaves oblong, oblong-lanceolate, or obovate, 4 to 7 cm. long, acute, rounded at base, serrate; corolla 6 to 7 mm. long.

7. *Arbutus xalapensis* H. B. K. Nov. Gen. & Sp. 3: 279. 1819.

Arbutus densiflora H. B. K. Nov. Gen. & Sp. 3: 280. 1819.

Arbutus mollis H. B. K. Nov. Gen. & Sp. 3: 280. 1819.

Arbutus petiolaris H. B. K. Nov. Gen. & Sp. 3: 281. 1819.

Arbutus laurifolia Lindl. Bot. Reg. 25: pl. 67. 1839.

Arbutus varians Benth. Pl. Hartw. 77. 1841.

Arbutus floribunda Mart. & Gal. Bull. Acad. Brux. 9¹: 534. 1842.

Arbutus macrophylla Mart. & Gal. Bull. Acad. Brux. 9¹: 534. 1842.

Arbutus paniculata Mart. & Gal. Bull. Acad. Brux. 9¹: 535. 1842.

Arbutus prunifolia Klotzsch, Linnaea 24: 73. 1851.

Arbutus texana Buckl. Proc. Acad. Phila. 1861: 460. 1862.

Chihuahua and Nuevo León to Veracruz, Oaxaca, and Sinaloa; type from Jalapa, Veracruz. Guatemala; western Texas and southern New Mexico.

Shrub or tree, sometimes 15 meters high, the bark thin, red-brown, peeling off in large papery sheets; leaves oblong to ovate or oval, 3 to 10 cm. long, acute to rounded at apex, entire or serrate, usually tomentose beneath when young, glabrate in age; corolla white, 7 mm. long; fruit dark red, 8 to 10 mm. in diameter; wood hard, close-grained, reddish brown, its specific gravity about 0.75. "Madroño" (Chihuahua, Durango, Oaxaca, Mexico, Sinaloa, San Luis Potosí); "nuzu-ndu" (Oaxaca, *Seler*); "manzanita" (Durango).

The wood of this and other species is useful for various purposes.

DOUBTFUL SPECIES.

ARBUTUS OVATA Mart. & Gal. Bull. Acad. Brux. 9¹: 533. Type from Oaxaca. According to Small, probably a species of *Gaultheria*.

7. *PERNETTIA* Gaud. Ann. Sci. Nat. 5: 102. 1825.

1. *Pernettia ciliata* (Schlecht. & Cham.) Small, N. Amer. Fl. 29: 82. 1914.

Gaultheria ciliata Schlecht. & Cham. Linnaea 5: 126. 1830.

Pernettia pilosa G. Don, Hist. Dichl. Pl. 3: 837. 1834.

Pernettia ciliaris G. Don, Hist. Dichl. Pl. 3: 837. 1834.

Pernettia buxifolia Mart. & Gal. Bull. Acad. Brux. 9¹: 538. 1842.

Gaultheria hirsuta Mart. & Gal. Bull. Acad. Brux. 9¹: 540. 1842.

Pernettia seleriana Loesener, Bull. Herb. Boiss. II. 3: 217. 1903.

High mountains, Michoacán to San Luis Potosí, Veracruz, and Chiapas.

Low shrub, 60 cm. high or less, the branchlets hirsute; leaves alternate, short-petiolate, persistent, narrowly oblong to oval, 1 to 2.5 cm. long, acute

or obtuse, crenate-serrulate, setulose or glabrous beneath; flowers white or pink, in short few-flowered racemes; calyx 5-lobate, the lobes ovate or lanceolate; corolla urceolate, 5 to 7 mm. long; stamens 10, the anthers appendaged above; fruit a 5-celled berry, 6 to 7 mm. in diameter. "Capulincillo" (Mexico, Oaxaca); "arrayán" (Chiapas).

P. pentlandii DC., a South American species, known in Colombia as "maíz de perro," is said to have poisonous fruit.

130. VACCINIACEAE. Blueberry Family.

Shrubs or small trees, sometimes epiphytic and subscandent; leaves alternate, estipulate, persistent or deciduous, entire or serrate; flowers usually racemose, perfect; calyx tube adnate to the ovary, the limb 4 or 5-lobate or entire; corolla gamopetalous, 4 or 5-dentate, the lobes imbricate; stamens twice as many as the corolla lobes, epigynous or adherent to the base of the corolla, the anthers 2-celled, often awned; style filiform, the stigma simple; ovary inferior; fruit baccate.

Corolla campanulate, globose, or urceolate, small, less than 1 cm. long.

Stamens included; corolla closed in bud.....1. **VACCINIUM.**

Stamens exserted; corolla open in bud.....2. **POLYCODIUM.**

Corolla tubular, 1 to 2.5 cm. long.

Filaments equal in length.....3. **MACLEANIA.**

Filaments unequal.....4. **CAVENDISHIA.**

1. **VACCINIUM** L. Sp. Pl. 349. 1753.

Shrubs; leaves short-petiolate, persistent or deciduous, entire or serrate; flowers white or pink, solitary or in terminal or axillary racemes; calyx limb truncate or 5-dentate; corolla campanulate or urceolate, 4 or 5-dentate; stamens 8 or 10, the anthers often awned, opening by terminal pores; berry 5 or 10-celled.

The species occurring in the United States are known as blueberries or whortleberries, and sometimes erroneously as huckleberries.¹ All have edible fruit, although in some species the fruit is so small as to be worthless. Some of the blueberries afford one of the finest of all the native North American fruits. In recent years they have been greatly improved by cultivation.

Filaments glabrous; leaves deciduous.....1. **V. geminiflorum.**

Filaments pubescent; leaves persistent.

Flowers 4-parted.....2. **V. consanguineum.**

Flowers 5-parted.

Anthers awned.

Racemes leafy; corolla about 5 mm. long.....3. **V. stenophyllum.**

Racemes naked; corolla about 2.5 mm. long.....4. **V. leucanthum.**

Anthers not awned.

Corolla urceolate.....5. **V. cordatum.**

Corolla campanulate.....6. **V. confertum.**

1. **Vaccinium geminiflorum** H. B. K. Nov. Gen. & Sp. 3: 267. pl. 252. 1819.

High mountains, Jalisco to Veracruz and Oaxaca; type collected between Omitlán and Morán, Hidalgo.

¹ This name should be restricted to species of the genus *Gaylussacia*.

Low shrub, less than 10 cm. high, the branches puberulent; leaves short-petiolate, oblong or oblong-obovate, 6 to 18 mm. long, obtuse, serrulate, glabrous or with a few stipitate glands beneath; flowers axillary, solitary; corolla 4 to 4.5 mm. long.

2. *Vaccinium consanguineum* Klotzch, Linnaea 24: 64. 1851.

Chiapas. Central America; type from Chiriquí Volcano, Panama.

Shrub or small tree, the branchlets puberulent or glabrate; leaves mostly elliptic-oblong, 1.5 to 3.5 cm. long, acute, crenate-serrate, glabrous or nearly so; racemes short and few-flowered or sometimes 4.5 cm. long; corolla urceolate, pink, 6 to 7 mm. long; fruit black, 5 to 7 mm. in diameter.

3. *Vaccinium stenophyllum* Steud. Nom. Bot. ed. 2. 2: 740. 1841.

Vaccinium angustifolium Benth. Pl. Hartw. 45. 1840. Not *V. angustifolium* Ait. 1789.

Vaccinium angustifolium glaucescens Benth. Pl. Hartw. 45. 1840.

Sinaloa, Tepic, and Jalisco; type from Bolaños, Jalisco.

Shrub, sometimes 3 meters high, the branches puberulent; leaves nearly sessile, elliptic-lanceolate to linear-oblong, 2 to 4.5 cm. long, acute or acuminate, glandular-serrulate or entire, lustrous, paler beneath; racemes terminal, very leafy. "Madroño chino," "mandroñito" (Sinaloa).

4. *Vaccinium leucanthum* Schlecht. Linnaea 8: 524. 1833.

?*Vaccinium schlechtendalii* Don, Hist. Dichl. Pl. 3: 856. 1834.

Vaccinium micranthum Dunal in DC. Prodr. 7: 568. 1839.

Michoacán to Veracruz, Hidalgo, Puebla, and Oaxaca; type from San Salvador, near Chiconquiaco, Veracruz.

Shrub, sometimes 4.5 meters high, the branches puberulent; leaves lanceolate or oblong-ovate, 2 to 4.5 cm. long, acute, glandular-serrate, glabrous or nearly so; racemes many-flowered, 3 to 6 cm. long; corolla globose or urceolate; fruit black, 5 mm. in diameter. "Axocopaconi" (Puebla); "cahuichi," "cahuitzi" (Hidalgo, Veracruz).

5. *Vaccinium cordatum* Hemsl. Biol. Centr. Amer. Bot. 2: 274. 1881.

Gaylussacia cordifolia Mart. & Gal. Bull. Acad. Brux. 9¹: 529. 1842. Not *Vaccinium cordifolium* Stapf, 1894.

Veracruz; type from Pedregal de Las Vegas, near Jalapa.

Erect shrub, the branchlets puberulent; leaves broadly ovate, 3 to 4.5 cm. long, obtuse, rounded or subcordate at base, crenate-serrate, nearly glabrous, pale beneath; racemes axillary, 2 to 3.5 cm. long; corolla 6.5 mm. long; fruit 5 mm. in diameter.

6. *Vaccinium confertum* H. B. K. Nov. Gen. & Sp. 3: 265. pl. 250. 1819.

Vaccinium eriocladum Dunal in DC. Prodr. 7: 571. 1839.

Vaccinium brachystachyum Benth. Pl. Hartw. 65. 1840.

Vaccinium discolor Mart. & Gal. Bull. Acad. Brux. 9¹: 531. 1842.

Chihuahua to San Luis Potosí, Chiapas, and Sinaloa; type collected near Morán and Cerro de Oyamel, Hidalgo.

Shrub, 0.3 to 1 meter high, the branchlets puberulent or hirtellous; leaves oval to oblong-ovate, 6 to 15 mm. long, obtuse or acute, crenate-serrate, pale beneath and glandular; racemes few-flowered, equaling or shorter than the leaves; corolla white or pink, 3 to 4 mm. long; fruit black, 5 to 6 mm. in diameter.

2. POLYCODIUM Raf. Amer. Month. Mag. 2: 266. 1818. •

The other species are natives of the eastern United States.

1. *Polycodium kunthianum* (Klotzsch) C. B. Robinson, Bull. Torrey Club 39: 559. 1912.

Vaccinium kunthianum Klotzsch, Linnaea 24: 56. 1851.

Hidalgo and Puebla; type collected between Pachuca and Real del Monte, Hidalgo.

Shrub, 15 to 60 cm. high, the branches hirtellous; leaves subsessile, deciduous, oval to elliptic-oblong, 1.5 to 3 cm. long, acute to rounded at apex, entire, hirtellous or glabrate, often glaucous beneath; flowers in short leafy racemes; corolla campanulate, 4 to 6 mm. long; stamens 10, exserted, the anthers awned.

Humboldt, Bonpland, and Kunth referred the plant to *Vaccinium stamineum* L. (*Polycodium stamineum* Greene), a United States species. The fruit in this genus is not edible.

3. MACLEANIA Hook. Icon. Pl. pl. 109. 1837.

1. *Macleania insignis* Mart. & Gal. Bull. Acad. Brux. 9¹: 531. 1842.

Mountains of Veracruz and Oaxaca; type from Mirador, Veracruz.

Shrub, epiphytic or terrestrial, glabrous; leaves subsessile, broadly ovate to ovate-oblong, 3 to 6.5 cm. long, obtuse; flowers axillary, fascicled, reflexed; calyx 5-winged, the limb with 5 short teeth; corolla red, tubular, 2.5 cm. long; stamens 10, equal, the anthers not awned; fruit a 5-celled berry.

4. CAVENDISHIA Lindl. Bot. Reg. 21: pl. 1791. 1836.

Shrubs or small trees, terrestrial or epiphytic; leaves persistent, coriaceous, entire; flowers large, axillary or terminal, racemose or subumbellate; calyx limb 5-dentate; corolla tubular, 5-dentate; stamens 10, equal in length, but the filaments alternately unequal, the anthers not awned; fruit a 5-celled berry.

Inflorescence short, umbel-like-----1. *C. latifolia*.

Inflorescence an elongate raceme.

Corolla 2 to 2.5 cm. long-----2. *C. acuminata*.

Corolla 1 to 1.5 cm. long.

Leaves 2.5 to 4.5 cm. wide; petioles 2 to 4 mm. long-----3. *C. crassifolia*.

Leaves 4.5 to 6 cm. wide; petioles 7 to 13 mm. long-----4. *C. chiapensis*.

1. *Cavendishia latifolia* Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.

Type from Pueblo Nuevo (Tabasco ?).

Glabrous shrub; leaves short-petiolate, broadly ovate, 10 to 15 cm. long, 7.5 cm. wide or less, acuminate, 7 or 9-nerved; flowers 12 to 16 mm. long, long-pedicellate; calyx pink; corolla white.

2. *Cavendishia acuminata* (Hook.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 272. 1881.

?*Thibaudia mexicana* Mart. & Gal. Bull. Acad. Brux. 9¹: 530. 1842.

Thibaudia acuminata Hook. in Curtis's Bot. Mag. pl. 5752. 1869.

Oaxaca. Central and South America.

Glabrous shrub; leaves short-petiolate, oblong-lanceolate, 8 to 12 cm. long, attenuate-acuminate, 5-nerved, paler beneath; racemes loose, many-flowered.

3. *Cavendishia crassifolia* (Benth.) Hemsl. Biol. Centr. Amer. Bot. 2: 273. 1881.

Thibaudia crassifolia Benth. Pl. Hartw. 65. 1841.

Oaxaca and Chiapas; type from Totontepec, Oaxaca. Guatemala.

Glabrous shrub; leaves ovate to oblong-lanceolate, 5 to 10 cm. long, long-acuminate, rounded at base, 5-nerved, lustrous; racemes many-flowered, the flowers long-pedicellate.

4. *Cavendishia chiapensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Type from Cerro del Boquerón, Chiapas.

Glabrous epiphytic shrub; leaves oblong-ovate, 12 to 15 cm. long, 5 or 7-nerved, coriaceous; racemes 3 to 5.5 cm. long, the flowers long-pedicellate; corolla pale red, 1.5 cm. long; fruit 8 mm. in diameter.

131. THEOPHRASTACEAE. Theophrasta Family.

REFERENCE: Mez in Engl. Pflanzenreich IV. 236a. 1903.

Shrubs or trees; leaves alternate or pseudovercicellate, entire or serrate, estipulate; flowers perfect, racemose or umbellate, regular, usually 5-parted; calyx lobes free or short-connate, imbricate, rounded at apex; corolla gamopetalous, rotate or funnelform, fleshy; stamens 5, 5 staminodia also present; style simple, the stigma entire or nearly so; fruit baccate or drupaceous.

Staminodia ligulate; leaves not spine-tipped-----1. **DEHERAINIA**.

Staminodia petal-like; leaves spine-tipped-----2. **JACQUINIA**.

1. **DEHERAINIA** Decaisne, Ann. Sci. Nat. VI. 3: 138. 1876.

One other species is known, a native of Cuba.

1. *Deherainia smaragdina* (Planch.) Decaisne, Ann. Sci. Nat. VI. 3: 139. pl. 12. 1876.

Jacquinia smaragdina Planch.; Linden, Pl. Nouv. 8. 1859.

Tabasco.

Shrub, the branchlets rufous-villous; leaves petiolate, elliptic, about 15 cm. long and 5 cm. wide, subacuminate, entire, coriaceous, glabrous above, ferruginous-pubescent beneath; flowers solitary or fasciculate in the leaf axils, pedicellate, 16 to 20 mm. long, green; petals united to the middle, the lobes suborbicular, spreading.

2. **JACQUINIA** L.; Jacq. Stirp. Amer. 53. 1763.

Shrubs or trees; leaves entire, persistent, rigid, each tipped with a rigid spine, short-petiolate; flowers terminal, yellow or orange, 5-parted; corolla lobes spreading; staminodia inserted upon the corolla tube, resembling the corolla lobes but smaller; fruit ovoid or globose, large, cuspidate, few-seeded.

The following names are reported for species of uncertain identity: "Muyché" (Yucatán); "flor de Mayo" (Veracruz); "sixje" (Tabasco); "sicajan" (Chiapas). In South America some species are known as "barbasco." The plants are used widely in tropical America as fish poisons.

Flowers umbellate or fasciculate.

Leaves mostly elliptic, about 2 cm. wide-----1. **J. liebmannii**.

Leaves oblanceolate, about 8 mm. wide-----2. **J. pringlei**.

Flowers racemose.

Leaves tomentose beneath-----3. **J. seleriana**.

Leaves glabrous beneath.

Connective produced beyond the anther cells as a short sharp point.

4. **J. pungens**.

Connective not produced into a sharp point.

Staminodia 3 to 5 times as long as broad-----5. *J. flammea*.

Staminodia not more than twice as long as broad.

Filaments connate into a long tube free from the corolla.

6. *J. schiedeana*.

Filaments short-connate at base, not forming a tube free from the corolla.

Inflorescence corymb-like-----7. *J. aurantiaca*.

Inflorescence strictly racemose.

Racemes much longer than the leaves-----8. *J. racemosa*.

Racemes about as long as the leaves-----9. *J. axillaris*.

1. *Jacquinia liebmannii* Mez in Engl. Pflanzenreich IV. 236a: 38. 1903.

Type from Laguna Colorada and San Agustín.

Branchlets puberulent; leaves broadly elliptic or ovate-elliptic, about 4.5 cm. long, obtuse or acute at apex, rounded or obtuse at base, glabrous; inflorescence 1 to 3-flowered; fruit 1.7 to 2 cm. in diameter.

2. *Jacquinia pringlei* Bartlett, Proc. Amer. Acad. 44: 630. 1909.

Type from Iguala Canyon, Guerrero.

Small tree; leaves petiolate, 4 to 4.5 cm. long, acute, attenuate at base, glabrous; fruit 12 to 15 mm. in diameter.

3. *Jacquinia seleriana* Urb. & Loes. in Seler, Alt. Weg. Mex. 73. 1900.

Oaxaca; type material from San Carlos Yautepec and Rancho de los Pichones.

Branchlets tomentulose; leaves oblanceolate or linear-oblanceolate, 3 to 5 cm. long, acute to rounded at apex, attenuate at base, glabrous above, the margins revolute; flowers long-pedicellate, about 8 mm. broad; fruit 1 cm. in diameter. "Chilillo."

Used as a fish poison.

4. *Jacquinia pungens* A. Gray, Mem. Amer. Acad. n. ser. 5: 325. 1855.

Jacquinia donnell-smithii Mez in Engl. Pflanzenreich IV. 236a: 39. 1903.

Sonora to Veracruz and Chiapas; type from Sonora. Guatemala.

Shrub or small tree, usually 1 to 4 meters high, with very dense crown, the bark gray; leaves linear-lanceolate to elliptic-oblong or linear-oblong, 3 to 6 cm. long, acute, subsessile, rigid; flowers reddish yellow, about 7 mm. long, in short racemes; fruit 1.5 to 2 cm. in diameter. "San Juan" (Sinaloa); "San Juanito," "San Juanico" (Sonora); "pinicua" (Sonora, Ramírez); "rosadilla" (Oaxaca); "mata-peje," "luruche" (Guatemala)

McGee states that the Seri Indians of Sonora eat the green fruits, and when dry they employ them as rattle beads. The flowers, which are stiff and rigid, are strung as necklaces in some localities, and they are used to give a durable yellow dye to palm leaves and baskets. The fruit is much used along the west coast for stupefying fish.

5. *Jacquinia flammea* Millsp.; Mez in Engl. Pflanzenreich IV. 236a: 40. 1903. Yucatán.

Branchlets glabrous; leaves oblong or obovate, 3 to 4.5 cm. long, rounded or obtuse at apex and minutely aciculate-pungent; racemes corymbiform, equaling or longer than the leaves; flowers orange, 8 to 10 mm. long.

6. *Jacquinia schiedeana* Mez in Engl. Pflanzenreich IV. 236a: 41. 1903.

Reported from Guerrero and Puebla, and from other localities of uncertain position.

Branchlets finely pubescent; leaves lanceolate, about 4.5 cm. long and 1.5 cm. wide, acute, subtriplinerved; inflorescence elongate-racemose, about as long as the leaves; flowers 8 to 10 mm. long.

7. *Jacquinia aurantiaca* Ait. Hort. Kew. ed. 2. 2: 6. 1811.

Jacquinia mexicana Regel, Ind. Sem. Hort. Petrop. 48. 1865.

Jacquinia arenicola T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Sinaloa to Tamaulipas, Veracruz, Tabasco, and Oaxaca. Central America and West Indies.

Shrub or small tree, 2 to 9 meters high, the branchlets pubescent; bark smooth; leaves oblong to elliptic, 3 to 6 cm. long, obtuse or acute; corymbs few-flowered; flowers orange, about 8 mm. long; fruit globose, about 2 cm. in diameter. "Palo de las ánimas" (Guerrero); "gule-zee," "flor del niño" (Oaxaca, *Seler*); "rosadilla," "rosadillo" (*Robelo*); "neuxochitl" (Nahuatl, "honey-flower," *Robelo*); "siche" (Tabasco); "ducuche" (Guatemala); "San Juan" (Sinaloa); "barbasco," "limoncillo," "escorpioncillo," "mirra," "espino ruco," "cru-cillo" (El Salvaor).

The flowers are said to be eaten by birds. Palmer reports that in Guerrero the powdered bark is mixed with salt and applied to sores upon animals. The crushed fruit is employed extensively in Mexico and Central America for poisoning fish.

The tree is described and figured by Hernández¹ as "hoitzxochitl," or "arbor lonchifolia." The bark, he states, was employed as a remedy for venereal diseases; a decoction of the seeds as a remedy for headache and toothache. He states that other names for the plant were "xochipaltic," "neuhxochitl," and "hoatzinxochitl."

8. *Jacquinia racemosa* DC. Prodr. 8: 150. 1844.

Type from Tampico, Tamaulipas.

Branchlets puberulent; leaves lanceolate, about 5 cm. long and 1.5 cm. wide, acute, 1-nerved; racemes about 7-flowered, the flowers 7 mm. long.

9. *Jacquinia axillaris* Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 121. 1861.

Veracruz and Oaxaca; type from Papantla, Veracruz.

Branchlets puberulent; leaves lanceolate to elliptic-oblong, 5 to 7.5 cm. long, acute, triplinerved; flowers orange, 7 to 10 mm. long.

EXCLUDED SPECIES.

Mez reports *J. angustifolia* Oerst. and *J. submembranacea* Mez from Mexico, but this is merely through ignorance concerning the localities, which should be Costa Rica and Nicaragua, respectively.

132. MYRSINACEAE. Myrsine Family.

REFERENCE: Mez in Engl. Pflanzenreich IV. 236. 1902.

Shrubs or trees; leaves estipulate, alternate, entire, crenate, or serrate, punctate or lineolate; flowers small, white or pink, perfect, 5 or 4-parted; calyx inferior, the segments free or short-connate, usually punctate; petals usually united, the corolla rotate, the lobes valvate or dextrorsely convolute; stamens as many as the corolla segments and opposite them, usually attached to the corolla; style simple, the stigma punctiform or capitate; fruit baccate or drupaceous.

¹Thesaurus 39. 1651.

- Shrub or small tree, sometimes 6 meters high, with a trunk 16 cm. in diameter, the bark thin, close, grayish; leaves oblong or obovate, 4 to 10 cm. long, cuneate at base, coriaceous, lustrous above, the margins revolute; inflorescences 3 to 7-flowered, shorter than the petioles, the flowers 2 to 2.5 mm. long; sepals and petals spotted and striped with purple; fruit globose, black or bluish, about 4 mm. in diameter; wood hard, strong, close-grained, light yellowish brown. "Badula," "mameyuelo" (Porto Rico).

3. *Rapanea ferruginea* (Ruiz & Pav.) Mez in Urb. Symb. Antill. 2: 429. 1901.
Caballeria ferruginea Ruiz & Pav. Syst. Veg. Peruv. Chil. 250. 1798.
Myrsine ferruginea Spreng. Syst. Veg. 1: 664. 1825.
Myrsine myricoides Schlecht. Linnaea 8: 525. 1833.

Durango to Tepic, Oaxaca, and Veracruz. West Indies; Central and South America; type from French Guiana.

Shrub or small tree, 4 to 8 meters high; leaves slender-petiolate, lanceolate or oblanceolate, 5 to 12 cm. long, acute, attenuate at base, pubescent or glabrate beneath, thin; inflorescences 3 to 9-flowered, the flowers 2 to 3.5 mm. long; fruit 2 to 3 mm. in diameter, black. "Laurel chino" (Durango); "ratón" (Costa Rica); "arrayán," "arrayán bobo," "badula," "cucúbano," "mameyuelo" (Porto Rico).

3. *STYLOGYNE* DC. Ann. Sci. Nat. II. 16: 78. 1841.

1. *Stylogyne laevis* (Oerst.) Mez in Engl. Pflanzenreich IV. 236: 268. 1902.
Ardisia laevis Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 125. 1861.
 Tabasco. Central America; type from Volcán de Irazú, Costa Rica.

Branchlets glabrous; leaves petiolate, elliptic or oblong-elliptic, about 12 cm. long and 5 cm. wide, short-acuminate, acute at base, entire, coriaceous, glabrous; flowers corymbose, in terminal panicles, glabrous, about 4 mm. long, 5-parted; sepals ovate, rounded at apex, short-connate; petals subelliptic, acute, punctate; stamens much shorter than the petals; ovary glabrous.

4. *ICACOREA* Aubl. Pl. Guian. 2: Suppl. 1. 1775.

Shrubs or trees; leaves petiolate, entire, crenate, or serrate; flowers small, white or pink, 5-parted; sepals free or short-connate; petals short-connate, the lobes spreading or recurved, dextrorsely imbricate; stamens inserted at the base of the corolla tube; fruit globose, 1-seeded, bearing the persistent style at the apex.

Bracts ovate or elliptic, but caducous; flowers in racemes or spikes upon the branches of the panicle.

Sepals dextrorsely imbricate.

Petals conspicuously biseriate-lineate.....1. *I. karwinskyana*.

Petals punctulate at apex, elsewhere furnished with a few pale obscure lines.....2. *I. lindonii*.

Sepals imbricate or quincuncial, not dextrorsely imbricate.

Stamens shorter than the petals.....3. *I. revoluta*.

Stamens equaling or longer than the petals.

Flowers racemose.....4. *I. paniculata*.

Flowers spicate.....5. *I. spicigera*.

Bracts minute, triangular or scalelike; flowers in corymbs or umbels in the panicle.

Filaments glandular-pubescent; sepals and petals with numerous slender lines.....6. *I. nigrescens*.

Filaments glabrous; sepals and petals punctate or with broad lines.

Leaves closely pectinate-dentate, the teeth very acute.

Sepals and ovary punctate.....7. *I. pellucida*.

Sepals and ovary not punctate.....8. *I. pectinata*.

Leaves entire or crenulate.

Sepals ciliate.....9. *I. crenipetala*.

Sepals not ciliate.

Anthers elliptic; leaves crenate.....10. *I. liebmannii*.

Anthers linear; leaves entire.....11. *I. compressa*.

1. *Icacorea karwinskyana* (Mez) Standl.*Ardisia karwinskyana* Mez in Engl. Pflanzenreich IV. 236: 85. 1902.

Type from Ixcatlán, Oaxaca.

Branchlets glabrous; leaves obovate or broadly oblong, about 20 cm. long and 8.5 cm. wide, rounded at apex (?), acute at base, entire, glabrous; flowers racemose, the panicles many-flowered, much shorter than the leaves; buds 6 to 7 mm. long; sepals broadly ovate, ciliolate.

2. *Icacorea lindenii* (Mez) Standl.*Ardisia lindenii* Mez in Engl. Pflanzenreich IV. 236: 86. 1902.

Type from Poyapatengo, Tabasco.

Branchlets glabrous; leaves obovate, about 11 cm. long and 5 cm. wide, acute at base, entire, glabrous; panicles few-flowered, the flowers racemose; buds 7 mm. long, glabrous; sepals broadly ovate, rounded at apex, ciliate.

3. *Icacorea revoluta* (H. B. K.) Standl.*Ardisia revoluta* H. B. K. Nov. Gen. & Sp. 3: 246. 1819.*Ardisia bracteosa* DC. Trans. Linn. Soc. Bot. 17: 127. 1834.*Ardisia scopulina* T. S. Brandeg. Zoe 5: 215. 1905.

Sinaloa to Durango, Veracruz, and Oaxaca; type from La Venta de Moxonera. Central America.

Shrub or tree, 2 to 10 meters high, glabrous; leaves short-petiolate, elliptic or obovate, 9 to 19 cm. long, obtuse or acute, acute at base, entire; panicles equaling the leaves, the flowers racemose, long-pedicellate; sepals ovate, rounded at apex; corolla pinkish white; fruit globose, 4 to 5 mm. in diameter. "Laurel," "laurel de la sierra," "mangle," "pimientilla" (Sinaloa); "negrito" (Durango, *Patoni*); "camaca," "sirasil" (Oaxaca, Chiapas, *Seler*); "capulín manso" (Veracruz, *Urbina*); "capulín" (Colima); "uva" (El Salvador, Nicaragua); "guastomate," "fruta de pava" (Costa Rica); "arrayán" (Mexico, *Mez*); "cerezo" (El Salvador).

The fruit is edible.

4. *Icacorea paniculata* (Nutt.) Sudw. Gard. & For. 6: 324. 1893.*Cyrilla paniculata* Nutt. Amer. Journ. Sci. 5: 290. 1822.*Ardisia escallonioides* Schlecht. & Cham. Linnaea 6: 393. 1831.*Ardisia pickeringia* Torr. & Gray; DC. Prodr. 8: 124. 1844.

Tamaulipas, San Luis Potosí, Veracruz, Oaxaca, and Chiapas. Florida, West Indies, and Guatemala.

Shrub or small tree, sometimes 7.5 meters high, with a trunk 15 cm. in diameter, the bark thin, light gray or white, scaly; leaves obovate or elliptic, 6 to 12 cm. long, obtuse or acute, acute at base, entire, glabrous; flowers fragrant, the panicles 5 to 12 cm. long; fruit globose, 4 to 8 mm. in diameter, black and shining; wood hard, brown, marked with darker bands, its specific gravity about 0.86. "Huitumbio" (Chiapas); "morita" (Oaxaca); "xook num" (Yucatán, Maya, *Seler*).

5. *Icacorea spicigera* (Donn. Smith) Standl.*Ardisia spicigera* Donn. Smith, Bot. Gaz. 27: 434. 1899.

Type from Comitán, Chiapas.

Branchlets glabrous; leaves oblong-elliptic, about 12 cm. long and 4 cm. wide, acute, entire, glabrous; panicles many-flowered, longer than the leaves; buds 5 to 6 mm. long.

6. *Icacorea nigrescens* (Oerst.) Standl.*Ardisia nigrescens* Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 130. pl. 2. 1861.

Veracruz; type material collected near Collpa and Jacaltepec.

Branchlets tomentose; leaves elliptic-lanceolate, about 6 cm. long and 2 cm. wide, short-acuminate, acutish or rounded at base, glabrous above, strigose or glabrate beneath; inflorescence few-flowered, terminal and axillary, often simple and consisting of 2 to 4 umbellate flowers; buds 6 mm. long; sepals ovate, acutish.

7. *Icacorea pellucida* (Oerst.) Standl.

Ardisia pellucida Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 130. *pl.* 2. 1861.

Type from Pital, Veracruz. Guatemala.

Leaves oblong, about 25 cm. long and 8 cm. wide, short-acuminate, acute at base, glabrous; panicles few-flowered, much shorter than the leaves, the flowers corymbose; sepals broadly ovate, acute.

8. *Icacorea pectinata* (Donn. Smith) Standl.

Ardisia pectinata Donn. Smith, Bot. Gaz. 12: 132. 1887.

Tabasco. Type from Pansamalá, Guatemala.

Leaves elliptic, about 28 cm. long and 12 cm. wide, acuminate, acute at base, glabrous; panicles many-flowered, much shorter than the leaves, the flowers corymbose, 5 mm. long, glabrous; sepals ovate, acutish, ciliate.

9. *Icacorea crenipetala* (Mez) Standl.

Ardisia crenipetala Mez in Engl. Pflanzenreich IV. 236: 91. 1902.

Veracruz and Chiapas; type from Orizaba.

Branchlets puberulent; leaves elliptic or oblong-ob lanceolate, 9 to 14 cm. long, 4 to 5 cm. wide, acuminate, acute at base, crenate, glabrous; panicles pyramidal, few-flowered; buds 5 mm. long; sepals narrowly triangular, acutish.

10. *Icacorea liebmanni* (Oerst.) Standl.

Ardisia liebmanni Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1861: 129. *pl.* 2. 1861.

Veracruz; type from Amatlán.

Branchlets puberulent; leaves elliptic-lanceolate or oblong-lanceolate, about 12 cm. long and 3.5 to 4 cm. wide, acuminate, acute or obtuse at base; panicles many-flowered, corymbiform, shorter than the leaves; buds 4 mm. long, glabrous; sepals broadly ovate.

11. *Icacorea compressa* (H. B. K.) Standl.

Ardisia compressa H. B. K. Nov. Gen. & Sp. 3: 245. 1819.

Ardisia capollina DC. Trans. Linn. Soc. Bot. 17: 116. 1834.

Sinaloa to Oaxaca and Veracruz. Central and South America.

Shrub or small tree, the branchlets glabrous or nearly so; leaves lanceolate to oblong or elliptic, 6 to 15 cm. long, acute or acuminate, acute at base, glabrous; panicles terminal and axillary, longer or shorter than the leaves, the flowers white, 5 to 6 mm. long, glabrous; sepals ovate-elliptic; fruit globose, red or black, about 6 mm. in diameter. "Laurelillo" (Sinaloa); "capulín silvestre," "chico correoso" (Veracruz); "capulincillo" (Veracruz, Oaxaca); "tucuico" (Costa Rica); "capulín de tejón," "capulín de mayo" (Veracruz); "cerezo," "cercilla," "cotomate," "cercita" (El Salvador).

The fruit is edible and has an acid flavor.

5. *PARATHESIS* Hook. f.; Benth. & Hook. Gen. Pl. 2: 645. 1876.

Shrubs or small trees; leaves petiolate, entire or crenulate; flowers small, 5-parted, in terminal or axillary panicles, usually pink; sepals minute, connate below; corolla rotate, the lobes linear or oblong, valvate; fruit small, globose, 1-seeded.

Panicles axillary.

Ovary and style glabrous.....1. *P. oerstediana*.

Ovary or base of style, or both, pubescent.

Leaves 3.5 to 9 cm. long.

Buds 2.5 mm. long; inflorescence simple or once branched...2. *P. tenuis*.Buds 4 mm. long; inflorescence twice branched.....3. *P. rekoi*.Leaves 11 to 18 cm. long.....4. *P. melanosticta*.

Panicles terminal.

Ovary pubescent, at least at apex.....5. *P. serrulata*.

Ovary glabrous.

Flower buds 7 to 8 mm. long.....6. *P. chiapensis*.

Flower buds 5 mm. long or less.

Leaves glabrous.....7. *P. corymbosa*.Leaves thinly stellate-pubescent beneath.....8. *P. lanceolata*.1. *Parathesis oerstediana* Mez in Engl. Pflanzenreich IV. 236: 178. 1902.

Type from Tontalcingo.

Branchlets ferruginous-tomentulose; leaves obovate, about 19 cm. long and 8.5 cm. wide, acute or acuminate, attenuate to base, entire, thin, glabrous above, stellate-pubescent or glabrate beneath; panicles many-flowered, equaling or shorter than the leaves; buds 4 mm. long, puberulent.

2. *Parathesis tenuis* Standl., sp. nov.

Type collected somewhere in southern Mexico, probably in Oaxaca or Veracruz (*Liebmann* 14; U. S. Nat. Herb. no. 1012707).

Branchlets slender, minutely brown-tomentulose; petioles 3 to 9 mm. long; leaves elliptic or lance-elliptic, 3.5 to 5.5 cm. long, 1.3 to 2 cm. wide, abruptly obtuse-acuminate, cuneate-acuminate at base, entire, thin, glabrous; panicles few-flowered, once branched, or the flowers merely racemose, the inflorescence slightly shorter than the leaves, on a long filiform peduncle, the pedicels filiform, 5 to 9 mm. long; buds 2.5 mm. long, minutely tomentulose; ovary puberulent.

3. *Parathesis rekoi* Standl., sp. nov.

Type from Cafetal Soledad, Cerro Espino, Oaxaca, altitude 800 meters (*Reko* 3335; U. S. Nat. Herb. no. 842483).

Branchlets minutely tomentulose; petioles slender, 10 to 14 mm. long; leaf blades obovate-elliptic, 5.5 to 9 cm. long, 2.5 to 3.5 cm. wide, obtusely short-acuminate, cuneate at base, thin, entire or undulate-crenate, sparsely appressed, stellate-pubescent or glabrate; panicles axillary, twice branched, lax, many-flowered, 10 to 13 cm. long, the flowers long-pedicellate; buds 4 mm. long, granular-puberulent; sepals punctate; anthers 1 mm. long, acuminate, purple-punctate dorsally; ovary glabrous, the style puberulent.

4. *Parathesis melanosticta* (Schlecht.) Hemsl. Biol. Centr. Amer. Bot. 2: 291. 1881.

Ardisia melanosticta Schlecht. Linnaea 8: 526. 1833.

Veracruz, Oaxaca, and Chiapas; type collected between San Salvador and Jalapa, Veracruz. Guatemala.

Branchlets ferruginous-tomentulose; leaves oblanceolate or oblanceolate-elliptic, 10 to 18 cm. long, acuminate, attenuate at base, entire or crenulate, tomentulose or glabrate beneath; panicles many-flowered, equaling or shorter than the leaves; buds 4 to 5 mm. long, puberulent.

5. *Parathesis serrulata* (Swartz) Mez in Urban, Symb. Antill. 2: 403. 1901.

Ardisia serrulata Swartz, Prodr. Veg. Ind. Occ. 48. 1788.

Ardisia crenulata Vent. Choix Pl. Cels 5. pl. 5. 1803.

Parathesis crenulata Hook. f.; Hemsl. Biol. Centr. Amer. Bot. 2: 291. 1881.

Parathesis reflexa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 189. 1915.

Tepic to San Luis Potosí, Veracruz, Oaxaca, and Chiapas. West Indies, Central America, and northern South America.

Shrub, 1 to 2.5 meters high, the branchlets ferruginous-tomentulose; leaves petiolate, oblanceolate, oblong, or elliptic-lanceolate, 10 to 20 cm. long, acuminate, attenuate or acute at base, entire or crenulate, glabrous above, beneath glabrous or stellate-tomentulose; panicles many-flowered, shorter or longer than the leaves; flowers pink, the buds about 4 mm. long, tomentulose; fruit globose, bluish black. "Cugía" (Nicaragua); "cinco negritos" (Chiapas); "rasca-garganta," "seca-garganta" (Porto Rico); "jálapón" (Santo Domingo).

The fruit is edible.

6. *Parathesis chiapensis* Fernald, Proc. Amer. Acad. 36: 497. 1901.

Chiapas; type collected between San Martín and Ococingo.

Branchlets ferruginous-tomentose; leaves elliptic, about 17 cm. long and 7 cm. wide, acuminate, crenulate, coriaceous, glabrous above, stellate-tomentulose beneath; panicles pyramidal, longer than the leaves; buds tomentose. "Telinté."

7. *Parathesis corymbosa* Hemsl. Biol. Centr. Amer. Bot. 2: 191. 1881.

Guerrero, Oaxaca, Veracruz, and Yucatán; type from Sierra San Pedro Nolasco, Oaxaca.

Shrub, sometimes 4 meters high; leaves elliptic or oblong-obovate, 13 cm. long and 5 cm. wide or smaller, acute, attenuate to base, entire, thin; panicles many-flowered, pyramidal, the flowers pink; buds tomentulose.

8. *Parathesis lanceolata* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 188. 1915.

Chiapas; type from Finca Irlanda.

Branchlets ferruginous-tomentose; leaves elliptic or elliptic-lanceolate, 8 to 17 cm. long, long-acuminate, attenuate to base, entire or crenulate, thin, glabrous above, stellate-tomentulose or glabrate beneath; panicles equaling or shorter than the leaves, tomentulose.

133. PLUMBAGINACEAE. Plumbago Family.

1. PLUMBAGO L. Sp. Pl. 151. 1753.

REFERENCE: Boissier in DC. Prodr. 12: 690-694. 1848.

Plants herbaceous or fruticose, subscandent; leaves alternate, entire, estipulate; flowers spicate, bracteate and bracteolate, blue or white; calyx tubular, glandular, 5-dentate, 5-costate; corolla salverform, with a slender tube, the limb 5-lobate; stamens 5, free from the corolla, the anthers oblong-linear; style filiform, 5-branched; fruit a capsule, circumscissile near the base.

Plumbago capensis Thunb., a native of South Africa, with showy blue flowers, is cultivated in Mexico. In El Salvador it is known as "umbela" and "lumbela."

Corolla white, the tube twice as long as the calyx, the lobes retuse or obtuse; calyx with glands extending to the base-----1. *P. scandens*.

Corolla blue, the tube one and one-half times as long as the calyx or shorter, the lobes acute; calyx without glands below-----2. *P. pulchella*.

1. *Plumbago scandens* L. Sp. Pl. ed. 2. 215. 1762.

Plumbago mexicana H. B. K. Nov. Gen. & Sp. 2: 221. 1817.

Nearly throughout Mexico. Widely distributed in tropical America.

Plants suffrutescent, subscandent, 1 to 3 meters high, glabrous except in the inflorescence; leaves short-petiolate, oblong to ovate, acuminate, acute at base; spikes long and slender, many-flowered; calyx about 1 cm. long; corolla 2.5 to 3.5 cm. long. "Canutillo" (Sinaloa); "hierba de alacrán" (Sinaloa, Jalisco, Oaxaca, San Luis Potosí, Guanajuato); "hierba del negro" (Conzatti); "lagaña de perro" (Morelos, Seler); "chapak" (Yucatán, Maya, Seler); "pitillo" (flower), "turicua" (Tamaulipas); "dentelaria" (Oaxaca, Reko); "tlalchichinolli," "tlepatli" (Nahuatl); "embeles," "jasmín azul" (Yucatán); "beleza," "veleza enredadera," "meladillo," "higuillo" (Porto Rico); "centella," "hierba del diablo" (Colombia); "pegajoso" (Tamaulipas, Sinaloa); "guacochile" (El Salvador).

The leaves and root when applied to the skin produce almost instant rubefaction and in a very short time blisters. Taken internally they are poisonous. A decoction is applied externally for erysipelas, itch, and similar affections. *Plumbago europæa* L., of Europe, has similar properties. It is used internally as an emetic. When chewed, the plant excites the flow of saliva. The root has long been employed to relieve toothache, hence the French name of "dentelaire." Beggars are said sometimes to employ the leaves to raise sores upon the body for the purpose of exciting pity.

This species was listed by Sessé and Mociño as *P. zeylanica*, an Old World species.

2. *Plumbago pulchella* Boiss. in DC. Prodr. 12: 692. 1848.

Plumbago lanceolata Sessé & Moc. Fl. Mex. 31. 1893.

Durango to Veracruz and Oaxaca; type from the City of Mexico.

Plants herbaceous or suffrutescent, subscandent, glabrous except in the inflorescence; leaves petiolate, ovate, acute, acute or attenuate at base; spikes many-flowered, lax; calyx about 6 mm. long; corolla 10 to 15 mm. long. "Pañete" (Querétaro, Mexico); "jiricua" (Mexico, Guanajuato); "dominguilla" (Durango); "cola de iguana" (Mexico); "tiricua" (Guanajuato); "hierba del negro" (Oaxaca); "cola de pescado" (Mexico); "curiqua" (Michoacán, Tarascan, León); "chilillo" (Oaxaca, Ramírez); "hierba del alacrán" (Zacatecas); "hierba lumbré" (Oaxaca, Zacatecas); "tianquiz" (Querétaro, Ramírez); "tlepatli" ("fire-medicine"), "tlachichinol" (Nahuatl).

This is employed in Mexico like *P. scandens*, especially for toothache and to destroy ulcers. It is also used popularly as a remedy for rheumatism.

134. SAPOTACEAE. Sapote Family.

Shrubs or trees, sometimes armed with spines, the sap often milky; leaves alternate, entire, petiolate, estipulate, usually persistent; flowers axillary or lateral, small, white or greenish, perfect; sepals 4 to 12, imbricate; corolla gamopetalous, appendages often present between the lobes; stamens as many as the corolla lobes, borne upon the corolla, usually alternating with staminodia; ovary 4 to 12-celled, the styles united, the ovules solitary; fruit baccate or drupaceous, small or large.

Staminodia none.....1. **CHRYSOPHYLLUM.**

Staminodia present.

Appendages (2) present between the corolla lobes.

Ovary glabrous; endosperm abundant.....2. **DIPHOLIS.**

Ovary hairy; endosperm scant or none.....3. **BUMELIA.**

Appendages of the corolla none.

Ovary 10 to 12-celled; flowers solitary in the leaf axils-----4. **ACHRAS.**

Ovary 4 to 5-celled; flowers usually fasciculate in the axils, or lateral.

Sepals 8 to 10-----5. **CALOCARPUM.**

Sepals 4 to 6.

Endosperm none; flowers axillary-----6. **LUCUMA.**

Endosperm abundant; flowers usually lateral on old wood.

7. **SIDEROXYLON.**

1. **CHRYSOPHYLLUM** L. Sp. Pl. 192. 1753.

Trees with milky juice; leaves with numerous close parallel lateral nerves, estipulate; flowers fasciculate at the nodes or in the axils, pedicellate; sepals 5 or 6; corolla tubular-campanulate, the limb 5 or 6-lobate; staminodia none; ovary 4 to 11-celled; fruit baccate or drupaceous.

Flowers small, about 2 mm. long; corolla glabrous-----1. **C. mexicanum.**

Flowers larger, about 4 mm. long; corolla sparsely or densely sericeous.

Leaves glabrous on the upper surface; fruit containing several seeds.

2. **C. cainito.**

Leaves ferruginous-tomentulose on the upper surface; fruit 1-seeded.

3. **C. tepicense.**

1. **Chrysophyllum mexicanum** T. S. Brandeg., sp. nov.

Oaxaca, Veracruz, and Yucatán; type from Zacuapan, Veracruz (*Purpus* 7679; U. S. Nat. Herb. no 877540). Also in El Salvador.

Petioles 5 to 10 mm. long; leaf blades oval to oblong-elliptic, 5.5 to 12 cm. long, 2.5 to 5 cm. wide, obtuse to short-acuminate, obtuse or acute at base, with very numerous close straight lateral nerves, glabrous above, sericeous beneath, the hairs closely appressed, dense or sparse, grayish or brownish, lustrous; flowers 5-parted, few or numerous, the pedicels 3 to 5 mm. long; sepals orbicular, about 1 mm. long, sericeous; corolla 1.5 to 2 mm. long, glabrous; fruit 1-seeded. "Caimito," "zapote calmito," "canela," "palo de canela" (Oaxaca); "zapoyillo," "guayabillo" (El Salvador).

This has smaller flowers than any of the West Indian species. *Liebmann* 308, *Purpus* 8038, and *Gaumer* 896 are referred here. Mature fruit has not been seen.

2. **Chrysophyllum cainito** L. Sp. Pl. 192. 1753.

Yucatán; cultivated (?) in Guerrero. West Indies, Central America, and Colombia.

Tree, 8 to 15 meters high; leaves oval or broadly elliptic to oblong, 7 to 15 cm. long, abruptly short-acuminate, bright green above, golden or brownish-sericeous beneath, the pubescence very dense and lustrous; flowers greenish; stigma 8 to 11-lobed; fruit the size of an apple, globose, white to purple, with milky sweet flesh, containing several large brown seeds. "Caimito" (Yucatán, Guerrero, Central America, Cuba, Santo Domingo); "cayumito" (Yucatán).

The wood is said to be rather coarse and purplish gray, with a specific gravity of 0.88; it is of little value. The star-apple is cultivated for its fruit, which is highly valued in some parts of tropical America. The fruit is eaten raw. The name star-apple is derived from the fact that when the fruit is cut transversely, the seeds are seen to radiate like the points of a star. The tree is perhaps not a native of Yucatán but only in cultivation there.

3. Chrysophyllum tepicense Standl., sp. nov.

Type from Acaponeta, Tepic (*Rose* 1456; U. S. Nat. Herb. no. 300289).

Branchlets brownish-tomentulose; leaves (very immature) on petioles 1.5 to 2 cm. long, the blades oblong-elliptic, 3.5 to 4 cm. long, 1.7 to 2 cm. wide, obtuse or rounded at base and apex, densely brown-tomentulose on both surfaces; flowers borne on defoliate nodes of old branchlets, numerous in each cluster, the pedicels 8 to 10 mm. long, puberulent; sepals 5, orbicular, 2 mm. long, minutely sericeous; corolla 3.5 mm. long, greenish, sparsely sericeous; fruit oval, about 3 cm. long and 2 cm. thick, 1-seeded; seed brown, smooth, about 2.2 cm. long, the hilum near the apex on the ventral side, 8 mm. long and 3.5 mm. wide.

2. DIPHOLIS A. DC. in DC. Prodr. 8: 188. 1844.**1. Dipholis salicifolia** (L.) A. DC. in DC. Prodr. 8: 188. 1844.

Achras salicifolia L. Sp. Pl. ed. 2. 470. 1762.

Veracruz, Oaxaca, and Yucatán. West Indies and southern Florida.

Slender unarmed tree, sometimes 16 meters high, with a trunk 50 cm. in diameter, the bark scaly; leaves slender-petiolate, oblong, lanceolate, or elliptic-oblong, 6 to 12 cm. long, acute or acuminate, thinly sericeous when young but soon glabrate; flowers in dense, lateral or axillary fascicles, the pedicels 2 to 3 mm. long; sepals sericeous, 1.5 mm. long; fruit ovoid or subglobose, black, 6 to 8 mm. in diameter; wood hard, strong, fine-grained, dark brown or reddish, its specific gravity about 0.93. "Xac-chum" (Yucatán, Maya); "jocuma," "almendro silvestre," "jocuma blanca," "cuyá," "carolina" (Cuba); "almen-drón," "tabloncillo" (Porto Rico).

Known in the British West Indies as "bustic," "wild cassada," and "cassada-wood."

3. BUMELIA Swartz, Prodr. Veg. Ind. Occ. 49. 1788.

Shrubs or trees, usually armed with spines or with spinose branchlets; leaves persistent or deciduous; flowers small, green or white, fasciculate, lateral or axillary; sepals 5, unequal; corolla 5-lobate, with 2 lobelike appendages in each sinus; staminodia petal-like; fruit 1-seeded.

Leaves tomentose beneath with loose matted hairs.

Fruit and ovary densely tomentose-----1. *B. eriocarpa*.

Fruit and ovary glabrous or nearly so, or the ovary pilose with straight hairs.

Fruit 7 to 10 mm. long; leaves attenuate at base-----2. *B. lanuginosa*.

Fruit about 2 cm. long; leaves rounded or obtuse at base.

Flowers sessile or subsessile-----3. *B. subsessiliflora*.

Flowers pedicellate.

Leaves short-petiolate, rough and dull on the upper surface, the tomentum of the lower surface white or gray---4. *B. altamiranoi*.

Leaves long-petiolate, smooth and lustrous above, the tomentum ferruginous-----5. *B. stenosperma*.

Leaves glabrous beneath or sericeous, the pubescence of straight closely appressed hairs.

Leaves obovate or oblanceolate, broadest above the middle, cuneate or attenuate at base.

Pedicels glabrous-----6. *B. spiniflora*.

Pedicels sericeous or tomentulose.

Flowers long-pedicellate, the pedicels more than twice as long as the calyx; leaves 1.5 cm. long or smaller-----7. *B. occidentalis*.

Flowers short-pedicellate, the pedicels usually less than twice as long as the calyx; leaves mostly larger.

Flowers nearly sessile in anthesis, the pedicels usually shorter than the calyx-----8. *B. retusa*.

Flowers pedicellate, the calyx usually equaling or longer than the calyx.

Leaves mostly 1.5 to 3 cm. long, pale beneath-----9. *B. brandegei*.

Leaves mostly 4 to 5.5 cm. long, not pale beneath.

10. *B. socorrensis*.

Leaves oblong to oval or elliptic, broadest at or below the middle, usually obtuse or rounded at base.

Petioles much longer than the pedicels, usually more than twice as long.

11. *B. laetevirens*.

Petioles equaling or usually shorter than the pedicels.

Pedicels densely ferruginous-sericeous-----12. *B. persimilis*.

Pedicels glabrous or nearly so-----13. *B. peninsularis*.

1. *Bumelia eriocarpa* Greenm. & Conz. Field Mus. Bot. 2: 334. 1912.

Oaxaca; type from Cerro San Antonio, altitude 1,700 meters.

Leaves short-petiolate, oblong or lance-oblong, 5 to 10 cm. long, 2 to 3.5 cm. wide, obtuse or rounded at apex, acute at base, thick-coriaceous, tomentulose or glabrate above, densely tomentose beneath; pedicels much shorter than the petioles, tomentose; fruit globose-ellipsoid, about 2 cm. long; seed 1.6 cm. long.

2. *Bumelia lanuginosa* (Michx.) Pers. Syn. Pl. 1: 237. 1805.

Sideroxylon lanuginosum Michx. Fl. Bor. Amer. 1: 122. 1803.

Bumelia lanuginosa rigida A. Gray, Syn. Fl. 2¹: 68. 1878.

Bumelia rigida Small, Bull. N. Y. Bot. Gard. 1: 444. 1900.

Coahuila and Nuevo León. Southern United States.

Tree, sometimes 20 meters high, with a trunk 1 meter in diameter, but usually much smaller, the branchlets spinose; bark dark grayish brown, deeply fissured into scaly ridges; leaves short-petiolate, oblong, cuneate-obovate, or oblong-oblongate, 2.5 to 8 cm. long, obtuse, brown-tomentose beneath or finally glabrate; pedicels about as long as the petioles; sepals 3 mm. long; fruit oval or obovoid, black; wood hard, close-grained, brown or yellowish, its specific gravity about 0.65. "Coma" (Texas).

The tree is known in Texas as "shittimwood" and "chittimwood." The wood is sometimes used for cabinet work and tool handles. The flowers are white and very sweet-scented. From the bark there exude drops of a gum, which is often chewed by children, who call it "chicady," this, according to Mackensen,¹ being probably a corruption of "chicle." The gum is known also as "gum elastic." The fruit is edible but not very palatable.

3. *Bumelia subsessiliflora* Hemsl. Biol. Centr. Amer. Bot. 2: 299. 1881.

Type from Guadalajara, Jalisco, altitude 900 meters.

Shrub, the branches armed with stout axillary spines 12 mm. long; leaves short-petiolate, oblong, 5 to 10 cm. long, 2 to 3 cm. wide, obtuse at each end, ferruginous-puberulent or glabrate, coriaceous, lustrous above; sepals ferruginous-hirsute.

The writer has seen no material of this species.

¹ The trees and shrubs of San Antonio and vicinity. 1909.

4. *Bumelia altamiranoi* Rose & Standl., sp. nov.

Type collected near Cadeyreta, Querétaro (*Rose, Painter & Rose* 9725; U. S. Nat. Herb. no. 453214).

Large tree, the branches armed with stout spines 1 to 3 cm. long, densely tomentose; petioles 3 to 6 mm. long; leaf blades broadly ovate to elliptic or oblong-oval, 2 to 4.5 cm. long, 1.5 to 3 cm. wide, rounded to subacute at apex, broadly rounded at base, loosely tomentose when young, glabrate above in age, paler beneath; pedicels in fruit stout, 4 to 5 mm. long, densely whitish-tomentose; fruit subglobose, 1.5 to 2 cm. long. "Huicicialtemetl."

Collected also at the same locality by F. Altamirano (no. 1644). The fruit is edible and has a sweet and agreeable flavor.

5. *Bumelia stenosperma* Standl., sp. nov.

Type collected between Totolapa and San Carlos, Oaxaca, altitude 900 to 1,140 meters (*Nelson* 2548; U. S. Nat. Herb. no. 569206).

Branches armed with stout spines 7 to 15 mm. long, the young branchlets ferruginous-tomentose; petioles slender, 6 to 8 mm. long; leaf blades broadly elliptic, 1.5 to 3 cm. long, 1.2 to 1.8 cm. wide, rounded or emarginate at apex, obtuse at base, thinly tomentose above when young but soon glabrate and very lustrous, densely ferruginous-tomentose beneath; pedicels in fruit very stout, about 5 mm. long; fruit oblong-ellipsoid, 1.5 to 2 cm. long; seed oblong, 1.5 cm. long, 6 mm. thick, smooth, brownish gray, mottled with small, pale brown spots.

6. *Bumelia spiniflora* A. DC. in DC. Prodr. 8: 191. 1844.

?*Bumelia ferox* Schlecht. & Cham. Linnaea 6: 392. 1831.

?*Bumelia spinosa* A. DC. in DC. Prodr. 8: 191. 1844.

Bumelia angustifolia Nutt. N. Amer. Sylv. 3: 38. pl. 93. 1849.

Bumelia schottii Britton, N. Amer. Trees 777. 1908.

Tamaulipas and Nuevo León; Sinaloa; Veracruz (?). Florida and Texas; Bahamas; El Salvador.

Shrub or small tree, 2 to 6 meters high, the trunk sometimes 20 cm. in diameter, the bark reddish gray, deeply fissured; branchlets spinose, sericeous when young or glabrous; leaves short-petiolate, cuneate-oblongate to rounded-obovate, rounded at apex, coriaceous, subsistent, glabrous; flowers short-pedicellate; sepals 2 to 2.5 mm. long; fruit oblong or oval, 1 to 2 cm. long, black, the flesh sweet and edible; wood hard, weak, light brown, its specific gravity about 0.79. "Coma resinera" (Tamaulipas); "coma" (Texas, Tamaulipas).

Known in Florida and the Bahamas as "saffron plum," "ant's-wood," and "downward plum." The Mexican plant has been referred to *B. cuneata* Swartz, a West Indian species. Endlich reports that in Tamaulipas the fruit is eaten as an aphrodisiac.

7. *Bumelia occidentalis* Hemsl. Biol. Centr. Amer. Bot. 2: 298. 1881.

Sonora and southern Baja California; type from Sonora.

Shrub, the branchlets sometimes spinose; leaves short-petiolate, obovate or cuneate, 6 to 15 mm. long, rounded at apex, grayish-sericeous or in age glabrate; pedicels 5 to 18 mm. long, usually longer than the leaves; sepals 3 mm. long, tomentulose. "Bebelama" (Sonora).

8. *Bumelia retusa* Swartz, Prodr. Veg. Ind. Occ. 49. 1788.

Yucatán. Jamaica (type locality).

Shrub or small tree, 3 to 4.5 meters high; leaves short-petiolate, broadly obovate or rounded-obovate, 2.5 to 4.5 cm. wide, rounded or emarginate at apex, broadly cuneate or sometimes rounded at base, coriaceous, brown-sericeous

beneath or glabrate; flowers numerous, in dense fascicles, greenish yellow; fruit subglobose, 8 to 10 mm. long. "Putzmucuy" (Yucatán, Maya).

The Yucatán material has been referred to *B. buxifolia* Willd., *B. glomerata* Griseb., and *B. microphylla* Griseb., but it is probable that all the collections are referable to *B. retusa*, to which some of them have been referred by Pierre and Urban.

9. *Bumelia brandegei* Blake, Contr. Gray Herb. 52: 76. 1907.

Bumelia fragrans T. S. Brandeg. Zoe 5: 106. 1901. Not *B. fragrans* Ridley, 1890.

Southern Baja California; type from San José del Cabo.

Shrub, 3 to 5 meters high, the branches armed with short spines; leaves short-petiolate, cuneate-obovate to suborbicular, rounded or retuse at apex, thick, glabrous or nearly so; flowers white, very fragrant, in dense fascicles, the pedicels 6 to 10 mm. long.

10. *Bumelia socorrensis* T. S. Brandeg. Zoe 5: 106. 1901.

Socorro Island.

Spiny shrub; leaves oblong-obovate, rounded at apex, cuneate at base, sparsely brown-sericeous when young but soon glabrate, thin; flowers few, the pedicels 3 to 4 mm. long; fruit ellipsoid, 12 to 14 mm. long, 8 mm. thick.

11. *Bumelia laetevirens* Hemsl. Biol. Centr. Amer. Bot. 2: 298. 1881.

Bumelia mexicana Engl. Bot. Jahrb. Engler 12: 519. 1890.

Achras olivacea Sessé & Moc. Fl. Mex. 91. 1894.

Bumelia palmeri Rose, Gard. & For. 7: 195. f. 35. 1894.

Bumelia arborescens Rose, Contr. U. S. Nat. Herb. 1: 339. 1895.

Sinaloa to Tamaulipas, Veracruz, Puebla, and Oaxaca; type from Cordillera of Oaxaca.

Tree, sometimes 16 meters high, with broad spreading dense crown, the bark thick, dark, irregularly furrowed; branchlets often spinose; leaves slender-petiolate, oblong to elliptic or broadly ovate, 5 to 10.5 cm. long, 2.5 to 5.5 cm. wide, rounded to subacute at apex, obtuse or acute at base, bright green, glabrous and lustrous above, paler beneath, and when young densely sericeous; flowers white, sweet-scented, in dense fascicles; fruit globose or oval, 1 to 1.5 cm. long, depressed at apex, black; seeds rounded, 8 to 10 mm. long, brown, very lustrous. "Coma" (Tamaulipas); "tempixtle" (Oaxaca, Veracruz, Jalisco); "tempixquiztli," "tempesquistle," "tempizquixtli," "tempizquiztle" (Oaxaca, Veracruz, Puebla, Jalisco); "tempixle" (Oaxaca, Reko); "tilapo" (Oaxaca, Veracruz, Jalisco); "cupia," "bebelama" (Sinaloa); "tempeschitle," "tilzapotl," "tempextle" (Sessé & Mociño).

The fruit is said to yield a kind of "chicle." It is eaten either fresh or dried, and is often seen in the markets. The immature fruits are pickled in vinegar and salt, like olives. The ripe fruit is sweet and mucilaginous.

The tree is described by Hernández under the name "tempixquiztli." He states that a decoction of the leaves was dropped into the ears and nostrils to allay pain, and that the leaves were heated and applied to the teeth for the same purpose, as well as to harden the gums.

12. *Bumelia persimilis* Hemsl. Biol. Centr. Amer. Bot. 2: 298. 1881.

Veracruz; type from region of Orizaba.

Tree; leaves short-petiolate, elliptic-oblong, 5 to 9 cm. long, obtuse at base and apex, bright green and glabrous above, brown-sericeous beneath when young; flowers in dense fascicles, the pedicels 6 to 10 mm. long.

13. *Bumelia peninsularis* T. S. Brandeg. Zoe 5: 107. 1901.

Southern Baja California, the type from mountains of the Cape Region; Sinaloa; San Luis Potosí.

Shrub, 3 to 4 meters high, the branches armed with spines; leaves short-petiolate, oblong to elliptic-oval, 2 to 4.5 cm. long, rounded at apex, obtuse or rounded at base, ferruginous-sericeous when young but soon glabrate; fascicles few-flowered; fruit ellipsoid, about 1.5 cm. long.

4. *ACHRAS* L. Sp. Pl. 1190. 1753.

The genus consists of a single species.

1. *Achras zapota* L. Sp. Pl. 1190. 1753.

Achras sapota L. Sp. Pl. ed. 2. 470. 1762.

Achras zapota zapotilla Jacq. Stirp. Amer. 57. 1763.

Sapota achras Mill. Gard. Dict. ed. 8. *Sapota* no. 1. 1768.

Sapota zapotilla Coville, Contr. U. S. Nat. Herb. 9: 369. 1905.

Sonora to Chiapas, Tabasco, Yucatán, and Veracruz; indigenous in Chiapas, Oaxaca, Tabasco, and Yucatán, but elsewhere perhaps only cultivated or adventive. West Indies, Central America, and northern South America, but doubtfully indigenous.

Large tree, sometimes 20 meters high or more, the crown dense, rounded or elongate; bark brownish, furrowed; leaves petiolate, clustered at the ends of the stout branchlets, elliptic-oblong or elliptic, 5 to 14 cm. long, obtuse, acute or obtuse at base, glabrous when mature, the lateral nerves numerous and parallel but scarcely visible; flowers solitary in the axils, the pedicels 1 to 1.5 cm. long; sepals usually 6, ovate, 9 mm. long; corolla white, 1 cm. long, glabrous; staminodia petal-like; fruit ovoid or globose, 6 cm. long or larger, the skin thin, brown, scaly or smooth; seeds 1 to 5, sometimes 10 or 12, brown or black, smooth and shining, 2 to 2.5 cm. long. "Zapote" (Yucatán, etc., Cuba); "chicozapote" (Veracruz, Oaxaca, Jalisco, Guerrero, etc.; from the Nahuatl *tzicozapotl*, "gum-zapote"; also written *chiczapotl* and *xicozapotl*); "sheink" (Mixe, *Belmar*); "zapote chico" (various localities); "chicle" (the gum); "palo María" (Yucatán, Chiapas, *Ramírez*); "ya" (Yucatán, Maya); "zapotillo" (Morelos, Veracruz, *Ramírez*); "peruétano" (Yucatán, Colima, *Urbina*); "zapote de abejas" (Yucatán, Colima, *Urbina*); "guenda-xiña" (Oaxaca, Zapotec. *Reko*); "chico" (Philippines); "níspero" (Central America, Porto Rico, Cuba, Venezuela, Colombia); "muyozapot" (El Salvador); "mamey" (Panama).

The saponilla or naseberry is one of the best-known tropical American trees. The fruit is highly esteemed by many persons. It is variable in form, but usually 5 to 9 cm. in diameter; the flesh is yellowish brown, translucent, soft, sweet, and delicious when fully ripe, but when green it contains tannin and a milky latex.

The most important product of the tree is "chicle" gum, which is employed in the manufacture of chewing gum. This is obtained by tapping the trees, or by pressing the fruit. That obtained by tapping is known as "chicle corriente," and that from the fruit as "chicle blanco" or "chicle virgen." The sap obtained by tapping is boiled after having been collected, and as a result the gum coagulates and is separated. Large mounts of the gum are exported from Chiapas, Tabasco, and Yucatán. The Aztecs were well acquainted with its extraction; the women and children chewed it, and figures were sometimes modeled from it.

The wood is fine, hard, and reddish. It is used for making carts and other articles. The bark is said to contain an alkaloid, sapotine, and is employed locally as a remedy for fevers. Diuretic properties are attributed to the seeds.

Achras cosagüico Llave,¹ described from Veracruz, is probably a synonym. It was described as having yellow fruit, and the vernacular name was given as "cosagüico," which, according to Urbina, should probably be "cozahuico."

The tree is described by Hernández under the name "xicozapotl." For illustrations see Contr. U. S. Nat. Herb. 18: pl. 46, 47.

5. *CALOCARPUM* Pierre in Urban, Symb. Antill. 5: 97. 1904.

Only one other species is known, a native of Central America.

1. *Calocarpum mammosum* (L.) Pierre in Urban, Symb. Antill. 5: 98. 1904.

Sideroxylum sapota Jacq. Enum. Pl. Carib. 15. 1760.

Achras mammosa L. Sp. Pl. ed. 2. 469. 1762.

Lucuma mammosa Gaertn. f. Fruct. & Sem. 3: 129. pl. 203. 1805.

Vitellaria mammosa Radlk. Sitzungsab. Math. Phys. Akad. Wiss. München 12: 296. 1882.

Achradelpha mammosa Cook, Journ. Washington Acad. Sci. 3: 160. 1913.

Widely cultivated in the warmer parts of Mexico, as far north as Sinaloa; perhaps native in southern Mexico. Widely distributed in tropical America, at least in cultivation.

Tree, 10 to 30 meters high, with milky juice, the crown rounded or depressed; bark reddish brown, shaggy; leaves deciduous, petiolate, obovate, 10 to 30 cm. long, rounded to acute at apex, attenuate at base, pubescent beneath when young but soon glabrate, the lateral nerves distant, parallel; flowers glomerate, subsessile, on defoliate branches; sepals 8 to 10, 2.5 to 6 mm. long, sericeous; corolla white, 9 to 10 mm. long, 5-lobate; fruit globose or ovoid, 8 to 20 cm. long, pointed at apex, the skin brown, scaly, the flesh pink or reddish; seed 1, about 8 cm. long, smooth and lustrous except for the large ventral area. "Zapote" (various localities, also Central America, Colombia, Ecuador, from the Nahuatl, *tzapotl*); "atzapotlquahuitl" (Nahuatl, *Ramírez*); "zapote colorado" (Tabasco, *Ramírez*); "tezonzapote" (southern Mexico, from the Nahuatl, *tezontzapotl*; "lava-zapote," from the rough brown skin, which resembles *tezontle*, a kind of volcanic rock); "mamey colorado" (Oaxaca, Yucatán, Cuba, Venezuela, Colombia, Ecuador); "mamey" (Guerrero, Morelos, Cuba); "zapote mamey" (Morelos, Yucatán, Oaxaca, Guerrero); "haaz," "chacal haaz" (Yucatán, Maya; according to Seler, *haaz* is now the Maya word for banana, but this is a recent application; the sapote is now called *chacal haaz*, "red haaz," to distinguish it from the banana); "potkak" (fruit), "kauk-pahk" (seed) (Mixe, *Belmar*); "mamey zapote" (Porto Rico); "tsapas sabani" (Zoque).

The sapote (known also as "mamee sapote" and "marmalade-fruit") is a common fruit tree of tropical America. By many persons the fruit is highly esteemed, but it is rarely liked by those who have not been accustomed to it. The flesh is sweetish, with peculiar flavor, and is often made into marmalade or jelly.

The handsome seeds, known in Mexico as "pizle" or "pixtle," and in Central America as "sapuyul" or "zapoyol," are still used in Central America and southern Mexico, mixed with cacao and parched corn, for the preparation

¹ Registro Trimestre, Mexico, Febr. 6, 1832.

of a beverage, which is called "choue" by some of the Mexican Indians. The sapote seeds are used because of their flavor, which resembles that of bitter almonds. In Costa Rica they were formerly employed in place of an iron for smoothing starched linen. In the same country, as well as in Mexico, the kernels are ground and made into sweetmeats.

The wood is said to be fine-grained, hard, and compact, with a specific gravity of about 0.58. It is suitable for cabinet work but is little used, since the trees are protected for their fruit.

There is a popular belief in Mexico that the oil of the seeds will restore fallen hair. According to Altamirano¹ and others this results from the fact that the Aztecs employed it for dressing the hair, to keep it soft and to prevent dandruff. The seed coat was used by the Aztecs as a remedy for epilepsy, and in Costa Rica it is considered a cure for colds. The sap of the tree is said to have vomitive and anthelmintic properties and the seeds to be diuretic.

The tree is described by Hernández under the name "tezontzapotl." He states that the oil of the seeds was applied to painted *jícaras* (cups made from gourds) and to other similar objects to fix their colors. The pulverized seed coat, drunk in wine, is said to cure the gravel and heart affections.

DOUBTFUL SPECIES.

CALOCARPUM PARVUM Pierre, Notes Bot. Sapot. 13. 1890. Briefly described from Mexico. The vernacular name is given as "zapote niño."

6. *LUCUMA* Molina, Sagg. Stor. Nat. Chil. 186. 1782.

Shrubs or trees, with milky juice; leaves petiolate; flowers pedicellate, solitary or fasciculate in the axils; sepals 4 to 6; corolla urceolate or campanulate, 4 or 5-lobate; stamens 4 or 5, alternating with small, linear or scalelike staminodia; seeds 1 to 5.

Sepals 6-----1. *L. salicifolia*.

Sepals 4 or 5.

Sepals 4-----2. *L. sphaerocarpa*.

Sepals 5.

Leaves subacuminate, 20 to 23 cm. long-----3. *L. campechiana*.

Leaves mostly obtuse, 6 to 16 cm. long-----4. *L. palmeri*.

1. *Lucuma salicifolia* H. B. K Nov. Gen. & Sp. 3: 241. 1819.

Vitellaria salicifolia Engl. Bot. Jahrb. Engl. 12: 514. 1890.

Sideroxylon campestre T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 329. 1920.

Veracruz and Morelos, and probably elsewhere.

Small or large tree, the branchlets brownish-sericeous or glabrate; leaves slender-petiolate, lanceolate or narrowly lanceolate, 13 to 28 cm. long, 3 to 7.5 cm. wide, acute or acuminate, attenuate at base, lustrous, glabrous; sepals about 6 mm. long, sericeous; corolla yellowish green; fruit subglobose or ovoid, 7.5 to 12 cm. in diameter, orange-yellow when mature, the pulp reddish yellow; seeds 3 or 4, ellipsoid, dark brown, about 5 cm. long and 2.5 cm. thick. "Zapote amarillo," "zapote borracho," "cozticzapotl," "atzapotl," "atzapolquahuitl," "zapote de niño."

The fruit is edible and is found in the markets, but the tree is seldom cultivated. The fruit is said to produce drowsiness, hence its name of "zapote borracho." The bark is reputed to have antiperiodic properties.

¹ Fernando Altamirano, El árbol de mamey, Naturaleza 3: 138-144. 1876.

The tree is described by Hernández, who says: "The Mexicans in their language, which is expressive, elegant, and precise, indicate in their names the properties as well as the uses of plants. In this way, they apply the name *tzapotl* [zapote] as a general term to all fruits which have a sweet flavor, and *xocotl* [jocote] to those which are sour. The *atzapotl* or 'water *tzapotl*' is so called because it comes from a tree which grows near the water. It is a large tree, with leaves like those of the orange, and bears near the ends of the branches white star-shaped flowers, which produce a fruit nearly round, large, yellow within, and of sweet flavor. This is in a way a disagreeable and indigestible food, and sometimes excites fever. Within the fruit is a stone which is used especially for ulcers."

2. *Lucuma sphaerocarpa* DC. Prodr. 8: 169. 1844.

Described from one of Sessé and Mociño's drawings of a Mexican plant; not known to the writer.

Petioles 6 to 8 mm. long; leaf blades oblong-obovate, 7.5 to 10 cm. long, 3.7 cm. wide, acute, acuminate at base; flowers pedicellate, in clusters of 3 or 4; corolla 6-lobate, greenish; fruit globose, 6 cm. in diameter, greenish, the flesh yellow; seeds 4, fuscous, ellipsoid, 3 cm. long.

The names "comíngalo" (Jalisco), "tempixque," and "tempixtle" (Tierra Caliente) are reported for this plant in Mexican literature, but there is no reason for believing that they apply to the plant originally described as *Lucuma sphaerocarpa*.

3. *Lucuma campechiana* H. B. K. Nov. Gen. & Sp. 3: 240. 1819.

Vitellaria campechiana Engl. Bot. Jahrb. Engl. 12: 513. 1890.

Type from Campeche. Reported from Honduras by Hemsley. Not known to the present writer.

Petioles about 2.5 cm. long; leaf blades oblong, 7 to 8 cm. wide, acute at base, glabrous, lustrous; pedicels ternate, half as long as the petiole; corolla 5-lobate, glabrous.

4. *Lucuma palmeri* Fernald, Proc. Amer. Acad. 33: 87. 1897.

Colima to Oaxaca; type from Acapulco. El Salvador.

Shrub, 1.5 to 3 meters high, the branchlets brown-sericeous; leaves petiolate, oblanceolate or oblong-obovate, 2.5 to 5.5 cm. wide, attenuate at base, ferruginous-pubescent beneath when young but soon glabrate; flowers solitary, geminate, or ternate, the pedicels 1 to 2 cm. long; sepals 5.5 mm. long, sericeous; corolla twice as long as the calyx, 5 or 7-lobate; fruit subglobose, 3 cm. long, yellow; seed 1, ellipsoid, 2.5 cm. long, stramineous, lustrous. "Huicón," "palo huicón"; "gülcume" (El Salvador).

The fruit is edible, but of poor quality.

DOUBTFUL SPECIES.

LUCUMA MULTIFLORA DC. is said to be cultivated in Yucatán, where it is known as "kanizté" or "kanisté." The writer has seen no specimens from Yucatán. The species is a native of Porto Rico and the Lesser Antilles.

7. *SIDEROXYLON* L. Sp. Pl. 192. 1753.

Shrubs or trees; leaves usually long-petiolate; flowers small, white or greenish yellow, in dense, axillary or lateral fascicles; sepals usually 5, ovate or orbicular, obtuse, subequal; corolla tubular-campanulate, usually 5-lobate; ovary usually 5-celled; fruit mostly 1-seeded.

Pedicels and petioles glabrous.

Sepals 1.5 mm. long-----1. *S. gaumeri*.

Sepals 3 mm. long-----2. *S. tempisque*.

Pedicels and petioles pubescent.

Leaves whitish, covered on both sides with a dense tomentum, small, mostly 1.5 to 2 cm. wide-----3. *S. leucophyllum*.

Leaves green, not tomentose, mostly 4 to 7 cm. wide.

Petioles elongate, usually half as long as the blades or longer.

4. *S. capiri*.

Petioles short, a fifth as long as the blades or shorter.

5. *S. angustifolium*.

1. *Sideroxylon gaumeri* Pittier, Contr. U. S. Nat. Herb. 13: 460. f. 86. 1912.

Yucatán; type from Izamal.

Tree, 30 meters high or less, glabrous throughout; leaves long-petiolate, oblong or oval-oblong, 8 to 14 cm. long, obtuse, rounded or obtuse at base, coriaceous, lustrous; flowers in dense fascicles on old wood, the pedicels 4 to 6 mm. long; fruit ellipsoid, 1-seeded, about 2 cm. long.

This has been reported from Yucatán as *S. mastichodendron* Jacq., a West Indian species, to which it is closely related.

2. *Sideroxylon tempisque* Pittier, Contr. U. S. Nat. Herb. 13: 461. f. 87, 88. 1912.

Chiapas. Central America; type from Laguna de Santa Tecla, El Salvador.

Large tree, glabrous throughout; leaves long-petiolate, oval or elliptic-oblong, 7 to 12 cm. long, obtuse or subacute, obtuse or rounded at base, coriaceous; pedicels 5 to 6 mm. long, densely clustered on old wood; corolla 7 to 8 mm. long; fruit ovoid or ellipsoid, 3 to 4 cm. long, 1-seeded. "Tempisque" (Guatemala, El Salvador); "saquaia" (El Salvador).

3. *Sideroxylon leucophyllum* S. Wats. Proc. Amer. Acad. 24: 59. 1889.

Southern Baja California; type from Los Angeles Bay.

Shrub or small tree, 1.5 to 2.5 meters high, the trunk sometimes 30 cm. in diameter; leaves oblong or narrowly oblong, 4 to 7 cm. long, obtuse, short-petiolate; flowers densely clustered in the leaf axils; sepals 4 mm. long, densely white-tomentose; corolla greenish yellow, 5 mm. long.

The fruit is not known, and the generic position of the plant is uncertain.

4. *Sideroxylon capiri* (A. DC.) Pittier, Contr. U. S. Nat. Herb. 13: 462. 1912.

Lucuma capiri A. DC. in DC. Prodr. 8: 173. 1844.

Sideroxylon mexicanum Hemsl. Biol. Centr. Amer. Bot. 2: 296. 1881.

Sideroxylon petiolare A. Gray, Proc. Amer. Acad. 22: 434. 1887.

Achras capiri Sessé & Moc. Pl. Nov. Hisp. ed. 2. 48. 1893.

Sinaloa and Jalisco to Guerrero; type (according to Sessé and Mociño) from Michoacán.

Large tree, the bark reddish brown or brownish yellow, the branchlets tomentulose; petioles often as long as the blades; leaf blades ovate to oval or oblong, 7 to 16 cm. long, acute to rounded at apex, rounded or obtuse at base, brownish-pubescent when young, in age glabrate; pedicels 10 to 12 mm. long, clustered on defoliate branches; sepals about 4 mm. long; corolla pale yellow; fruit ovoid, globose, or ellipsoid, 3 to 3.5 cm. long, containing 1 or more seeds. "Capiri," "capire" (Michoacán, Guerrero); "tempisque," "tempisque" (Michoacán); "huacux" (Michoacán, Tarascan); "zapote de ave" (Michoacán, Guerrero, *Urbina*); "tototzapotl" (Nahuatl); "cosahuico" (*Conzatti*).

The fruit is sweet and is eaten either raw or cooked. Birds are said to be fond of it.

5. *Sideroxylon angustifolium* Standl., sp. nov.

Sonora and Sinaloa; type from La Peonia, Sinaloa, altitude 610 meters (*Montes & Salazar* 884; U. S. Nat. Herb. no. 1035645).

Tree, 15 to 18 meters high, the trunk 40 to 60 cm. in diameter; leaves oblong or oblong-oblongeolate, 13 to 18 cm. long, 4 to 6 cm. wide, acute or obtuse, acute or subobtuse at base, brownish-pubescent on both surfaces or finally glabrate above; petioles 2 to 2.5 cm. long; flowers fasciculate on old wood, the pedicels 7 to 9 mm. long, pubescent; sepals 3 mm. long, brown-sericeous; ovary 5-lobate, glabrous. "Tempisque," "tempixtle" (Sinaloa).

The bark is used in Sinaloa for curdling milk.

One collection from Oaxaca (*Nelson* 2345) probably represents the same species, although in this the leaves are rounded or very obtuse at apex. The fruit is subglobose, 1-seeded, and about 2.5 cm. long.

135. DIOSPYRACEAE. Persimmon Family.

REFERENCE: Hiern, A monograph of Ebenaceae, Trans. Cambridge Phil. Soc. 12: 27-300. 1873.

Shrubs or trees; leaves alternate, entire, deciduous or persistent, estipulate; flowers small, white or green, solitary or cymose, axillary, unisexual; calyx inferior, the segments connate, persistent and accrescent in fruit; corolla urceolate, campanulate, or salverform; stamens 3 to many, inserted at the base of the corolla; ovary 2 to 16-celled, the ovules usually solitary; fruit baccate, large, containing several large seeds.

Flowers 3-parted-----1. **MABA.**
Flowers 4 to 6-parted-----2. **DIOSPYROS.**

1. MABA Forst. Char. Gen. 121. 1776.

Shrubs or trees; flowers dioecious, 3-parted, solitary or in small cymes, axillary; calyx 3-lobate, accrescent; corolla tubular or campanulate; stamens 3 to many in the staminate flower, usually about 9, glabrous; ovary 3 or 6-celled, usually hairy; fruit globose or ovoid, 1 to 6-celled, containing 1 to 6 seeds.

Leaves densely and softly grayish-pubescent beneath-----1. **M. albens.**
Leaves glabrate beneath, or the pubescence sparse or, if dense, brownish.

Leaves acute or acuminate.

Leaves hirtellous; fruiting calyx deeply lobate-----2. **M. acapulcensis.**

Leaves sparsely appressed-pilosulous or glabrate; fruiting calyx shallowly lobate-----3. **M. verae-crucis.**

Leaves rounded or very obtuse at apex.

Leaves 5.5 to 6 cm. wide, oblong-oval-----4. **M. rekol.**

Leaves 3 cm. wide or narrower.

Leaves oblong-oblongeolate, 5.5 to 8 cm. long, glabrate.

5. **M. salicifolia.**

Leaves oblong to obovate or elliptic, usually less than 6 cm. long, densely pubescent beneath, at least when young.

Leaves hirtellous beneath, mostly 3 to 6 cm. long--6. **M. latifolia.**

Leaves appressed-pilosulous beneath, mostly 1 to 2 cm. long.

7. **M. intricata.**

1. **Maba albens** (Presl) Hiern, Trans. Cambridge Phil. Soc. 12: 126. 1873.

Diospyros albens Presl, Rel. Haenk. 2: 62. 1836.

Guerrero and Oaxaca; type from Acapulco, Guerrero.

Leaves short-petiolate, oblong-obovate or oblong, 3 to 7 cm. long, obtuse or rounded at apex, acute at base, densely pubescent on both surfaces; staminate

calyx about 6 mm. long, densely pubescent; corolla pubescent outside, glabrous within. "Coacolutillo" (*Conzatti*).

2. *Maba acapulcensis* (H. B. K.) Hiern, Trans. Cambridge Phil. Soc. 12: 128. 1873.

Diospyros acapulcensis H. B. K. Nov. Gen. & Sp. 3: 254. 1819.

Type from Acapulco, Guerrero.

Leaves obovate-lanceolate, about 6.5 cm. long and 2 cm. wide, acute, cuneate at base, membranous; fruit subsessile, subglobose, 2.5 cm. in diameter, the calyx nearly 2.5 cm. broad.

3. *Maba verae-crucis* Standl. Contr. U. S. Nat. Herb. 18: 119. 1916.

Veracruz and Oaxaca; type from Catemaco, Veracruz, altitude 300 meters. El Salvador.

Leaves short-petiolate, elliptic-obovate or oblanceolate-oblong, 5.5 to 8.5 cm. long, 1.8 to 4 cm. wide, attenuate at base, glabrate in age; calyx 6 mm. long, densely pubescent; fruit 1.2 to 1.6 cm. in diameter, 6-seeded. "Pipinance" (El Salvador).

4. *Maba reko* Standl. Contr. U. S. Nat. Herb. 20: 193. 1919.

Type from Puerto Angel, Oaxaca.

Leaves short-petiolate, 10 to 11 cm. long, rounded at base, minutely pilose or glabrate; fruit globose, 1.5 to 2 cm. in diameter, the calyx 1.5 to 2 cm. broad, densely puberulent. "Zapote enano."

5. *Maba salicifolia* (Humb. & Bonpl.) Hiern, Trans. Cambridge Phil. Soc. 12: 129. 1873.

Diospyros salicifolia Humb. & Bonpl.; Willd. Sp. Pl. 4: 1112. 1805.

Specimens from Acapulco, Guerrero, are probably referable here; the species was described from tropical America.

Shrub, 2 to 3 meters high; leaves short-petiolate, 1 to 2 cm. wide, coriaceous, lustrous above, narrowed to the base; fruit about 2.5 cm. in diameter, greenish yellow. "Coacollatillo" (*Palmer*); "ébano" (Guerrero).

The fruit is edible, as in other species of the genus.

6. *Maba latifolia* Standl. Contr. U. S. Nat. Herb. 18: 118. 1916.

Sinaloa; type from Guadalupe.

Shrub or tree, 1 to 9 meters high; leaves oblong to oval-obovate, 1.5 to 3 cm. wide, rounded at apex, obtuse at base, coriaceous, grayish green; fruit about 2.5 cm. in diameter, yellowish, with reddish pulp; seeds 6, 11 mm. long. "Estrellito."

7. *Maba intricata* (A. Gray) Hiern, Trans. Cambridge Phil. Soc. 12: 126. 1873.

Macreightia intricata A. Gray, Proc. Amer. Acad. 5: 163. 1862.

Southern Baja California; type from Cape San Lucas.

Leaves oblong-obovate or oblong, 5 to 8 mm. wide, rounded at apex, obtuse or cuneate at base, coriaceous, grayish green; fruit orange, 1.5 to 2 cm. in diameter, 6-seeded. "Zapotillo."

This was reported by Goldman¹ as *Brayodendron texanum*.

EXCLUDED SPECIES.

MABA PAVONII (A. DC.) Hiern, Trans. Cambridge Phil. Soc. 12: 129. 1873.
Diospyros pavonii A. DC. in DC. Prodr. 8: 222. 1844. Described as a native of

¹ Contr. U. S. Nat. Herb. 16: 359. 1916.

either Mexico or Peru, but no similar plant has been found recently in Mexico. The vernacular name is given as "orlaca," which does not suggest a Mexican name.

2. DIOSPYROS L. Sp. Pl. 1057. 1753.

Shrubs or trees; leaves persistent or deciduous; flowers dioecious, rarely polygamous, axillary, cymose or fasciculate; calyx 4 or 5-lobate; corolla urceolate, campanulate, or salverform, the lobes obtuse, spreading or recurved; fruit baccate, containing 1 to 10 seeds.

The genus is a large one, containing 150 or more species, most of which are natives of the Old World. Some of them furnish the ebony of commerce. *Diospyros kaki* L. is the Japanese persimmon, which is widely grown for its large handsome sweet fruit. *Diospyros virginiana* L. is the common persimmon of the eastern and southern United States. Its fruit is extremely astringent when green, but in fall, especially after frost, it becomes soft and sweet. It is a favorite wild fruit in the regions where it grows, and has been used in the preparation of a kind of beer, as well as distilled liquors. In the Southern States the seeds have been roasted and ground and used as a coffee substitute. The green fruit contains tannic acid, and has been employed as a domestic remedy for diarrhoea, chronic dysentery, and uterine hemorrhage. The bark is astringent and very bitter.

The following names are reported for unplaced Mexican species of *Diospyros*; they probably relate to *D. ebenaster*: "Hinchuik," "huinchuik" (Mixe, *Belmar*); "bomuttza" (Otomí, *Buelna*).

Ovary and fruit glabrous.

Leaves densely pubescent.....1. *D. oaxacana*.

Leaves glabrous or nearly so.

Leaves acute or acuminate.

Leaves ciliate.....2. *D. blepharophylla*.

Leaves not ciliate.....3. *D. konzattii*.

Leaves rounded or retuse at apex.

Flowers 5-parted.....4. *D. palmeri*.

Flowers 4-parted.....5. *D. anisandra*.

Ovary and fruit pubescent.

Leaves densely hirtellous beneath.....6. *D. texana*.

Leaves glabrous beneath, or when young with sparse appressed hairs.

Fruit 4 to 7 cm. in diameter; leaves mostly 9 to 17 cm. long.

7. *D. ebenaster*.

Fruit 3 cm. or less in diameter; leaves usually smaller.

Calyx lobes broadest toward the apex, obtuse; leaves nearly sessile.

8. *D. sonorae*.

Calyx lobes broadest at the apex, acutish or acute; leaves usually conspicuously petiolate.

Leaves rounded at base; petioles 2 to 4 mm. long...9. *D. sinaloensis*.

Leaves obtuse or cuneate at base; petioles 6 to 7 mm. long.

Calyx densely puberulent.....10. *D. rosei*.

Calyx nearly glabrous.....11. *D. sphaerantha*.

1. *Diospyros oaxacana* Standl. Contr. U. S. Nat. Herb. 20: 194. 1919.

Type from Cuicatlán, Oaxaca, altitude 600 meters.

Leaves nearly sessile, obovate-oblong or elliptic-oblong, 4 to 7.5 cm. long, obtuse or rounded at apex and base; fruit pedicellate, 1.5 cm. or more in diameter, the calyx lobes oblong, obtuse.

2. *Diospyros blepharophylla* Standl. Contr. U. S. Nat. Herb. 18: 119. 1916.
Diospyros ciliata A. DC. in DC. Prodr. 8: 229. 1844. Not *D. ciliata* Raf. 1836.
 The type is said to have come from southern Mexico.

Petioles 1 cm. long; leaves ovate-elliptic, 4 to 7 cm. long, obtuse at base, membranaceous; flowers 4-parted.

3. *Diospyros konzattii* Standl. Journ. Washington Acad. Sci. 12: 399. 1922.
 Type from Cafetal San Rafael, Cerro Espino, Distrito de Pochutla, Oaxaca, altitude 1,000 meters.

Tree, 10 meters high; leaves short-petiolate, ovate-oblong or lance-oblong, 5 to 9.5 cm. long, acuminate; calyx lobes linear-lanceolate, 15 to 18 mm. long, long-attenuate; fruit depressed-globose, about 4 cm. in diameter, green, the flesh black; seeds 5 to 10. "Zapote negro montés."

The fruit is said to be of excellent flavor, and Professor Konzatti states that it is superior to any of the native Mexican fruits, with the possible exception of the chicozapote.

4. *Diospyros palmeri* Eastw. Proc. Amer. Acad. 44: 604. 1909.

Tamaulipas and San Luis Potosí; type from San Dieguito, San Luis Potosí.

Shrub or small tree, 2.5 to 4.5 meters high, the trunk 10 to 15 cm. in diameter, the bark scaly; leaves oblong-obovate or elliptic-oblong, 2.5 to 5.5 cm. long; flowers 5-parted, glabrous; fruit black, 2.5 to 3 cm. in diameter. "Chapote," "zapote negro" (Tamaulipas).

5. *Diospyros anisandra* Blake, Proc. Biol. Soc. Washington 34: 44. 1921.

Type from forests of Suintun, Yucatán.

Shrub, 3 meters high; leaves obovate, 2.5 to 4.5 cm. long, retuse at apex, shining above, glabrous except for a few hairs at base of blade on upper side; staminate corolla yellow, 14 mm. long, glabrous.

6. *Diospyros texana* Scheele, Linnaea 22: 145 1849.

Brayodendron texanum Small, Bull. Torrey Club 28: 356. 1901.

Coahuila, Nuevo León, and Tamaulipas. Western Texas.

Shrub or tree, sometimes 16 meters high, with a trunk 60 cm. in diameter; bark thin, smooth, light reddish gray, the outer layers peeling off; leaves nearly sessile, broadly obovate or oblong-obovate, 1 to 4 cm. long, rounded or emarginate at apex; corolla sericeous, 8 to 12 mm. long; fruit black, about 2 cm. in diameter, the pulp sweet, dark, containing 3 to 8 seeds; wood hard, compact, nearly black, its specific gravity about 0.85. "Chapote" (Tamaulipas, Texas); "chapote prieto" (Nuevo León).

The wood is susceptible of a high polish. It has been used for turning and for making tool handles, and in England it is said to have been used as a substitute for boxwood, in making engravings. The fruit is astringent when green but sweet when fully ripe. It leaves an indelible black stain upon everything with which it comes in contact, and is employed locally for dyeing sheep and goat skins.

Diospyros cuneifolia Hiern,¹ does not appear distinguishable from the description. It is said to come from Mexico. The writer has seen no material of *D. texana californica* T. S. Brandeg.,² which was described from Baja California. It may be a plant closely related to *D. texana*, but it seems more probable that it is a relative of *D. sonorae*, unless it should be found to be *Maba intricata*. Specimens of the last have been reported from Baja California as *Brayodendron texanum*.

¹ Trans. Cambridge Phil. Soc. 12: 268. 1873.

² Zoe 5: 164. 1903.

7. *Diospyros ebenaster* Retz. Obs. Bot. 5: 31. 1789.*Diospyros obtusifolia* Humb. & Bonpl.; Willd. Sp. Pl. 4: 1112. 1805.*Diospyros tiltzapotl* Sessé & Moc. Pl. Nov. Hisp. 179. 1887.

Cultivated in Mexico from Jalisco to Chiapas, Veracruz, and Yucatán, and apparently naturalized locally. Native of the East Indies, but widely cultivated in tropical America.

Large shrub or medium-sized tree; leaves oblong or elliptic, sometimes 30 cm. long, persistent, obtuse or acutish, glabrous; flowers polygamous; corolla yellowish white or greenish; fruit subglobose, shining, olive-green, the pulp dark and soft; seeds 4 to 10. "Zapote prieto" (Jalisco, Chiapas, Michoacán, Guerrero, Morelos, Tabasco, Yucatán, Philippines); "tauch," "tauch ya" (Yucatán, Maya); "zapote negro" (Oaxaca); "biaqui" (Oaxaca, Zapotec, *Reko*); "tliltzapotl," "totocuitlatzapotl," "tlilzapotl" (Nahuatl); "guayabota" (Porto Rico).

This tree must have been introduced into Mexico at an early date, for it is mentioned by the older writers. Indeed, some writers have been inclined to consider it a native of Mexico, and Merrill states that it was carried from this country to the Philippines.

The tree is said to be the source of some of the East Indian ebony. The fruit is eaten, but is of poor quality. The green fruit is reported to have been used in the Philippines and West Indies for stupefying fish. In Mexico the ripe fruit is made into preserves, which are reported to be of excellent quality. Brandy also is said to have been made from the pulp. Urbina reports the Otomí names as "bom-rza" and "phonimurza."

The tree was described by Hernández under the name "tlilzapotl" ("black zapote"). He states that it was used as a remedy for leprosy, ringworm, and itch, and also for killing fish.

8. *Diospyros sonorae* Standl. Contr. U. S. Nat. Herb. 18: 120. 1916.

Sonora and Sinaloa; type from Alamos, Sonora.

Tree of large or medium size, the crown dense and spreading; leaves oblong or narrowly oblong, 6 to 13 cm. long, rounded at apex, grayish green, puberulent or glabrate beneath; fruit about 2.5 cm. in diameter; seeds about 8. "Guayaparín."

The tree is cultivated, but is probably also native in the region. The pulp of the fruit is black and insipid.

9. *Diospyros sinaloensis* Blake, Contr. Gray Herb. 52: 77. 1917.

Sinaloa; type from Altata.

Leaves oblong, 5 to 12 cm. long, rounded at apex, grayish green, very sparsely appressed-pilosulous beneath when young but soon glabrous; corolla densely sericeous, about 1 cm. long.

10. *Diospyros rosei* Standl. Contr. U. S. Nat. Herb. 18: 119. 1916.

Sinaloa (?) and Tepic; type from Acaponeta, Tepic.

Tree; leaves obovate-oblong, 6 to 14 cm. long, rounded at apex, cuneate at base, puberulent or glabrate beneath, coriaceous; fruit about 2.5 cm. in diameter; seeds 8 to 10. "Guayaparín" (Sinaloa).

11. *Diospyros sphaerantha* Standl. Contr. U. S. Nat. Herb. 18: 191. 1916.

Type collected near Colomas, in the Sierra Madre of Sinaloa.

Leaves deciduous, elliptic-oblong, 4.5 to 8 cm. long, obtuse or rounded at apex, sparsely strigillose when young but soon glabrous; calyx 3 cm. broad; corolla 8 mm. long, densely sericeous.

It is rather doubtful whether this and *D. sinaloensis* are distinct from *D. rosei*.

DOUBTFUL SPECIES.

Diospyros velutina Hiern, Trans. Cambridge Phil. Soc. 12: 200. 1873. Based upon material from Brazil, but one Mexican specimen is reported.

136. STYRACACEAE. Storax Family.

REFERENCE: Perkins in Engl. Pflanzenreich IV. 241. 1907.

1. STYRAX L. Sp. Pl. 444. 1753.

Shrubs or small trees, with stellate pubescence; leaves alternate, estipulate, entire or remotely serrate; flowers perfect, white, in short, axillary or terminal, simple or branched racemes; calyx cupuliform, truncate or 5-denticulate; petals 5, short-connate; stamens 10, inserted at base of the corolla; style simple, the stigma capitate; fruit globose, dry or nearly so, 1-seeded, usually indehiscent.

Styrax benzoin Dryand., an Old World species, furnishes the resin known as benzoin, which is an official drug, and is employed also in perfumes and incense.

Corolla lobes imbricate; leaves less than twice as long as broad.

Leaves densely stellate-pubescent on the upper surface----1. *S. jaliscanus*.

Leaves glabrous on the upper surface or nearly so.

Leaves densely stellate-tomentulose beneath-----2. *S. pilosus*.

Leaves glabrous beneath, sometimes barbate in the axils of the nerves.

3. *S. glabrescens*.

Corolla lobes valvate; leaves more than twice as long as broad.

Leaves covered beneath with coarse spreading stellate hairs, the pubescence velutinous-----4. *S. argenteus*.

Leaves covered beneath with a minute, very close, stellate tomentum.

Flowers 1.5 cm. long-----5. *S. ramirezii*.

Flowers about 1 cm. long.

Calyx about 2 mm. long-----6. *S. cyathocalyx*.

Calyx about 4 mm. long-----7. *S. polyneurus*.

1. *Styrax jaliscanus* S. Wats. Proc. Amer. Acad. 26: 144. 1891.

Styrax officinalis jaliscanus Perkins in Engl. Pflanzenreich IV. 241: 82. 1907.

Jalisco; type from Sierra de San Esteban.

Shrub, about a meter high; leaves subsessile, rounded-ovate to oblong-ovate, 4 to 10 cm. long, abruptly short-acuminate, entire, densely whitish-tomentulose beneath; racemes 1 to 5-flowered, short; calyx evidently dentate; flowers 1.5 to 2 cm. long; fruit 8 to 12 mm. in diameter.

This is closely related to *S. officinalis* L., and perhaps not sufficiently distinct from that species of the Mediterranean region. The latter species yields a gum which was employed by the Egyptians as a perfume, and in recent times has been employed in medicine as "*storax officinalis*."

2. *Styrax pilosus* (Perkins) Standl.

Styrax glabrescens pilosus Perkins in Engl. Pflanzenreich IV. 241: 72. 1907.

Type from Chinantla and Rincón, Oaxaca, altitude 900 meters.

Leaves slender-petiolate, elliptic-oblong or elliptic, 6 to 10 cm. long, short-acuminate, glabrous above or when young with minute scattered stellate hairs, densely and minutely tomentulose beneath; flowers sweet-scented; calyx 4 mm. long, subentire, minutely grayish-tomentulose.

3. *Styrax glabrescens* Benth. Pl. Hartw. 66. 1839.

Veracruz, Hidalgo, Oaxaca, and Chiapas; type from Llano Verde, Oaxaca. Guatemala and Costa Rica.

Tree, 6 to 12 meters high; leaves slender-petiolate, elliptic-oblong to elliptic or ovate, 7 to 17 cm. long, abruptly short-acuminate, acute to rounded at base, thin, glabrous or nearly so; inflorescence lax, few-flowered, the flowers 1.5 to 3 cm. long; calyx 5 to 7 mm. long, stellate-pilose with rufous or yellowish hairs; fruit about 1 cm. in diameter. "Azahar del monte" (Veracruz); "bracino" (Costa Rica).

4. *Styrax argenteus* Presl, Rel. Haenk. 2: 60. 1836.

Sinaloa to Chiapas; type from Acapulco. Central America.

Tree, 5 to 6 meters high, the trunk 30 cm. in diameter; leaves petiolate, oblong or lance-oblong, 7 to 14 cm. long, short-acuminate, rounded or obtuse at base, usually coriaceous; racemes axillary, few-flowered, the flowers 12 to 20 mm. long; calyx 4 to 5 mm. long, truncate; fruit 10 to 13 mm. in diameter. "Ruín" (Sinaloa); "capulín," "hoja de jabón" (Oaxaca); "chilacuate" (Michoacán, Guerrero); "resino," "resina" (Nicaragua, Costa Rica); "bracino" (Costa Rica); "estoraque" (Costa Rica, El Salvador); "estorac" (El Salvador); "sahumerio" (Panama).

In Costa Rica and probably elsewhere the gum is burned as incense in the churches. It is said that the bark is employed in El Salvador for stupefying fish.

5. *Styrax ramirezii* Greenm. Proc. Amer. Acad. 34: 20. 1899.

Styrax micranthus Perkins, Bot. Jahrb. Engler 31: 480. 1902.

Styrax orizabensis Perkins, Repert. Sp. Nov. Fedde 2: 25. 1906.

Michoacán, Morelos, Veracruz, and Oaxaca; type from Cuernavaca, Morelos.

Tree, 9 to 13 meters high; leaves petiolate, oblong or lance-oblong, 10 to 18 cm. long, acute or short-acuminate, obtuse or rounded at base, coriaceous, entire, glabrous above; calyx 4 to 6 mm. long, truncate; fruit 1 to 1.5 cm. long. "Chilacuate" (Morelos).

6. *Styrax cyathocalyx* Perkins, Repert. Sp. Nov. Fedde 2: 24. 1906.

Type from Rincón, Oaxaca, altitude 900 to 1,200 meters.

Leaves petiolate, oblong or lance-oblong, 10 to 14 cm. long, long-acuminate, obtuse at base, coriaceous, glabrous and lustrous above; calyx truncate.

7. *Styrax polyneurus* Perkins, Bot. Gaz. 35: 5. 1904.

Chiapas. Costa Rica, the type from Copey.

Tree; leaves petiolate, lanceolate or obovate-oblong, 8 to 12 cm. long, short-acuminate, cuneate at base, thin, entire, glabrate above; calyx truncate; fruit 7 mm. long.

A collection from San Luis Potosí (*Purpus* 5317), referred to *S. polyneurus* by Brandegee, probably represents an undescribed species, but the material is in fruit and furnishes no characters by which it may be segregated.

137. SYMPLOCACEAE. Sweetleaf Family.

REFERENCE: Brand in Engl. Pflanzenreich IV. 242. 1901.

The family consists of a single genus.

1. SYMPLOCOS Jacq. Enum. Pl. Carib. 5. 1760.

Shrubs or trees; leaves alternate, sessile or petiolate, estipulate, entire or serrate, usually persistent; flowers small, perfect, mostly axillary, solitary, spicate, racemose, or fasciculate; sepals 5, connate, persistent; petals 3 to 11,

more or less connate; stamens 4 to many, inserted on the corolla; style simple, the stigma entire or lobulate; fruit baccate, globose or cylindric, 1 to 5-celled.

In South America the leaves of some species are used for making a tea, which is highly esteemed by the Indians as a tonic for the stomach. *S. tinctoria* (L. f.) L'Hér. is a native of the southern United States, where it is known as "sweetleaf." Its leaves have a sweet pleasant flavor, and are employed for dyeing yellow. The root has been used locally as a stomachic, and for syphilitic and scrofulous affections and kidney diseases.

Flowers solitary, or the inflorescences 2 or 3-flowered.....1. *S. coccinea*.
Flowers in several-flowered inflorescences.

Branchlets brownish-tomentulose.

Leaves entire or nearly so.....2. *S. pycnantha*.

Leaves serrulate.....3. *S. prionophylla*.

Branchlets glabrous or nearly so, the pubescence, if any, not brownish.

Inflorescence sessile.

Leaves glabrous.

Calyx sericeous.....4. *S. speciosa*.

Calyx glabrous.....5. *S. apolis*.

Leaves pilose beneath, at least along the nerves.....6. *S. jurgensenii*.

Inflorescence pedunculate.

Leaves glabrous.....7. *S. limoncillo*.

Leaves pilose beneath along the nerves.....8. *S. citrea*.

1. *Symplocos coccinea* Humb. & Bonpl. Pl. Aequin. 1: 185. pl. 52. 1808.

Alstonia ciliata Benth. Pl. Hartw. 48. 1840.

Symplocos ciliata Benth. Pl. Hartw. 78. 1841.

Hypopogon brevipes Turcz. Bull. Soc. Nat. Moscou 31¹: 246. 1858.

Symplocos benthamii Gürke in Engl. & Prantl, Pflanzenfam. 4¹: 172. 1890

Symplocos coccinea hirta Brand in Engl. Pflanzenreich IV. 242: 80. 1901.

Veracruz and Oaxaca; type from Jalapa, Veracruz.

Tree, the trunk 40 to 60 cm. in diameter, the branchlets hirsute or hirtellous; bark smooth, grayish; leaves short-petiolate, elliptic to oblong, acuminate, crenulate, glabrous or pilosulous beneath; flowers about 1.5 cm. long, red, 10-parted; calyx and corolla sericeous; fruit oblong or ellipsoid, about 2.5 cm. long, black, hirsute.

2. *Symplocos pycnantha* Hemsl. Biol. Centr. Amer. Bot. 2: 302. 1881.

Veracruz, Oaxaca, and Chiapas; type from Pueblo Nuevo, Chiapas.

Shrub or small tree; leaves obovate-oblong or oblong-oblongeolate, 6 to 12 cm. long-acuminate, cuneate at base, subcoriaceous, sparsely pilosulous beneath or glabrate; flowers pink, in sessile fascicles; corolla 5 or 6-parted 3 times as long as the calyx.

3. *Symplocos prionophylla* Hemsl. Biol. Centr. Amer. Bot. 2: 302. 1881.

Symplocos pringlei Robinson, Proc. Amer. Acad. 18: 168. 1891.

Michoacán, Morelos, Mexico, and Oaxaca; type from Oaxaca.

Tree, 6 to 9 meters high; leaves petiolate, elliptic or oblong-obovate, 6 to 12 cm. long, acute or short-acuminate, rounded or cuneate at base, appressed pilose beneath; flowers in sessile clusters; corolla 5 or 6-parted; fruit oblong, 1.5 cm. long or larger.

Brand lists *S. pringlei* as a distinct species, but states that it may be only a variety of *S. prionophylla*. The characters by which he separates the two in his key do not hold for the specimens examined.

4. *Symplocos speciosa* Hemsl. Biol. Centr. Amer. Bot. 2: 302. 1881.

Type from the mountains of Oaxaca, altitude 1,800 to 2,100 meters. Guatemala.

Tree; leaves petiolate, lanceolate to elliptic, 5 to 12 cm. long, acuminate, cuneate at base, entire, glabrous above, pilosulous beneath along the costa; corolla pink, glabrous or nearly so.

5. *Symplocos apolis* Brand, Ann. Cons. Jard. Bot. Genève 15-16: 343. 1913.

Type probably from Mexico, but perhaps from Peru.

Leaves broadly obovate, 8 to 11 cm. long, rounded or short-apiculate at apex, entire, glabrous; calyx lobes ciliate; corolla 6-lobate.

6. *Symplocos jurgensenii* Hemsl. Biol. Centr. Amer. Bot. 2: 301. 1881.

Oaxaca; type from Sierra San Pedro Nolasco.

Leaves lance-oblong or elliptic-oblong, 6 to 9 cm. long, obtusely short-acuminate, acute at base, crenulate; corolla 5-parted, glabrous; ovary 5-celled.

7. *Symplocos limoncillo* Humb. & Bonpl. Pl. Aequin. 1: 196. 1808.

Veracruz and Oaxaca; type from Jalapa, Veracruz. El Salvador.

Tree, nearly glabrous throughout; leaves petiolate, oblong to elliptic, 8 to 14 cm. long, acute or short-acuminate, entire or serrate, lustrous; flowers pink or white, about 1 cm. long; fruit about 18 mm. long, glabrous. "Garrapata," "garrapatilla," "limoncillo" (Veracruz); "chillador" (El Salvador).

Specimens of this species were referred by Hemsley to *S. martinicensis* Jacq., a West Indian species.

8. *Symplocos citrea* Lex.; Llave & Lex. Nov. Veg. Descr. 1: 22. 1824.

Oaxaca and perhaps elsewhere; type from Chaqueo.

Leaves oval, 9 to 11 cm. long, serrulate; flowers sweet-scented; calyx sericeous; corolla 6-lobate.

DOUBTFUL SPECIES.

SYMPLOCOS SCHIEDEANA Schlecht. Linnaea 8: 527. 1833. Type collected between Tioselo and Jicochimalco. Brand states that the type is without flowers and fruit, and probably does not belong to this genus.

138. OLEACEAE. Olive Family.

Shrubs or trees, rarely herbs, unarmed; leaves all or mostly opposite, simple or pinnate, estipulate; flowers perfect or unisexual, regular, variously arranged; calyx free, small, 4 to 15-dentate or lobate, rarely none; corolla gamopetalous or of distinct petals, the segments 4 to 6, sometimes absent; stamens 2 or 4; ovary superior, 2-celled, the style simple, the stigma usually capitate; fruit a capsule, samara, or drupe, containing 1 to 4 seeds.

The typical plant of the family is the olive ("olivo," "oliva," "aceituno"), *Olea europaea* L., which was introduced into Mexico soon after the Conquest, but is only sparingly cultivated. The lilac ("lila"), *Syringa vulgaris* L., is frequently found in Mexican gardens. Several species of jasmine (*Jasminum*), an Old World genus, are widely cultivated in Mexico, where they are known as "jazmín" (often with varietal names) and "Gran Duque."

Fruit a samara; leaves usually pinnate, sometimes simple----1. **FRAXINUS**.

Fruit baccate, drupaceous, or capsular; leaves simple or lobate, never pinnate.

Fruit a didymous capsule; herbs or small shrubs-----2. **MENODORA**.

Fruit baccate or drupaceous; trees or large shrubs.

Corolla lobes induplicate-valvate. Flowers in terminal panicles.

3. **LIGUSTRUM**.

Corolla lobes or petals imbricate or none.

Flowers in terminal panicles. Corolla of 4 distinct petals.

4. HESPERELAEA.

Flowers axillary or lateral.

Corolla none or of 1 or 2 petals; calyx none or minute.

5. FORESTIERA.

Corolla gamopetalous; calyx well developed-----**6. OSMANTHUS.**

1. FRAXINUS L. Sp. Pl. 1057. 1753.

REFERENCES: Wenzig, Die Gattung *Fraxinus*, Bot. Jahrb. Engler 4: 165-188. 1883; Lingelsheim, Vorarbeiten zu einer Monographie der Gattung *Fraxinus*, Bot. Jahrb. Engler 40: 185-223. 1907; Rehder, The genus *Fraxinus* in New Mexico and Arizona, Proc. Amer. Acad. 53: 199-212. 1917; Lingelsheim in Engl. Pflanzenreich IV. 243¹: 9-61. 1920.

Shrubs or trees; leaves opposite, usually odd-pinnate, rarely simple; flowers green or white, dioecious or polygamous, fasciculate or paniculate; calyx 4-lobate or dentate, or none; petals 2 to 4, or commonly absent; stamens usually 2; fruit a samara, winged at the apex, usually 1-seeded.

The various species of ash are common in temperate regions of the Northern Hemisphere. Some of them furnish strong wood which is useful for building purposes, interior finish, furniture, and tool handles. They make excellent shade trees and are often planted on that account. The bark contains a glucoside, fraxin, and, like the leaves, has been used in Mexico, the United States, and Europe as a tonic and febrifuge. A decoction of the leaves has been employed in Mexico particularly for yellow fever and malaria. The leaves are said also to have purgative properties, and they have been used for gout and rheumatism. *Fraxinus ornus* L., a species of the Mediterranean region, produces from cuts in the bark an exudate, which is an official drug, manna, of the United States Pharmacopoeia. It is used in medicine as a gentle laxative.

There is a popular belief in some parts of the southern United States that ash leaves are so offensive to rattlesnakes that the latter are never found on land where the trees grow. Hunters are said sometimes to stuff their boots with ash leaves as a preventive of rattlesnake bites.

The ordinary Spanish name for the ash tree, and the one generally employed in Mexico, is "fresno," a derivative of the Latin "fraxinus." The following names are reported for species of doubtful identity: "Yaga-guillaa," "yaga-nisse" (Oaxaca, Zapotec, *Reko*); "paramu" (Michoacán, Tarascan, *Ramírez*); "demettza" (Otomí, *Buelna*).

Petioles and leaf rachis narrowly winged; leaves sometimes simple or trifoliate.

Leaves all pinnate, with 5 or more leaflets.

Leaflets coarsely serrate-----**1. F. purpusii.**

Leaflets entire or nearly so.

Leaflets small, 1 to 3 cm. long, 2.5 to 8 mm. wide.

Leaflets narrowly oblanceolate-----**2. F. greggii.**

Leaflets ovate-----**3. F. rufescens.**

Leaflets large, mostly 3.5 to 6 cm. long and 8 to 20 cm. wide.

Leaflets glabrous above-----**4. F. schiedeana.**

Leaflets pilose on both surfaces-----**5. F. attenuata.**

Leaves simple, or some of them sometimes trifoliolate.

Fruit 2.5 to 3 cm. long; leaves simple or trifoliolate, if simple long-petiolate-----6. *F. dipetala*.

Fruit 1.5 cm. long; leaves mostly simple, short-petiolate.

Leaves broadly rounded at base-----7. *F. potosina*.

Leaves acute at base-----8. *F. nummularis*.

Petioles and rachis not winged; leaves pinnate, all or most of them with 5 or more leaflets.

Flowers with petals. Leaves usually sharply serrate-----9. *F. cuspidata*.

Flowers without petals.

Wing of the samara equaling or shorter than the body.

Leaflets glabrous or nearly so; wing of the samara usually acutish or at least narrowed to the apex-----10. *F. berlandieriana*.

Leaflets finely pubescent beneath; wing of the samara very obtuse or emarginate-----11. *F. velutina*.

Wing of the samara longer than the body.

Leaflets conspicuously barbate beneath along the costa, even in age. 12. *F. uhdei*.

Leaflets glabrous beneath or finely pubescent, very inconspicuously if at all barbate.

Leaflets glaucous beneath-----13. *F. papillosa*.

Leaflets green beneath or merely glaucescent.

Venation of the leaflets prominently reticulate beneath.

14. *F. standleyi*.

Venation not prominently reticulate, only the lateral nerves conspicuous.-----15. *F. pringlei*.

1. *Fraxinus purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 90. 1910.

Puebla; type from San Simón.

Small tree, glabrous throughout; leaflets 5 or 7, ovate-oblong to lanceolate, 2 to 5 cm. long, acute, obtuse at base, sessile, coarsely serrate, thick, lustrous; flowers apetalous, in very short panicles; samaras 2 cm. long, the wing emarginate, longer than the thick body.

2. *Fraxinus greggii* A. Gray, Proc. Amer. Acad. 12: 63. 1877.

Fraxinus schiedeana parvifolia Torr. U. S. & Mex. Bound. Bot. 166. 1859. Coahuila to Tamaulipas and Zacatecas. Western Texas.

Shrub or tree, sometimes 8 meters high, with a trunk 20 cm. in diameter, the bark thin, gray, scaly; leaflets usually 5 or 7, sessile, obtuse, glabrous, the margins often revolute; flowers apetalous, in very short clusters; samaras 1.5 to 2 cm. long, the wing much longer than the thick terete body; wood hard, close-grained, brown, its specific gravity about 0.79. "Escobilla," "barreta china" (Coahuila).

The wood is used only for fuel. Palmer reports that in Coahuila the leafy branches are used for making coarse brooms.

3. *Fraxinus rufescens* Lingelsheim, Bot. Jahrb. Engler 40: 218. 1907.

Type from "Sierra de Corton" (Veracruz?).

Shrub or small tree, the branchlets and inflorescence ferruginous-tomentose; leaflets 7 or 9, sessile, 1 to 1.5 cm. long, 5 to 8 mm. wide, subcoriaceous, glabrous, paler beneath; panicles 2 cm. long, the flowers apetalous; samaras 2 to 2.5 cm. long, the wing emarginate.

4. *Fraxinus schiedeana* Schlecht. & Cham. Linnaea 6: 391. 1831.

Veracruz; type from Jalapa.

Large shrub or small tree; leaflets 5 to 9, oblong, lance-oblong, or elliptic, sessile, narrowed to the obtuse apex, attenuate at base, glabrous, subcoriaceous, lustrous, the margins subrevolute; samaras about 1.5 cm. long, the wing longer than the body, emarginate.

5. *Fraxinus attenuata* Jones, Contr. West. Bot. 12: 59. 1908.

Fraxinus jonesii Lingelsh. in Engl. Pflanzenreich IV. 243¹: 35. 1920.

Type from Valley of Palms, Baja California; reported from Chihuahua.

A tree; rachis very narrowly winged; leaflets usually 5, oval, sessile or nearly so, 0.5 to 2 cm. long (very immature), 0.5 to 1 cm wide, entire or obscurely crenulate, whitish-pilose on both surfaces, especially beneath.

6. *Fraxinus dipetala* Hook. & Arn. Bot. Beechey Voy. 362. pl. 87. 1841.

Fraxinus dipetala trifoliolata Torr. U. S. & Mex. Bound. Bot. 167. 1859.

Baja California. California.

Shrub or small tree; leaves simple, or the leaflets 3 to 9, long-petiolulate, oblong to oval or rounded, obtuse or acute, entire or nearly so, thin, glabrous; flowers white, with 2 large petals, the panicles about as long as the leaves; samaras 2 to 3 cm. long.

In the typical form there are 5 to 9 leaflets. The Mexican material is *F. dipetala trifoliolata*, characterized by having simple or trifoliate leaves. It was reported from Baja California by Goldman¹ as *F. attenuata* Jones.

7. *Fraxinus potosina* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 275. 1912.

Type from Minas de San Rafael, San Luis Potosí.

Plants glabrous; leaves simple, suborbicular, 1 to 2.5 cm. long, entire or serrate, coriaceous; samaras 4 to 5 mm. long, the wing rounded at apex, much shorter than the compressed body.

8. *Fraxinus nummularis* Jones, Contr. West. Bot. 12: 59. 1908.

Coahuila; type from Sierra Mojada.

Shrub with stiff branchlets; leaves mostly simple but sometimes trifoliate, the simple leaves oblanceolate to oval, 1 to 2.5 cm. long, obtuse, glabrous, subcoriaceous; flowers apetalous; wing of the samara much longer than the body.

It seems probable that this is a form of *F. greggii*, bearing the same relation to the latter that *F. dipetala trifoliolata* does to *F. dipetala*. In the type collection of *F. nummularis* all the leaves are simple and oval. A specimen from Sierra de Parras (*Purpus* 5064) shows leaves of the same kind, but some of the leaves are trifoliate, and some of the simple ones are exactly like the leaflets of *F. greggii*.

9. *Fraxinus cuspidata* Torr. U. S. & Mex. Bound. Bot. 166, 1859.

Fraxinus cuspidata serrata Rehder, Proc. Amer. Acad. 53: 202. 1917.

Chihuahua and Coahuila. Western Texas to Arizona; type from Texas.

Slender shrub or tree, sometimes 8 meters high, with a trunk 20 cm. in diameter; leaflets 3 to 9, long-petiolulate, linear-lanceolate to ovate, 2 to 7 cm. long, long-attenuate, thin, glabrous; flowers white, sweet-scented, in loose panicles; petals 4, about 1.5 cm. long; samaras about 2 cm. long, the wing equaling or shorter than the flat body. "Fresno."

¹ Contr. U. S. Nat. Herb. 16: 360. 1916.

10. *Fraxinus berlandieriana* A. DC. in DC. Prodr. 8: 278. 1844.

Coahuila to Veracruz and Durango. Western Texas, the type from Austin.

Tree, 10 to 12 meters high, the trunk about 30 cm. in diameter; bark thick, gray, fissured; leaflets 3 to 7, lanceolate or oblong, petiolulate, 4 to 13 cm. long, acute or attenuate, thick, remotely serrulate or subentire; flowers dioecious; samaras 2.5 to 3.5 cm. long, the body terete. "Plumero" (Veracruz); "fresno" (Nuevo León, Durango).

This species is often planted as a shade tree in northeastern Mexico. The samaras are sometimes 3-winged.

11. *Fraxinus velutina* Torr. in Emory, Mil. Recon. 149. 1848.

Fraxinus pistaciaefolia Torr. U. S. Rep. Expl. Miss. Pacif. 4: 128. 1856.

Fraxinus toumeyi Britton, N. Amer. Trees 803. f. 732. 1908.

Fraxinus velutina toumeyi Rehder, Proc. Amer. Acad. 53: 204. 1917.

Sonora and Chihuahua; perhaps also in Baja California. Western Texas to southern California; type from New Mexico.

Small tree, usually 12 meters high or less, the trunk 20 cm. in diameter; bark gray and rough; leaflets 5 to 9, oblong, lanceolate, or ovate-oblong, 4 to 7 cm. long, acute or acuminate, serrate or subentire; samaras 2 to 3 cm. long, the body terete, the wing obtuse or emarginate. "Fresno."

12. *Fraxinus uhdei* (Wenzig) Lingelsheim, Bot. Jahrb. Engler 40: 221. 1907.

Fraxinus americana uhdei Wenzig, Bot. Jahrb. Engler 4: 182. 1883.

Sinaloa to San Luis Potosí, Veracruz (?), and Oaxaca.

Tree, 15 to 18 meters high, with dark furrowed bark; leaflets 5 to 9, usually long-petiolulate, lanceolate or oblong-lanceolate 7 to 15 cm. long, long-attenuate, obtuse or acute at base, serrulate, barbate beneath along the costa but elsewhere glabrous; flowers in large panicles, these sometimes 20 cm. long; samaras 2.5 to 4 cm. long. "Fresno" (Jalisco, Sinaloa).

Often planted as a shade tree in the Valley of Mexico, at Guadalajara, and elsewhere.

It is not certain that the specimens described and referred here are identical with those to which Wenzig applied the name *uhdei*. They agree well with his diagnosis except for his statement that the leaflets are sessile.

13. *Fraxinus papillosa* Lingelsheim, Bot. Jahrb. Engler 40: 219. 1907.

Mountains of Chihuahua; type from Colonia García. Southern New Mexico.

Tree; leaflets 5 to 9, sessile, elliptic to ovate-oblong, 3 to 6 cm. long, acute, serrulate or subentire, glabrous; samaras 2.5 to 3 cm. long, the wing obtuse or emarginate.

14. *Fraxinus standleyi* Rehder, Proc. Amer. Acad. 53: 208. 1917.

Mountains of northern Sonora. Southern New Mexico and Arizona; type from Organ Mountains, New Mexico.

Tree, usually small but sometimes 15 meters high; leaflets 5 to 9, sessile or petiolulate, elliptic to lanceolate, 4 to 11 cm. long, acute or attenuate, serrulate, glabrous or pubescent beneath; samaras 2 to 3 cm. long.

It is doubtful whether this is distinct from *F. papillosa* and *F. pringlei*, and the three will probably have to be united ultimately.

15. *Fraxinus pringlei* Lingelsheim, Bot. Jahrb. Engler 40: 221. 1907.

Hidalgo; type from Dublán.

Large tree; leaflets 3 to 7, elliptic to lanceolate, 3 to 11 cm. long, acuminate, serrate, glabrous or nearly so; panicles 5 to 20 cm. long; samaras 2 to 3.5 cm. long, the body terete, the wing obtuse or emarginate.

DOUBTFUL SPECIES.

FRAXINUS OVALIFOLIA (Wenzig) Lingelsh. Bot. Jahrb. Engler 40: 221. 1907.
Fraxinus americana var. *uhdei* β *ovalifolia* Wenzig, Bot. Jahrb. Engler 4: 182.
 1883. Described from Mexico, the locality not indicated. The fruit is not
 known and the position of the plant is uncertain. The vernacular name is
 given as "fresnillo."

2. *MENODORA* Humb. & Bonpl. Pl. Aequin. 2: 98. 1809.

Plants low, herbaceous or usually woody, at least at base; leaves opposite,
 or the upper alternate, sessile or nearly so, entire or lobed; flowers perfect,
 yellow, solitary or corymbose; calyx with 5 to 15 linear lobes; corolla subro-
 tate to salverform, the limb 5 or 6-lobate; stamens 2; capsule didymous, 2-
 celled, each cell usually 2-seeded.

Corolla tube elongate, longer than the limb, the lobes acuminate.

1. *M. longiflora*.

Corolla tube shorter than the limb.

Leaves mostly pinnatifid-----2. *M. heterophylla*.

Leaves entire.

Calyx lobes 5 or 6-----3. *M. scoparia*.

Calyx lobes 7 to 15.

Stems erect, 20 to 50 cm. high; flowers usually corymbose.

Calyx lobes about 12 mm. long, pilosulous-----4. *M. mexicana*.

Calyx lobes less than 10 mm. long, glabrate or scaberulous.

Leaves bractlike, 4 to 5 mm. long; stems striate-angulate.

5. *M. intricata*.

Leaves well developed, larger; stems not conspicuously striate.

6. *M. scabra*.

Stems diffusely branched, low, spreading; flowers mostly solitary.

Stems hirtellous; leaves mostly oblong-elliptic.

7. *M. helianthemoides*.

Stems glabrate or scaberulous; leaves linear or nearly so.

8. *M. coulteri*.

1. *Menodora longiflora*. A. Gray, Amer. Journ. Sci. II. 14: 45. 1852.

Menodoropsis longiflora Small, Fl. Southeast. U. S. 917. 1903.

Coahuila. Western Texas and southern New Mexico; type from Texas.

Plants erect, usually woody at base, glabrous or scaberulous; leaves linear
 or lanceolate, 1.5 to 2.5 cm. long, subsessile, entire; flowers few, usually
 corymbose; corolla yellow, the tube 2 to 5 cm. long.

2. *Menodora heterophylla* Moric.; DC. Prodr. 8: 316. 1844.

Bolivaria grisebachii Scheele, Linnaea 25: 254. 1852.

Nuevo León and Tamaulipas. Western Texas; type collected between Laredo
 and San Antonio.

Plants chiefly herbaceous, diffuse and spreading, scaberulous or nearly
 glabrous; leaves pinnatifid into 3 to 7 linear lobes, or some of them entire;
 flowers mostly solitary, yellow or purplish; corolla 1 to 1.5 cm. long; capsule
 about 1 cm. broad.

3. *Menodora scoparia* Engelm.; A. Gray in Brewer & Wats. Bot. Calif. 1:
 471. 1876.

Baja California, Coahuila, and Durango; type from Saltillo, Coahuila.
 Arizona and southern California.

Plants erect, woody at base, glabrous or scaberulous, the branches striate; leaves linear, 1.5 to 3 cm. long, acute; flowers corymbose, yellow, the corolla 1 to 1.5 cm. long.

4. *Menodora mexicana* (A. DC.) A. Gray, Amer. Journ. Sci. II. 14: 45. 1852.
Bolivaria mexicana A. DC.; DC. Prodr. 8: 315. 1844.

Type collected near Oaxaca.

Stems glabrous; lower leaves oblong-obovate, the upper ones linear-lanceolate, 18 mm. long, 4 to 6 mm. wide; corolla slightly longer than the calyx lobes; capsule 6 mm. long.

5. *Menodora intricata* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 380. 1913.
San Luis Potosí; type from Minas de San Rafael.

Stems herbaceous, glabrous; leaves linear, bractlike; calyx lobes about 10, 5 mm. long; corolla yellow, 1 cm. long.

6. *Menodora scabra* A. Gray, Amer. Journ. Sci. II. 14: 44. 1852.

Chihuahua to San Luis Potosí and Durango; Baja California. Western Texas to Arizona; type from New Mexico.

Plants herbaceous or woody at base, scaberulous or glabrate; leaves linear or oblong, 1 to 2 cm. long; corolla yellow, 1 to 1.5 cm. long.

7. *Menodora helianthemoides* Humb. & Bonpl. Pl. Aequin. 2: 98. pl. 110. 1809.
Menodora helianthemoides parviflora Greenm. Proc. Amer. Acad. 34: 369. 1899.

Nuevo León and Zacatecas to San Luis Potosí and Hidalgo; type from Actopán, Hidalgo.

Plants herbaceous or often fruticose, with spreading branches; leaves 5 to 15 mm. long, acute to rounded at apex, usually short-petiolate, pubescent; flowers few, the corolla yellow, 1 cm. long, or sometimes as much as 2 cm. "Jazminillo del monte" (Nuevo León).

8. *Menodora coulteri* A. Gray, Amer. Journ. Sci. II. 14: 44. 1852.

Coahuila to San Luis Potosí and Hidalgo; type from Zimapán, Hidalgo.

Plants usually woody, at least at base, the branches crooked and interlaced; leaves mostly 1 to 2 cm. long, sessile, acute, scaberulous; flowers few, the corolla 1 to 1.5 cm. long.

Perhaps only a variant of *M. helianthemoides*.

3. *LIGUSTRUM* L. Sp. Pl. 7. 1753.

The species are all natives of the Old World. *L. vulgare* L. is the common privet, which is grown extensively for hedges in the United States and is said to be cultivated in Mexico. It differs from the following species in having smaller deciduous leaves.

1. *Ligustrum lucidum* Ait. Hort. Kew. ed. 2. 1: 19. 1810.

Widely cultivated in Mexico, and in some localities, apparently, escaped from cultivation. Native of China and Japan.

Large shrub or small tree, glabrous throughout; leaves opposite, petiolate, ovate or ovate-lanceolate, 7 to 12 cm. long, acute or acuminate, entire, persistent; flowers perfect, whitish, sessile in large terminal panicles; corolla funnelform, about 3 mm. long, with very short tube and 4 spreading lobes; fruit bluish black, 7 to 10 mm. long, usually 2-seeded. "Trueno" (San Luis Potosí, Mexico, Oaxaca, etc.).

A handsome tree, often planted for shade in Mexican parks and gardens. This species has often been confused with *L. japonicum* Thunb.

4. **HESPERELAEA** A. Gray, Proc. Amer. Acad. 11: 83. 1876.

The genus consists of a single species.

1. **Hesperelaea palmeri** A. Gray, Proc. Amer. Acad. 11: 83. 1876.

Known only from Guadalupe Island, Baja California.

Small glabrous tree, leaves mostly opposite, oblong, 5 cm. long or more, entire, coriaceous; flowers perfect, yellow, in a terminal panicle, the pedicels short, articulate; sepals 4, deciduous; petals 4, spatulate, about 12 mm. long, clawed; stamens 4; fruit drupaceous.

5. **FORESTIERA** Poir. in Lam. Encycl. Suppl. 2: 664. 1811.

Shrubs or small trees; leaves opposite, entire or serrulate, persistent or deciduous, often punctate; flowers small, greenish, polygamous or dioecious, fascicled or racemose, lateral; calyx none or minute and 4-lobate; corolla none or of 1 or 2 small deciduous petals; stamens 2 to 4; fruit a small drupe.

Leaves with conspicuous pores beneath.

Leaves oblong-ovate to rounded-ovate, 10 to 23 mm. wide---1. **F. reticulata**.

Leaves linear to oblanceolate-oblong, 1.5 to 7 mm. wide.

Leaves glabrous-----2. **F. angustifolia**.

Leaves pubescent on one or both surfaces.

Leaves linear, glabrous beneath, puberulent above-----3. **F. puberula**.

Leaves oblong-oblanceolate or narrowly elliptic-oblong, densely pubescent beneath-----4. **F. durangensis**.

Leaves without pores beneath.

Leaves serrulate or crenulate.

Leaves suborbicular, 7 to 12 mm. long, rounded at apex---5. **F. rotundifolia**.

Leaves ovate or rounded-ovate, 30 to 50 mm. long, acute or acuminate.

6. **F. racemosa**.

Leaves entire.

Leaves puberulent on the upper surface-----7. **F. tomentosa**.

Leaves glabrous on the upper surface.

Leaves 4.5 to 6 cm. long-----8. **F. chiapensis**.

Leaves 1 to 3 cm. long.

Leaves 2 to 3 cm. long; fruit 12 to 15 mm. long---9. **F. macrocarpa**.

Leaves mostly 1 to 2 cm. long; fruit 6 to 8 mm. long.

10. **F. phillyreoides**.

1. **Forestiera reticulata** Torr. U. S. & Mex. Bound. Bot. 167. 1859.

No Mexican specimens have been seen, but the species has been collected along the Rio Grande in Texas, and doubtless occurs on the Mexican side of the river. Western Texas, the type collected near the mouth of the Pecos.

Glabrous shrub or small tree; leaves short-petiolate, 2 to 3 cm. long, acute or obtuse, often serrulate, coriaceous, lustrous, paler beneath; fruit globose-obovoid, 7 mm. long.

2. **Forestiera angustifolia** Torr. U. S. & Mex. Bound. Bot. 168. 1859.

Coahuila, Nuevo León, and Tamaulipas. Western Texas; type collected near the Rio Grande.

Densely branched, glabrous shrub, 1.5 to 4.5 meters high, the branchlets stiff; leaves sessile, oblanceolate-oblong or linear-oblanceolate, 1 to 2.5 cm. long, 2 to 5 mm. wide, obtuse, bright green, the margins somewhat revolute; fruit ovoid, black, about 6 mm. long. "Panalero" (Tamaulipas).

The fruit is edible but not very palatable.

3. *Forestiera puberula* Eastw. Proc. Amer. Acad. 44: 605. 1909.

Coahuila and Zacatecas; type from Cedros, Zacatecas.

Shrub, the branchlets short and stiff; leaves 5 to 12 mm. long, the margins strongly revolute; fruit black, about 7 mm. long, conspicuously curved.

4. *Forestiera durangensis* Standl., sp. nov.

Durango; type collected near the city of Durango (*Palmer* 837; U. S. Nat. Herb. no. 304930).

Shrub, 2 to 2.5 meters high, the branchlets short and stiff, densely puberulent at first; leaves short-petiolate, narrowly oblong or oblanceolate-oblong, 12 to 30 mm. long, 4 to 7 mm. wide, obtuse, attenuate at base, entire, coriaceous, sparsely puberulent or glabrate above, densely pubescent beneath; staminate flowers in small dense clusters; stamens 4; fruit oblong, 7 to 8 mm. long. "Palo blanco."

Palmer 323 from Tepehuane belongs here. It is probably this plant which was listed by Paton as *F. phillyreoides*, for which the vernacular names are given as "lentisco," "lantisco," "lantrisco," and "acebuche."

5. *Forestiera rotundifolia* (T. S. Brandeg.) Standl.

Adelia rotundifolia T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 386. 1909.

Type from Cerro de Matzize, Puebla.

Glabrous shrub, 2 meters high; leaves short-petiolate, coriaceous, lustrous, crenulate.

6. *Forestiera racemosa* S. Wats. Proc. Amer. Acad. 25: 158. 1890.

Nuevo León; type from the Sierra Madre near Monterrey.

Slender shrub or small tree, 4.5 to 6 meters high; leaves slender-petiolate, rounded at base, coriaceous, glabrous and lustrous above, pilosulous or glabrate beneath; fruit subglobose, 6 mm. long, bluish black.

7. *Forestiera tomentosa* S. Wats. Proc. Amer. Acad. 25: 157. 1890.

Jalisco to Puebla; type collected near Guadalajara.

Shrub, 3 to 4.5 meters high, with stiff branches; leaves oblong to elliptic or ovate, 1.5 to 3.5 cm. long, obtuse or rounded at apex, obtuse or acute at base, short-petiolate, coriaceous; fruit ellipsoid, bluish black, 6 to 10 mm. long. "Pico de pájaro" (Michocán); "mimbres" (Jalisco).

8. *Forestiera chiapensis* Standl., sp. nov.

Type from Canjob, Chiapas (*Goldman* 794; U. S. Nat. Herb. no. 470599).

Branchlets puberulent when young but soon glabrous; leaves short-petiolate, broadly elliptic, 4.5 to 6 cm. long, 2.3 to 3 cm. wide, obtusely short-acuminate, acute or obtuse at base, thin, entire, glabrous; staminate flowers in lax racemes about 1 cm. long; stamens 2 to 4.

9. *Forestiera macrocarpa* T. S. Brandeg. Zoe 4: 404. 1894.

Type from Sierra San Lázaro, Cape Region of Baja California.

Shrub or small tree, 2 to 6 meters high, glabrous; leaves elliptic or oblong-ovate, obtuse or acutish, cuneate at base, thin; fruit oblong, dark blue.

10. *Forestiera phillyreoides* (Benth.) Torr. U. S. & Mex. Bound. Bot. 167. 1859.

Piptolepis phillyreoides Benth. Pl. Hartw. 29. 1840.

Jalisco to Guanajuato and Puebla; type from Guanajuato.

Shrub, 2 to 3 meters high; leaves short-petiolate, ovate to oval or obovate, obtuse or rounded at apex, acute at base, pubescent or glabrate beneath, the margins usually revolute; fruit ellipsoid, black.

6. **OSMANTHUS** Lour. Fl. Cochinch. 28. 1790.

All the other species are natives of Asia and the Pacific Islands.

1. **Osmanthus americana** (L.) Benth. & Hook.; A. Gray, Syn. Fl. 2¹: 78. 1878.
Olea americana L. Mant. Pl. 24. 1767.

Veracruz and Oaxaca. Southern United States.

Shrub or tree, sometimes 15 meters high, with a trunk 30 cm. in diameter, the bark thin, scaly, dark gray or reddish gray; leaves opposite, petiolate, persistent, elliptic to oblanceolate, 7 to 14 cm. long, acuminate, attenuate or acute at base, leathery, lustrous, entire, glabrous; flowers whitish, fragrant, in short axillary racemes or panicles; calyx with 4 deltoid lobes; corolla 3 to 4 mm. long, the limb 4-lobate; stamens 2; fruit a drupe, oval or obovoid, 1.2 to 1.8 cm. long, yellow-green to deep purple, the flesh dry and thin; wood hard, close-grained, dark brown, its specific gravity about 0.81.

Known in the United States as "devilwood." The writer has seen two Mexican specimens, one from Cumbre del Obispo (*Schiede*), and one from Monte Pelado, Oaxaca (*Galeotti* 529). Although not in the best condition for comparison, they seem to agree perfectly with specimens from the United States.

139. **LOGANIACEAE. Logania Family.**

Shrubs, trees, or herbs, sometimes scandent; leaves opposite, entire or toothed, estipulate but the petioles usually united by a stipular line; flowers perfect, large or small, variously arranged, regular; calyx inferior, campanulate or tubular, 4 or 5-lobate; corolla gamopetalous, funnelform, salverform, or tubular, the limb 4 or 5-lobate; stamens as many as the corolla lobes and alternate with them, inserted in the throat or tube of the corolla; style simple, the stigma capitate or lobate; fruit capsular, baccate, or drupaceous.

Several genera of the family are represented in Mexico only by herbaceous species.

Stigma bifid.

Plants scandent; capsule compressed, many-seeded; seeds winged.

1. **GELSEMIUM.**

Plants erect; capsule terete, 2-seeded; seeds each with a tuft of bristles at apex.

Stigma entire or nearly so----- 2. **PLOCOSPERMA.**

Leaves quintuplinerved; fruit baccate----- 3. **STRYCHNOS.**

Leaves pinnate-nerved; fruit capsular.

Corolla tubular, about 3.5 cm. long; stamens exserted----- 4. **EMORYA.**

Corolla short-salverform, less than 1 cm. long; stamens not exserted.

5. **BUDDLEIA.**1. **GELSEMIUM** Juss. Gen. Pl. 150. 1789.

One other species is known, a native of eastern Asia.

1. **Gelsemium sempervirens** (L.) Ait. Hort. Kew 2: 64. 1811.

Bignonia sempervirens L. Sp. Pl. 623. 1753.

Veracruz, Puebla, Oaxaca, and Chiapas. Guatemala; southern United States.

Slender scandent glabrous shrub; leaves persistent, short-petiolate, lanceolate, 3.5 to 7.5 cm. long, attenuate, rounded or obtuse at base, entire; flowers in axillary 1 to 6-flowered cymes, short-pedicellate; calyx 5-lobate; corolla funnelform, 5-lobate, bright yellow, 2.5 to 3.5 cm. long; stamens 5; capsule compressed, elliptic, 2-celled, septicidally dehiscent, 8 to 15 mm. long; seeds winged.

A handsome vine, known in the United States as "yellow jasmine." The root is reported to contain an alkaloid, gelsemine. A tincture of the root is sometimes administered in domestic practice for rheumatism and gonorrhea. It is said to act as an arterial sedative, and in larger doses to produce insensibility to pain, but its use is dangerous or even fatal. Large doses are said to cause vertigo and perverted vision.

2. PLOCOSPERMA Benth. in Benth. & Hook. Gen. Pl. 2: 789. 1876.

1. *Plocosperma microphyllum* Baill.; Solenreder in Engl. & Prantl, Pflanzenfam. 4²: 50. 1895.

Oaxaca, and perhaps elsewhere.

Rigid shrub; leaves fasciculate or opposite, subsessile, oval or oblong, 8 to 13 mm. long, rounded or shallowly emarginate at apex, rounded at base, entire, coriaceous, glabrous; flowers solitary or fasciculate in the axils, 5-parted; fruit a terete capsule, 4 to 6 cm. long, 3 to 4 mm. in diameter; seeds 2, about 2 cm. long, each with a dense tuft of silky bristles at the apex.

3. STRYCHNOS L. Sp. Pl. 189. 1753.

The genus consists of about 200 species of trees, shrubs, or vines, distributed in the tropics of both hemispheres. Some of the species have edible fruit. The seeds of *S. nux-vomica* L., of India, furnish the drugs strychnine and nux-vomica.

1. *Strychnos tepicensis* Standl., sp. nov.

Sinaloa and Tepic; type from Acaponeta, Tepic (*Rose* 1441; U. S. Nat. Herb. 300272).

Branches glabrous or when young sparsely hirtellous; leaves opposite, the petioles 3 to 5 mm. long, hirtellous or glabrous, the blades ovate-elliptic, 5.5 to 10 cm. long, 2.5 to 5 cm. wide, acuminate or long-acuminate, obtuse at base, coriaceous, glabrous, entire, quintuplinerved, the venation prominent beneath; seeds strongly compressed, rounded-triangular or rounded, about 2 cm. in diameter and 6 mm. thick.

The material is very imperfect, consisting of leafy branches and a few seeds, but it seems desirable to assign a specific name to it for the purpose of convenience.

No species of the genus has been reported definitely from Mexico, but there are casual reports of *S. triplinervia* Mart., a Brazilian plant, from San Juan Bautista, Tabasco, where it is said to be known as "cabalonga de Tabasco," "mata-perros," and "veneno del diablo." The Tabascan plant is probably not *S. triplinervia*, but it may be one of the few species that have been described from Central America.

4. EMORYA Torr. U. S. & Mex. Bound. Bot. 121. 1859.

A single species is known.

1. *Emorya suaveolens* Torr. U. S. & Mex. Bound. Bot. 121. pl. 36. 1859.

Nuevo León. Type collected in canyons of the Rio Grande below Presidio del Norte.

Shrub, 1 to 2 meters high; leaves opposite, short-petiolate, ovate or rhombic, 1.5 to 5 cm. long, obtuse, obtuse or truncate at base, coarsely sinuate-dentate, glabrate above, minutely whitish-tomentulose beneath; flowers in narrow terminal thyrsiform panicles, sweet-scented; calyx tubular, 4-lobate; corolla tubular, 3.5 cm. long, greenish yellow; stamens 4, exserted; fruit a 2-celled capsule.

The genus was named for Major William H. Emory, United States Commissioner to the Mexican Boundary Survey.

5. BUDDLEIA L. Sp. Pl. 112. 1753.

Shrubs or small trees, usually with stellate tomentum; leaves entire or toothed; flowers small, in heads or dense cymes, these solitary and axillary or spicate or paniculate; calyx campanulate, 4-dentate; corolla short-salverform, the 4 lobes imbricate, spreading in anthesis; stamens 4; capsule septicidally bivalvate.

Some of the Old World species have showy flowers and are cultivated for ornament. The leaves of *B. madagascariensis* Lam. were formerly employed in Madagascar as a soap substitute, and the plant is used as a remedy for asthma, coughs, and bronchitis. Some of the members of the genus are said to be used for poisoning fish. The usual Mexican name for all the species is "tepozán."

Under the name "topoçan," Sahagún mentions one species which was employed as a diuretic and to "regulate the digestion and moderate the heat of the body." In another place he says: "There is a medicinal tree called *tepoçan*. Its leaves are long, velvety, rounded, and pointed. In color they are somewhat whitish green, and they exhale a rather unpleasant odor. The tree is good for heat of the head in either children or adults. The roots are large and long and have a slightly disagreeable odor. Cut up, pulverized, and mixed with the root of *tepeyiloxochitlacotl*, they are good to stop nose-bleed."

Hemsley listed 26 species of *Buddleia* from Mexico, and others have been described since. Many of them, however, have been based upon trivial characters and must be reduced to synonymy.

Flowers in dense heads, these spicate or racemose or sometimes solitary.

Heads distinctly pedunculate.

Heads mostly terminal and solitary.

Leaves 1 to 3 cm. long, obtuse or rounded at apex—1. *B. marrubiifolia*.

Leaves 4.5 to 6 cm. long, acuminate—2. *B. saltillensis*.

Heads axillary, racemose.

Leaves petiolate, the petioles not dilated at base—3. *B. wrightii*.

Leaves sessile, or with dilated clasping petioles.

Leaves coarsely serrate, contracted into a short petiole, this broadly marginate and dilated at base—4. *B. chapalana*.

Leaves crenulate, sessile—5. *B. perfoliata*.

Heads all or mostly sessile.

Leaves sessile, never contracted into a winged petiole, small, mostly 1 to 3 cm. long, narrowly oblong—6. *B. scordioides*.

Leaves petiolate, or at least contracted into a winged petiole, mostly 4 to 12 cm. long or larger, commonly lanceolate or ovate.

Heads 3 to 7-flowered; leaves obtuse, 7 cm. long or less.

7. *B. tuxtlica*.

Heads many-flowered; leaves acute or acuminate, usually longer.

8. *B. sessiliflora*.

Flowers in cymes, or capitate but the heads paniculate.

Leaves rounded or cordate at base, not decurrent.

Leaves covered beneath with a minute close whitish tomentum.

9. *B. tomentella*.

Leaves covered beneath with a loose floccose brownish tomentum.

Leaves rounded at apex—10. *B. elliptica*.

Leaves acute or acuminate.

Leaves usually quickly glabrate on the upper surface; flower clusters partly short-pedunculate-----11. *B. cordata*.

Leaves persistently tomentose on the upper surface; flower clusters all sessile-----12. *B. crotonoides*.

Leaves acute to attenuate at base or decurrent.

Flower clusters in paniced spikes or racemes.

Flower clusters all closely sessile-----13. *B. floccosa*.

Flower clusters, at least the lower ones, pedunculate-----14. *B. americana*.

Flower clusters loosely paniculate, neither spicate nor racemose.

Flowers 4 mm. long-----15. *B. nitida*.

Flowers 2 to 3 mm. long-----16. *B. parviflora*.

1. *Buddleia marrubiifolia* Benth. in DC. Prodr. 10: 441. 1846.

Chihuahua, Coahuila, Nuevo León, and Zacatecas; type from Monterrey, Nuevo León. Western Texas.

Shrub, about 1 meter high or less; leaves short-petiolate, oval, rounded, or rhombic, acute or decurrent at base, coarsely crenate, densely stellate-tomentose; flower heads globose, 10 to 12 mm. in diameter, very dense, the flowers yellow or orange. "Azafrán" ("saffron"; Zacatecas, Coahuila); "azafrán del campo" (Chihuahua, Coahuila); "azafrancillo," "azafranillo" (Coahuila).

A decoction of the flowers is employed in Coahuila to give a yellow or orange color to vermicelli and butter. The decoction is used also in the form of a bath for rheumatism, and the plant is used popularly as an aperitive and diuretic.

2. *Buddleia saltillensis* Kränzlein, Bot. Jahrb. Engler 50: Beibl. 111: 41. 1913.

Type from Saltillo, Coahuila (the locality is given erroneously by Kränzlein as "Texas").

Leaves lanceolate, petiolate, short-pilose above, ferruginous-tomentose beneath; flower heads few or several-flowered, 2 cm. long, subcylindric; calyx 2.5 mm. long.

Known to the writer only from the original description.

3. *Buddleia wrightii* Robinson, Bot. Gaz. 16: 341. 1891.

Sonora to Tepic; type from Mazatlán River, Sinaloa.

Shrub, 2 to 3 meters high; leaves ovate to narrowly lanceolate, 6 to 22 cm. long, acuminate or attenuate, attenuate or abruptly decurrent at base, serrate or entire, tomentulose or glabrate; flower heads 1 to 1.5 cm. in diameter. "Teposana" (Sinaloa).

Perhaps only a form of *B. sessiliflora*.

4. *Buddleia chapalana* Robinson, Proc. Amer. Acad. 26: 169. 1891.

Jalisco; type from Lake Chapala.

Shrub, 1 meter high or less; leaves oblong to rhombic-ovate, 2.5 to 6.5 cm. long, acute, stellate-pilose, the petioles united at base around the stem; flower heads slender-pedunculate, about 1 cm. in diameter, very dense, globose.

5. *Buddleia perfoliata* H. B. K. Nov. Gen. & Sp. 2: 346. 1817.

Buddleia sphaerantha Schlecht. & Cham. Linnaea 5: 104. 1830.

San Luis Potosí, Veracruz, Querétaro, Hidalgo, and Puebla; type collected between Chalco and Mexico.

Shrub, 1 to 1.5 meters high, densely brownish-tomentose throughout; leaves lanceolate to oblong, 3 to 8 cm. long, acute or attenuate, narrowed and connate

at base; flower heads 8 to 10 mm. in diameter, very dense, globose. "Salvia real" (San Luis Potosí, Veracruz); "salvia de bolita" (Mexico); "salvia india" (Querétaro).

The plant is very aromatic and slightly bitter. A hot tea made from the leaves is administered for neuralgic pains and as a stimulating medicine. The plant is employed also to reduce perspiration, especially in tuberculosis.

6. *Buddleia scordioides* H. B. K. Nov. Gen. & Sp. 2: 345. pl. 183. 1817.

Buddleia scordioides capitata S. Wats. Proc. Amer. Acad. 18: 116. 1883.

Chihuahua to San Luis Potosí, Hidalgo, and Mexico; type collected near the City of Mexico. Western Texas and southern Arizona.

Aromatic shrub, a meter high or less; leaves coarsely crenate, rugose, tomentose, or glabrate above; flower heads 5 to 8 mm. in diameter, densely lanate. "Salvia" (Durango); "escobilla" (Durango, Coahuila, San Luis Potosí, Valley of Mexico); "hierba de las escobas" (San Luis Potosí); "golondrilla" (Durango, Coahuila).

Tea made from the plant is much used as a remedy for indigestion. Stock are said to be fond of the shrub.

7. *Buddleia tuxtlica* Loesener, Verh. Bot. Ver. Brandenb. 53: 73. 1911.

Type from Hacienda Petapa, Distrito de Tuxtla, Chiapas.

Leaves lanceolate to oblong or subrhombic, 2 to 7 cm. long, serrate or entire, decurrent to base of petiole, densely stellate-tomentose beneath; calyx 2 mm. long.

Known to the writer only from the original description.

8. *Buddleia sessiliflora* H. B. K. Nov. Gen. & Sp. 2: 345. pl. 183. 1817.

Buddleia verticillata H. B. K. Nov. Gen. & Sp. 2: 346. pl. 184. 1817.

Buddleia pseudoverticillata Mart. & Gal. Bull. Acad. Brux. 12²: 24. 1845.

Buddleia melliodora Kunth, Ind. Sem. Hort. Berol. 10. 1845.

Buddleia barbata Kunth, Ind. Sem. Hort. Berol. 12. 1847.

Buddleia pringlei A. Gray, Proc. Amer. Acad. 19: 86. 1883.

Buddleia simplex Kränzlein, Ann. Naturhist. Hofmus. Wien 26: 396. 1912.

Sonora to Coahuila, San Luis Potosí, Mexico, and Oaxaca; type collected near the City of Mexico. Southern Arizona.

Shrub or small tree, 1 to 5 meters high; leaves narrowly lanceolate to broadly rhombic-ovate, 5 to 18 cm. long; attenuate or decurrent at base, entire or serrate, usually densely tomentose, at least beneath, but sometimes glabrous; flower heads 1 to 2 cm. in diameter, usually dense and many-flowered, sometimes in naked terminal spikes, the flowers greenish yellow, very fragrant. "Tepozán" (Querétaro, Aguascalientes, Morelos, Guanajuato, Tamaulipas); "hierba del tepozán" (Sinaloa); "tepoja" (Michoacán, Guerrero); "tepoza" (Jalisco); "tepozán verde" (Guanajuato); "lengua de vaca" (Morelos, Oaxaca); "tepuza," "tepozancillo," "salvia" (*Urbina*); "mispatle," "quimixpatli" (Valley of Mexico).

A tea made from the leaves, bark, and roots is taken internally for various purposes, and the leaves, boiled with salt, are applied to wounds and sores.

9. *Buddleia tomentella* Standl., sp. nov.

Coahuila, Nuevo León, and Zacatecas; type from Saltillo, Coahuila (*Palmer* 138; U. S. Nat. Herb. no. 336132).

Shrub, the branchlets minutely tomentulose; leaves long-petiolate, ovate-lanceolate to oblong-ovate or deltoid-ovate, 5 to 11 cm. long, acute or acuminate, entire or crenate-serrate, tomentulose above at first but soon glabrate, covered beneath with a very dense, minute, closely appressed, pale tomentum, coriaceous; flower heads small, few-flowered, in large terminal naked panicles,

these 10 to 25 cm. long; calyx 2 to 2.5 mm. long, tomentulose, the lobes deltoid, obtuse or acute; corolla barbate within, the tube about as long as the calyx, the 4 lobes rounded, tomentulose outside; capsule 5 mm. long. "Tepozán" (Coahuila, Zacatecas).

The following additional collections belong here: *Palmer* 869, 718, 709, 138½; *Arsène* 6380; *Pringle* 1887.

10. *Buddleia elliptica* Mart. & Gal. Bull. Acad. Brux. 12²: 24. 1845.

Type from Pico de Quinceo, near Morelia, Michoacán, altitude 2,100 meters.

Leaves short-petiolate, elliptic-rounded, 7.5 cm. long, 5 cm. wide, tomentose beneath, entire; flower heads crowded, densely paniculate.

Known to the writer only from the original description.

11. *Buddleia cordata* H. B. K. Nov. Gen. & Sp. 2: 348. pl. 185. 1817.

Buddleia acuminata H. B. K. Nov. Gen. & Sp. 2: 349. pl. 187. 1817. Not *B. acuminata* Poir. 1810.

Buddleia humboldtiana Roem. & Schult. Syst. Veg. 3: Mant. 93. 1827.

Buddleia ovalifolia Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia macrophylla Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia cordata teposan Loesener, Verh. Bot. Ver. Brandenb. 53: 73. 1911.

Chihuahua to San Luis Potosí, Mexico, Chiapas, and Oaxaca; type from Guanajuato.

Shrub or small tree, 4.5 to 6 meters high; leaves long-petiolate, narrowly lanceolate to ovate, 8 to 30 cm. long, acute or attenuate, usually subcordate at base but rarely only obtuse or even short-decurrent, entire or serrulate, when young often loosely tomentose above but usually soon glabrous, loosely tomentose beneath, the tomentum persistent, sometimes with a minute tomentum beneath the longer hairs; flower heads in very large, naked, terminal panicles. "Tepozán" (Mexico, Durango, Tlaxcala); "tepozán blanco" (Guanajuato, Dugès).

Decoction of the bark and root used as a diuretic, for uterine affections, and for rheumatism.

12. *Buddleia crotonoides* A. Gray, Proc. Amer. Acad. 5: 165. 1861.

Southern Baja California; type from Cape San Lucas.

Shrub, densely brown-tomentose throughout; leaves short-petiolate, oblong-ovate or deltoid-ovate, 7 to 12 cm. long, acuminate, rounded or subcordate at base, thick, crenate; flower heads small, in panicked spikes.

13. *Buddleia floccosa* Kunth, Ind. Sem. Hort. Berol. 1844.

? *Buddleia propinqua* Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia floccosa crassifolia Loesener, Verh. Bot. Ver. Brandenb. 53: 72. 1911.

Michoacán to Morelos and Oaxaca. Central America.

Shrub, 1 to 3 meters high; leaves short-petiolate, narrowly or broadly lanceolate, 4 to 15 cm. long, acute or attenuate, sessile or short-petiolate, sometimes abruptly long-decurrent at base, entire or serrate, brown-tomentose beneath, tomentulose or glabrate above; flower clusters 1 cm. in diameter or less, very dense. "Tepozán," "tzompantle" (Oaxaca, Seler).

14. *Buddleia americana* L. Sp. Pl. 112. 1753.

? *Buddleia intermedia* H. B. K. Nov. Gen. & Sp. 2: 350. 1817.

Buddleia callicarpoides H. B. K. Nov. Gen. & Sp. 2: 350. 1817.

Buddleia floribunda H. B. K. Nov. Gen. & Sp. 2: 352. 1817.

Buddleia rufescens Willd.; Roem. & Schult. Syst. Veg. 3: Mant. 97. 1827.

Buddleia decurrens Schlecht. & Cham. Linnaea 5: 105. 1830.

Michoacán to Tamaulipas, Veracruz, and Chiapas. West Indies; Central and South America.

Shrub or small tree, 2 to 4 meters high; leaves petiolate, narrowly lanceolate to broadly ovate, 7 to 18 cm. long, acute to attenuate, decurrent at base, serrate or entire, usually glabrate above, tomentose or glabrate beneath; flower heads in panicles, leafy or naked spikes; flowers yellow. "Tepozán" (Veracruz, Mexico, Oaxaca, Nicaragua); "topozán" (Oaxaca, etc.); "zompantle" (Veracruz); "topoza" (Herrera); "zayolizán," "layolizán," "cayolizán," "cayolozán," "zayolizecán," "cayolinán" (Nueva Farm. Mex.) "hierba de la mosca" (Oaxaca, Reko); "salvia real" (Sessé & Mocino); "salvia" (El Salvador); "salvia sija," "salvia santa" (Guatemala); "tabaquillo" (Panama); "tabaco de monte," "salvia blanca" (Colombia).

The plant has a camphor-like odor. A decoction of the leaves, bark, and roots has been employed as a diuretic, especially in dropsy, as a healing lotion for wounds, and for rheumatic pains and uterine affections. In Colombia the leaves are applied to the forehead to relieve headache.

15. *Buddleia nitida* Benth. in DC. Prodr. 10: 437. 1846.

Type from Chiapas. Guatemala.

Leaves petiolate, lance-oblong, 5 to 12 cm. long, acuminate, usually acute at base, entire, coriaceous, glabrate above, closely brownish-tomentose beneath; panicles short and dense.

16. *Buddleia parviflora* H. B. K. Nov. Gen. & Sp. 2: 353. 1817.

Buddleia microphylla H. B. K. Nov. Gen. & Sp. 2: 353. 1817.

Buddleia abbreviata H. B. K. Nov. Gen. & Sp. 2: 353. 1817.

Buddleia lanceolata Benth. Pl. Hartw. 48. 1840.

Buddleia gracilis Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia venusta Kunth, Ind. Sem. Hort. Berol. 1844.

Buddleia ligustrina Loesener, Repert. Sp. Nov. Fedde 9: 359. 1911.

Buddleia monticola Loesener, Repert. Sp. Nov. Fedde 9: 360. 1911.

Sinaloa (?) and Jalisco to Durango, San Luis Potosí, Veracruz, and Oaxaca; type from Cuernavaca, Morelos.

Shrub or small tree, 1 to 6 meters high; leaves petiolate or subsessile, narrowly lanceolate to ovate, 2 to 10 cm. long, acute or attenuate, serrate or entire, usually glabrate above but densely tomentulose beneath; flower heads few-flowered, often loose, in small or large panicles. "Tepozán" (Sinaloa); "tepozán cimarrón," "tepozán de cerro" (Mexico).

DOUBTFUL SPECIES.

BUDDLEIA TEUCRIOIDES Kränzlein, Ann. Naturhist. Hofmus. Wien 26: 397. 1912. Locality not known, but probably Mexican.

140. APOCYNACEAE. Dogbane Family.

Shrubs or trees, rarely herbs, often scandent, with milky juice; leaves entire, estipulate, opposite, verticillate, or alternate; flowers usually in cymes, terminal or lateral, large or small, perfect, regular; calyx inferior, the segments united at base, often glandular within at base, usually 5-parted; corolla gamopetalous, usually salverform or funnelform, the limb commonly 5-lobate; stamens 5, inserted on the tube or throat of the corolla, the filaments short, the anthers narrow, free but often connivent, frequently appendaged at base; style 1, simple or cleft at base; fruit of 2 carpels, these dry or fleshy, dehiscent or indehiscent.

Two genera, *Amsonia* and *Apocynum*, are represented in Mexico only by herbaceous species. It is possible that *Allamanda cathartica* L. may extend into Mexico or at least be in cultivation. It is a woody vine with large showy yellow flowers.

Anther cells not appendaged at base; plants never scandent.

Leaves all alternate.

Carpels of the fruit many-seeded, dehiscent. Corolla salverform.

1. **PLUMERIA.**

Carpels 1 or 2-seeded, indehiscent.

Corolla salverform; carpels about 1 cm. long-----2. **VALLESIA.**

Corolla funnelform; carpels much larger-----3. **THEVETIA.**

Leaves opposite or verticillate.

Carpels of the fruit 1 or 2-seeded, almost wholly connate. Leaves verticillate-----4. **RAUWOLFIA.**

Carpels with more numerous seeds, free, at least above.

Leaves mostly verticillate. Carpels long and slender, dehiscent.

5. **TONDUZIA.**

Leaves opposite.

Calyx glandular within; carpels fleshy, usually indehiscent.

Corolla salverform-----6. **TABERNAEMONTANA.**

Corolla funnelform-----7. **STEMMADENIA.**

Calyx eglandular; carpels dry, dehiscent.

Carpels slender, terete; seeds not winged; herbs or low shrubs.

8. **CATHARANTHUS.**

Carpels broad, compressed; seeds broadly winged; large trees.

9. **ASPIDOSPERMA.**

Anther cells appendaged at base and sometimes at apex; plants usually scandent.

Corolla with 5 scales in the throat; leaves verticillate. Plants erect.

10. **NERIUM.**

Corolla without scales; leaves opposite.

Tips of the anthers exerted from the corolla.

Corolla subrotate, the tube very short.

Cymes umbel-like-----11. **THENARDIA.**

Cymes spikelike-----12. **FORSTERONIA.**

Corolla salverform, the tube elongate-----13. **PRESTONIA.**

Tips of the anthers not exerted.

Corolla funnelform, the throat evidently dilated.

Plants erect-----14. **MACROSIPHONIA.**

Plants scandent.

Calyx eglandular-----15. **RHABDADENIA.**

Calyx glandular within.

Anthers with a subulate twisted appendage at apex.

16. **URECHITES.**

Anthers not appendaged at apex, obtuse to acuminate.

17. **MANDEVILLA.**

Corolla salverform.

Calyx eglandular. Plants erect-----18. **HAPLOPHYTON.**

Calyx glandular within.

Flowers racemose-----19. **ECHITES.**

Flowers cymose.

Corolla tube twisted-----20. **STREPTOTRACHELUS.**

Corolla tube not twisted-----21. **SECONDATIA.**

1. PLUMERIA L. Sp. Pl. 209. 1753.

Shrubs or trees with thick branches and copious milky sap; leaves alternate, petiolate; flowers large, in terminal cymes; calyx 5-cleft, eglandular; corolla salverform, with slender tube; anthers obtuse, not appendaged, fruit of 2 large divergent many-seeded follicles; seeds flat, winged.

The generic name is often written incorrectly as *Plumiera* and *Plumieria*.

Leaves pubescent beneath. Flowers white or yellow.

Leaves oblong-linear, 1.5 to 3.5 cm. wide, the margins revolute---1. *P. alba*.

Leaves elliptic to elongate-oblong, mostly 4 to 7.5 cm. wide, the margins not revolute.

Leaves elongate-oblong, about 5 times as long as broad---2. *P. megaphylla*.

Leaves mostly elliptic or elliptic-oblong, 3 times as long as broad or less-----3. *P. mollis*.

Leaves glabrous or nearly so.

Corolla red or purple-----4. *P. rubra*.

Corolla white-----5. *P. acutifolia*.

1. *Plumeria alba* L. Sp. Pl. 210. 1753.

Yucatán, probably introduced and perhaps only in cultivation. Native of West Indies but often cultivated elsewhere.

Tree, 3 to 8 meters high; bark gray or whitish, slightly roughened; leaves short-petiolate, 16 to 30 cm. long, obtuse or acute, glabrous and lustrous above, minutely tomentulose beneath; corolla white, about 6 cm. long; follicles 18 to 20 cm. long. "Sabanicté" (Yucatán, Maya); "flor de pan" (Nicaragua); "amapola de Venus" (Central America); "amancayo," "azuceno" (Colombia); "lirio blanco," "lirio silvestre," "alelí blanco," "atabaiba" (Cuba); "tabaiba," "tapaiba" (Porto Rico); "amapola" (Venezuela).

The wood is said to be yellowish white or pale yellowish gray, compact, fine-grained, and strong. The juice is said to be poisonous and caustic; it is sometimes employed in the West Indies as a remedy for cutaneous and venereal diseases.

2. *Plumeria megaphylla* A. DC. in DC. Prodr. 8: 391. 1844.

Type from Puebla.

Leaves about 30 cm. long, 5 to 7.5 cm. wide, acuminate, glabrous above, puberulent or pubescent beneath along the nerves; corolla 5 cm. long or more, yellow.

3. *Plumeria mollis* H. B. K. Nov. Gen. & Sp. 3: 230. 1819.

Tepec and Jalisco to Aguascalientes and Chiapas. Type from the Orinoco River.

Leaves 12 to 23 cm. long, short-petiolate, acute or short-acuminate, acute at base, glabrous above, pubescent beneath or finally glabrate; corolla white, 5 to 7 cm. long; follicles 15 to 25 cm. long.

4. *Plumeria rubra* L. Sp. Pl. 209. 1753.

?*Plumeria xanthostoma* Schlecht. Linnaea 8: 523. 1833.

Yucatán, Puebla, and Chiapas, and doubtless elsewhere, at least in cultivation. West Indies; Central and South America.

Shrub or tree, 8 meters high or less, the branchlets pubescent; leaves elliptic-oblong to elliptic-obovate, 15 to 40 cm. long, acute or obtuse and short-pointed, obtuse or acute at base; corolla 3.5 to 5.5 cm. long; follicles 15 to 25 cm. long, about 2.5 cm. thick. "Sabanicté," "chacnicté," "nicté" (Yucatán, Maya); "flor de mayo" (Yucatán, Puebla, El Salvador); "flor de la cruz" (Guatemala).

El Salvador); "flor del toro" (Nicaragua); "caracacha colorada," "caracucho," "palo de cruz" (Panama); "Alejandría" (Morelos, Central America); "flor de señora" (El Salvador); "alef" (Porto Rico); "lirio colorado" (Cuba); "flor de ensarta" (El Salvador).

The flowers are handsome and sweet-scented. They are often strung with those of other colors to hang as festoons in churches.

A related species, *P. tricolor* Ruiz & Pav., in which the corolla is pink and yellow within, red and white outside, is said to be cultivated in Mexico, and to be known as "flor de mayo" and "ensalada." The corollas are said to be used for making sweetmeats and as a remedy for coughs.

5. *Plumeria acutifolia* Poir. Encycl. Suppl. 2: 667. 1811.

Plumeria mexicana Lodd. Bot. Cab. pl. 1024. 1825.

Plumeria lambertiana Lindl. Bot. Reg. pl. 1378. 1830.

Plumeria gouani D. Don; G. Don, Hist. Dichl. Pl. 4: 94. 1838.

Baja California and Sonora to Chihuahua, Veracruz, and Oaxaca. Widely dispersed in tropical America, and also naturalized in the Old World tropics.

Shrub or tree, 3 to 9 meters high, the branchlets usually pubescent; leaves oblong to elliptic, 15 to 30 cm. long or more, acute to long-acuminate, with numerous parallel lateral nerves; corolla 6 to 7 cm. long, the tube about equaling or much shorter than the lobes; follicles 10 to 25 cm. long, sometimes as much as 4 cm. wide. "Cacaloxochitl" (Baja California, Veracruz, Mexico, etc., Nahuatl); "cacalosúchil" (Oaxaca, etc.); "súchil" (Oaxaca); "jacalosúchil blanco" (Jalisco); "flor del cuervo," "campotonera," "campechana," "Alejandría" (various localities); "tizaxochitl"; "quie-chachi" (Oaxaca, Zapotec, *Reko*); "suchlcahue" (Oaxaca, *Reko*); "ahaipuih" (Mixe, *Belmar*); "cacalojoche," "juche" (Costa Rica); "sacuanjoche" (Nicaragua); "flor de la cruz," "flor de ensarta," "flor de mayo" (El Salvador); "calcachuchi" (Philippines).

The beautiful sweet-scented flowers were a favorite among the ancient Mexicans, and especially popular with the nobility. They are still greatly admired by the Mexican people, who often plant the tree in their gardens and use the flowers for decorations, especially in churches. The Indians often wear them in their hair. The name "frangipanni" is applied to this and related species, likewise "temple flower" and "graveyard-flower." The juice is sometimes employed in treating wounds and venereal diseases, and it is said to produce a good quality of rubber.

2. *VALLESIA* Ruiz & Pav. Fl. Peruv. Chil. 2: 26. 1799.

Shrubs or small trees; leaves short-petiolate, persistent, alternate; flowers in pedunculate cymes opposite the leaves; calyx eglandular, with 5 short lobes; corolla salverform, the tube enlarged below the lobes; anthers cordate, not appendaged; fruit a 1 or 2-seeded drupe; seeds naked.

The following species are the only ones known. The genus was named in honor of Francisco Valles, physician to Phillip II of Spain.

Leaves mostly obtuse, densely pubescent-----1. *V. laciniata*.

Leaves acute or acuminate, glabrous.

Corolla 15 to 18 mm. long-----2. *V. mexicana*.

Corolla about 5 mm. long-----3. *V. glabra*.

1. *Vallesia laciniata* T. S. Brandeg. Proc. Calif. Acad. II. 2: 182. 1889.

Baja California; type material collected at San Sebastián and Comondú.

Shrub, 1 meter high or less, the branchlets densely pubescent; leaves oblong or lanceolate, 2.5 to 7 cm. long; cymes dense, many-flowered; corolla 10 to 12 mm. long; fruit white.

2. *Vallesia mexicana* Muell. Arg. *Linnaea* 30: 393. 1860.

Veracruz; type from Orizaba. Guatemala.

Shrub; branchlets glabrous or sparsely pubescent; leaves oblong-lanceolate or elliptic-lanceolate, 8 to 11 cm. long, obtuse or acute at base; cymes dense, many-flowered, the flowers short-petiolate.

Neriandra aurantiaca Mart. & Gal.¹ is probably the same plant.

3. *Vallesia glabra* (Cav.) Link, Enum. Hort. Berol. 1: 207. 1821.

Rauwolfia glabra Cav. Icon. Pl. 3: 50. 1794.

Vallesia dichotoma Ruiz & Pav. Fl. Peruv. Chil. 2: 26. 1799.

Vallesia cymbifolia Orteg. Hort. Matr. Dec. 58. 1800.

Rauwolfia oppositiflora Sessé & Moc. Pl. Nov. Hisp. 32. 1887.

Baja California and Sonora to Querétaro, Hidalgo, and Oaxaca. Florida, West Indies, and South America.

Shrub or tree, 1 to 6 meters high, glabrous or nearly so; leaves narrowly lanceolate to oblong-lanceolate, 3 to 6 cm. long, rather fleshy, obtuse or acute at base; cymes few-flowered; corolla white; fruit oblong, about 1 cm. long, white. "Cacarahue," "otatave" (Sinaloa); "frutilla" (Querétaro); "huelatave" (Baja California); "palo boniato" (Cuba).

The fruit is sometimes eaten by children, and its juice is employed as a remedy for inflammation of the eyes.

3. *THEVETIA* Adans. Fam. Pl. 2: 171. 1763.

Shrubs or small trees; leaves alternate, 1-nerved or pinnate-nerved; flowers large, yellow, in terminal cymes; calyx 5-parted, glandular within at base, the segments spreading; corolla funnelform, the tube cylindric, abruptly expanded into the campanulate throat; anthers small, lanceolate; fruit drupaceous, broader than long, obcompressed, the endocarp nutlike, 2-celled; seeds large, with acute edges.

Leaves linear or nearly so.

Leaves glabrous beneath, the lateral nerves obsolete.....1. *T. peruviana*.

Leaves usually pubescent or tomentose beneath, the lateral nerves conspicuous.....2. *T. thevetioides*.

Leaves oblanceolate-oblong to obovate.

Leaves glabrous beneath.

Narrow portion of the corolla tube scarcely exceeding the calyx.

3. *T. gaumeri*.

Narrow portion of the corolla tube several times as long as the calyx.

4. *T. plumeriaefolia*.

Leaves pubescent beneath.

Leaves acuminate.....5. *T. nitida*.

Leaves obtuse or rounded at apex, or rarely acutish.....6. *T. ovata*.

1. *Thevetia peruviana* (Pers.) Merrill, Philip. Journ. Sci. 9: 130. 1914.

Cerbera thevetia L. Sp. Pl. 209. 1753.

Cerbera peruviana Pers. Syn. Pl. 1: 267. 1805.

Thevetia neriifolia Juss.; Steud. Nom. Bot. ed. 2. 2: 680. 1841.

Thevetia thevetia Millsp. Field Mus. Bot. 2: 83. 1900.

San Luis Potosí and Veracruz to Yucatán, Chiapas, and Guerrero. Florida, West Indies, and Central and South America.

Shrub or tree, 10 meters high or less; bark gray; leaves 7 to 15 cm. long, 0.5 to 1 cm. wide, acute, long-attenuate at base, lustrous; corolla about 7 cm.

¹ Bull. Acad. Brux. 11: 356. 1844.

long, the tube much shorter than the limb; fruit triangular, 3 to 4 cm. broad, about 2 cm. long, and 1 to 1.5 cm. thick, subtruncate. "Chirca" (Chiapas, Costa Rica, Guatemala); "campanilla" (Yucatán, Morelos, Guerrero, Panama, Philippines); "acitz" (Yucatán, Maya); "naranjo amarillo" (San Luis Potosí, *Ramírez*); "yoyote," "yoyotli" (Veracruz, Guerrero, *Ramírez*); "narciso amarillo" (Jalisco, *Oliva*); "chilca" (Nicaragua, Guatemala); "caballón" (Porto Rico); "cabalonga," "cobalonga" (Cuba, Porto Rico, Colombia); "amancay," "aje de monte," "pepa de cruz," "castañeto" (Colombia); "chilindrón," "campanilla amarilla" (El Salvador); "lengua de gato," "retama" (Venezuela); "camache," "caruache" (Guiana).

The tree is showy when in flower and is often cultivated in the tropics. In Florida it is known as "trumpet-flower" and "yellow oleander," and in the British West Indies as "lucky-nut," and "luck-seed." The flowers are very sweet-scented. The wood is said to be soft and fibrous and to have a specific gravity of about 0.80. The milky juice and the seeds are poisonous. In Yucatán cotton soaked in the juice is placed in cavities in teeth to relieve toothache. The seeds have been reported to yield a glucoside, thevetine. A tincture of the bark is considered a powerful febrifuge and in large doses is a violent purgative and emetic.

2. *Thevetia thevetioides* (H. B. K.) K. Schum. in Engl. & Prantl, Pflanzenfam. 4²: 159. 1895.

Cerbera thevetioides H. B. K. Nov. Gen. & Sp. 3: 223. 1819.

Thevetia yccotli A. DC. in DC. Prodr. 8: 343. 1844.

Thevetia yccotli glabra A. DC. in DC. Prodr. 8: 343. 1844.

Michoacán to Tamaulipas, Veracruz, and Oaxaca; type collected near Taxco and Tehuilotepic (Guerrero).

Shrub or small tree, 3 to 9 meters high; leaves 7 to 14 cm. long, 5 to 10 mm. wide, acute or attenuate, long-attenuate at base, the margins usually revolute; corolla 8 to 9 cm. long, the tube shorter than the limb; fruit about 4 cm. wide, 3 cm. long, and 3 cm. thick. "Codo de fraile" (Hidalgo); "yucucaca" (Oaxaca, Mixtec, *Reko*); "fraile" (Guanajuato); "cabrito" (Jalisco); "narciso amarillo" (Morelos); "calaveritas" (Oaxaca); "tzinacanytlacuatl" (*Herrera*); "yoyote" or "yoyotl" (from the Nahuatl *yoyotli*); "huesos de fraile" (fruit); "joyote," "joyota."

The seeds contain about 40 per cent of oil and also a glucoside, thevetin, and they are considered very poisonous. Taken internally they act as a violent vomitive, hinder respiration, and cause paralysis of the heart. They have been given in Mexico as a substitute for digitalis, but their use is dangerous. They are a popular remedy for hemorrhoids, and some of the Indians consider them a remedy for rattlesnake bites. They are said to have been worn about the ankles as rattles in certain dances. The leaves or the juice were employed by the Aztecs for deafness, cutaneous diseases, ulcers, and toothache.

3. *Thevetia gaumeri* Hemsl. in Hook, Icon. Pl. 16: pl. 1517. 1886.

Thevetia spathulata Millsp. Field Mus. Bot. 2: 383. 1898.

Yucatán; type from Cozumel Island.

Tree, 6 to 18 meters high, glabrous throughout; leaves oblanceolate, 5 to 12 cm. long, obtuse, long-attenuate at base, lustrous above, paler beneath; corolla 3.5 to 5 cm. long, the tube much shorter than the throat; fruit compressed, 3 cm. broad, 2 cm. long.

4. *Thevetia plumeriaefolia* Benth. Bot. Voy. Sulph. 124. pl. 43. 1844.

Veracruz and Oaxaca. Central America; type from Gulf of Fonseca, Honduras.

Glabrous tree; leaves oblanceolate-oblong to oblong-obovate, 13 to 23 cm. long, 4.5 to 7 cm. wide, acute or abruptly short-acuminate, acute at base, lustrous; corolla 4 to 5 cm. long, the tube longer than the throat. "Chilindrón" (Guatemala); "cojón de gato" (Guatemala, Honduras); "chirca venenosa" (Costa Rica); "tomatillo" (Colombia); "chilindrón blanco" (El Salvador).

5. *Thevetia nitida* (H. B. K.) A. DC. in DC. Prodr. 8: 344. 1844.

Cerbera nitida H. B. K. Nov. Gen. & Sp. 3: 225. 1819.

Reported from Tabasco and Yucatán. Panama; type from Colombia.

Leaves oblong-oblanceolate, 20 to 25 cm. long, 4 to 5 cm. wide, lustrous above, pilosulous beneath; corolla tube about 2.5 cm. long. "Ojo de venado" (*Conzatti*).

6. *Thevetia ovata* (Cav.) A. DC. in DC. Prodr. 8: 344. 1844.

Cerbera ovata Cav. Icon. Pl. 3: 35. pl. 270. 1794.

Cerbera cuneifolia H. B. K. Nov. Gen. & Sp. 3: 224. 1819.

Thevetia cuneifolia A. DC. in DC. Prodr. 8: 344. 1844.

Thevetia cuneifolia andrieuxii A. DC. in DC. Prodr. 8: 344. 1844.

Sinaloa and Jalisco to Chiapas. Reported from Guatemala.

Shrub or small tree, 2 to 5 meters high; leaves narrowly cuneate-oblong to broadly obovate, 5.5 to 11 cm. long, 1.5 to 4.5 cm. wide, cuneate or attenuate at base, glabrate and lustrous above, densely pubescent beneath; corolla 6 to 8 cm. long, the tube shorter than the throat; fruit scarcely compressed, 3.5 to 4 cm. broad, 2 to 3 cm. long. "Regalgar" (Sinaloa); "huevo de gato" (Jalisco); "meriendita"; "naranjo amarillo" (*Ramírez*); "narciso amarillo" (Michoacán); "cascabel" (Guatemala); "chirca venenosa" (Costa Rica).

As in other species, the seeds are reputed to be very poisonous. The Indians carry them in their pockets as a preventive of hemorrhoids.

4. *RAUWOLFIA* L. Sp. Pl. 208. 1753.

Shrubs or small trees; leaves usually verticillate, short-petiolate; flowers small, in pedunculate, mostly axillary cymes; calyx eglandular, 5-cléft; corolla salverform; stamens included, the anthers obtuse, not appendaged; fruit of 2 drupes, these connate, the fruit thus somewhat didymous.

Leaves densely and finely pubescent beneath.....1. *R. canescens*.

Leaves glabrous beneath or pubescent along the costa.

Leaves linear-lanceolate.....2. *R. longifolia*.

Leaves elliptic-oblong to elliptic or obovate.....3. *R. heterophylla*.

1. *Rauwolfia canescens* L. Sp. Pl. ed. 2. 303. 1762.

Veracruz; Sinaloa to Guerrero. Guatemala, West Indies, and northern South America.

Shrub, 4.5 meters high or less, the branchlets pubescent; leaves in whorls of 3 to 5, elliptic-oblong to elliptic-obovate, 5 to 10 cm. long, acute or obtuse at each end, puberulent or glabrate on the upper surface; cymes few or rarely many-flowered; corolla about 4 mm. long; fruit black, 6 to 8 mm. in diameter. "Venenito" (Colombia).

The fruit contains a black juice which has been employed for dyeing. If eaten it causes violent inflammation of the alimentary canal or even death. A decoction of the bark is used externally in the West Indies as a remedy for

chronic cutaneous diseases and to destroy parasites. It is also administered internally for syphilitic affections.

The calyx lobes are usually very obtuse, but in a specimen from Acapulco they are acuminate. The same variation is found in West Indian specimens.

2. *Rauwolfia longifolia* A. DC. in DC. Prodr. 8: 338. 1844.

Veracruz and Oaxaca; type from San Miguel Sola, Oaxaca.

Leaves ternate, 7.5 to 12.5 cm. long, 1 to 2 cm. wide, acuminate at each end, glabrous; cymes many-flowered; calyx glabrous, the lobes ovate, acute; flowers 12 mm. long, the corolla lobes acute.

3. *Rauwolfia heterophylla* Roem. & Schult. Syst. Veg. 4: 105. 1819.

Sinaloa to San Luis Potosí, Veracruz, Yucatán, Tabasco, and Oaxaca. Cuba; Central and South America.

Shrub, 1 to 2 meters high; leaves in whorls of 3 to 5, 3 to 10 cm. long, acute or acuminate, usually acute at base, glabrous or pubescent only beneath along the costa; cymes few-flowered; calyx lobes obtuse, usually ciliate; corolla greenish white, about 2.5 mm. long; fruit 6 to 8 mm. in diameter, red at first, purple-black at maturity. "Cabamuc" (Yucatán); "sarna de perro" (Colima); "cocotombo" (Guerrero, Sessé & Mociño); "guataco colorado," "viborilla," "comida de culebra" (Nicaragua); "cohatacô" (Costa Rica); "señorita," "amatillo," "hierba de San José," "matacoyote" (El Salvador).

The plant has milky sap. The crushed root was employed in Guerrero, according to Sessé and Mociño¹ (who list the plant as *Rauwolfia nitida*, a West Indian species), as a remedy for erysipelas, and the leaves for healing ulcers. In Colima the root decoction is used as a gargle for the throat and as a wash for the gums. The juice of the fruit is used as ink and also for dyeing. The fruit itself is reputed to be poisonous.

5. *TONDUZIA* Pittier, Contr. U. S. Nat. Herb. 12: 103. 1908.

Two other Central American species have been described. The genus was named for Señor Don Adolfo Tonduz, well known for his botanical work in Costa Rica.

1. *Tonduzia parvifolia* Pittier, Contr. U. S. Nat. Herb. 12: 103. 1908.

Oaxaca. Costa Rica; type from Angostura.

Shrub or small tree, glabrous; leaves mostly verticillate, petiolate, linear-lanceolate or narrowly oblong-lanceolate, 6 to 12 cm. long, acuminate or attenuate, attenuate at base, coriaceous; flowers white, in terminal and axillary cymes; calyx 5-parted, 1 to 1.2 mm. long; corolla salverform, the tube 4 to 5 mm. long; carpels slender, terete; seeds flat, elliptic, ciliate. "Chamicillo" (Oaxaca).

6. *TABERNAEMONTANA* L. Sp. Pl. 210. 1753.

Shrubs or trees, usually glabrous; leaves opposite; flowers in terminal cymes, sometimes sublateral, white or yellowish; calyx 5-lobate, glandular within; corolla salverform, the tube cylindric, the lobes contorted; anthers sagittate, not appendaged; fruit of 2 fleshy short follicles.

Calyx lobes linear-subulate; flowers 5 cm. long-----1. *T. litoralis*.

Calyx lobes ovate, usually obtuse; flowers less than 5 cm. long.

Tips of the anthers not exserted-----2. *T. citrifolia*.

Tips of the anthers exserted.

Corolla tube about 6 mm. long-----3. *T. alba*.

Corolla tube 8 to 15 mm. long-----4. *T. amygdalifolia*.

¹ Pl. Nov. Hisp. 32. 1887.

1. *Tabernaemontana litoralis* H. B. K. Nov. Gen. & Sp. 3: 228. 1819.

Type from Campeche; reported also from Tabasco, Veracruz, Guerrero, and British Honduras.

Leaves elliptic-oblong, about 12 cm. long and 5 cm. wide, subacuminate, acute at base; sepals fleshy, the margins imbricate; corolla tube 4 to 5 times as long as the calyx; stamens included.

Known to the writer only from the original description. The vernacular names "siete" and "sictillo" are reported from Tabasco, but they may pertain to some other species.

2. *Tabernaemontana citrifolia* L. Sp. Pl. 210. 1753.

Tabernaemontana martensii Peyr. Linnaea 30: 31. 1859.

Tabernaemontana paisavelensis Loesener, Bull. Herb. Boiss. 2: 555. 1894.

Tamaulipas, Veracruz, Tabasco, and Oaxaca. West Indies; Central and South America.

Glabrous shrub or small tree; leaves petiolate, oblanceolate-oblong to oblong-obovate or elliptic, 6 to 20 cm. long, acute or very abruptly short-acuminate, acute at base; flowers white, in dense or lax cymes, pedicellate; corolla tube 6 to 8 mm. long. "Cojón de gato" (Veracruz); "lecherillo" (Oaxaca); "palo de San Diego" (Tamaulipas); "cachito" (Nicaragua); "pegojo," "lechoso" (Cuba); "huevo de gallo" (Cuba, Porto Rico); "guacharaco," "cojón de cabrito," "turma de perro" (Colombia).

The flowers are sweet-scented. The milky juice is sometimes applied to warts to destroy them. In the West Indies the plant has been employed as a remedy for fevers.

3. *Tabernaemontana alba* Mill. Gard. Dict. ed. 8. *Tabernaemontana* no. 2. 1768.

Reported from Veracruz and Yucatán.

Leaves ovate-oblong, 12 to 15 cm. long, 5 to 6 cm. wide, abruptly short-acuminate, acute at base, petiolate; cymes many-flowered.

Known to the writer only from description.

4. *Tabernaemontana amygdalifolia* Jacq. Enum. Pl. Carib. 14. 1760.

Tabernaemontana acapulcensis Miers, Apocyn. S. Amer. 57. 1878.

Sinaloa to Oaxaca and Yucatán. Central and South America.

Shrub, 2 to 4.5 meters high, glabrous throughout; leaves elliptic to narrowly lance-oblong, 5 to 17 cm. long, acute or acuminate, acute at base; corolla white; follicles 4 to 6 cm. long, 1.5 to 2 cm. thick, smooth. "Berraco de la costa," "berraco" (Sinaloa); "chusumpek" (Yucatán Maya); "cojón de puerco" (Oaxaca, El Salvador); "utzupek," "olfato de perro" (Yucatán, Seler); "jasmín de perro" (Oaxaca, Yucatán); "huevos de toro" (Guerrero, Seler); "cojón de toro" (Oaxaca); "rejalgar" (Oaxaca, Reko); "platanito" (Colombia); "huevo de gato" (Panama); "jasmín del monte" (Panama, El Salvador); "chilindrón," "cojón macho," "leche de perra," "amatillo" (El Salvador).

7. *STEMMADENIA* Benth. Bot. Voy. Sulph. 124. 1844.

Shrubs or small trees; leaves opposite; flowers large, usually yellow, few, in terminal cymes; calyx 5-parted, the lobes imbricate, glandular within; corolla funnelform, the tube expanded into a broad throat, the lobes contorted; stamens included, the anthers sagittate, not appendaged; fruit of 2 short fleshy divaricate follicles.

Leaves glabrous beneath.

Corolla tube 2 to 2.5 cm. long-----1. *S. bella*.

Corolla tube 3 to 5.5 cm. long.

Corolla tube about 3 cm. long-----2. *S. bignoniaeflora*.

Corolla tube about 5 cm. long-----3. *S. insignis*.

Leaves pubescent beneath, at least along the costa.

Leaves barbate beneath along the costa, elsewhere glabrous or nearly so.

4. *S. palmeri*.

Leaves pubescent beneath over the whole surface.

Calyx about 5 mm. long-----5. *S. tomentosa*.

Calyx 12 to 20 mm. long-----6. *S. mollis*.

1. *Stemmadenia bella* Miers, Apocyn. S. Amer. 77. 1878.

Veracruz to Michoacán and Guerrero; reported from Tabasco; type from Orizaba, Veracruz.

Shrub, 2 meters high or more, glabrous throughout; leaves elliptic-ovate or oblong-elliptic, 7 to 12 cm. long, abruptly acuminate, acute at base; corolla lobes 12 to 15 mm. long. "Lechoso" (Michoacán, Guerrero).

2. *Stemmadenia bignoniaeflora* (Schlecht.) Miers, Apocyn. S. Amer. 77. 1878.

Echites bignoniaeflora Schlecht. Linnaea 26: 372. 1853.

Described from Mexico, the locality not known.

Glabrous shrub; leaves lance-elliptic, 10 cm. long, 4.5 cm. wide, acute at each end, on short marginate petioles; calyx 12 to 14 mm. long.

Known to the writer only from description.

3. *Stemmadenia insignis* Miers, Apocyn. S. Amer. 76. 1878.

Jalisco to Veracruz and Yucatán; type from Mérida, Yucatán.

Shrub or small tree, glabrous throughout; leaves short-petiolate, elliptic to elliptic-oblong or elliptic-obovate, 8 to 18 cm. long, abruptly acuminate, acute at base; calyx 12 to 15 mm. long; fruit carpels about 5 cm. long and 3 cm. wide, sharp-pointed. "Laurel" (Yucatán).

4. *Stemmadenia palmeri* Rose & Standl., sp. nov.

Sinaloa to Chihuahua, Morelos, and Jalisco; type from Imala, Sinaloa (*Palmer* 1470; U. S. Nat. Herb. no. 305608).

Shrub or small tree, 1 to 6 meters high, the branchlets glabrous; leaves on long or short petioles, elliptic or oblong-elliptic, 6 to 18 cm. long, abruptly short-acuminate, acute at base, glabrous above, densely barbate beneath along the costa or in age rarely glabrate; calyx lobes 4 to 6 mm. long, obtuse or acute, glabrous; corolla tube 3 to 4.5 cm. long, the lobes of about the same length; fruit carpels 4.5 cm. long and 3 cm. wide or smaller, falcate-ovoid. "Berraco," "tapaco" (Sinaloa).

5. *Stemmadenia tomentosa* Greenm. Proc. Amer. Acad. 35: 310. 1900.

Type collected near Zapotlán, Jalisco.

Shrub, 3 to 4.5 meters high; leaves short-petiolate, elliptic or oblong-elliptic, acuminate, acute at base, glabrous above, tomentose beneath; corolla yellow, 7.5 to 8 cm. long.

6. *Stemmadenia mollis* Benth. Bot. Voy. Sulph. 125. 1844.

Guerrero to Chiapas and Veracruz. Guatemala; type from Guayaquil, Ecuador.

Shrub or small tree, 3 to 7.5 meters high, the branchlets pubescent; leaves elliptic-oblong to broadly elliptic, 5 to 17 cm. long, obtuse or abruptly short-acuminate, pubescent on both surfaces; corolla yellow, 7 to 8 cm. long. "Cojón de puerco" (Oaxaca); "cojón" (Guatemala, El Salvador); "flor del día" (El Salvador).

8. CATHARANTHUS Don, Hist. Dichl. Pl. 4: 95. 1838.**1. Catharanthus roseus** (L.) Don, Hist. Dichl. Pl. 4: 95. 1838.*Vinca rosea* L. Syst. Nat. ed. 10. 944. 1759.*Lochnera rosea* Reichenb. Consp. Veg. 134. 1828.*Ammocallis rosea* Small, Fl. Southeast U. S. 936. 1903.

Cultivated in Mexico for ornament and in some places naturalized; specimens have been seen only from Sinaloa and Yucatán, but the plant must be much more widely distributed. Widely dispersed in the tropics of both hemispheres.

Plants herbaceous or woody at base, 1 meter high, thinly pubescent; leaves opposite, short-petiolate, oblong to elliptic, 3 to 8 cm. long, obtuse or retuse; flowers solitary or geminate in the axils; calyx 5-cleft; corolla salverform, white or pink, the slender tube 2.5 to 3 cm. long; follicles cylindric, 2 to 3 cm. long, pubescent. "Maravilla de España" (Mexico); "flor de todo el año," "jasmín del mar" (Porto Rico); "vicaria," "Dominica" (Cuba); "chichirica" (Philippines); "chula," "mulata" (El Salvador).

In the United States and the British West Indies the plant is known as "vinca," "old maid," "red periwinkle," and erroneously as "sweet-william." The flowers are showy and the plant is easily propagated. In Madagascar the bitter astringent leaves are employed as a vomitive, and the roots are said to be purgative, vermifuge, depurative, and hemostatic, and to be a remedy for toothache.

9. ASPIDOSPERMA Mart. & Zucc. Nov. Gen. & Sp. 1: 57. 1824.**1. Aspidosperma megalocarpon** Muell. Arg. Linnaea 30: 400. 1860.

Type from Colipa, Veracruz. Guatemala.

Large tree; leaves petiolate, oblong, 12 to 22 cm. long, acute, obtuse at base, coriaceous, glabrous, lustrous, often unequal at base; follicles obliquely reniform-obovate, 12 cm. long and 10 cm. wide, rounded-obtuse, glabrous; seed body compressed, 2 to 2.5 cm. broad, surrounded by a broad thin wing, the whole 7 to 9 cm. in diameter. "Volador" (Veracruz); "chichique," "chichica" (Guatemala).

10. NERIUM L. Sp. Pl. 209. 1753.**1. Nerium oleander** L. Sp. Pl. 209. 1753.

Cultivated in all the warmer parts of Mexico, and in places naturalized. Native of the Mediterranean region, but cultivated in all warm regions and in many places naturalized.

Shrub or small tree, glabrous or obscurely puberulent; leaves mostly ternate, short-petiolate, linear-oblong or linear-oblongate, acute, coriaceous; flowers pink or white, fragrant, often double, in terminal cymes; calyx 5-parted, glandular within; corolla funnelform, the limb 5-lobate; follicles elongate, straight, appressed. "Laurel rosa," "laurel blanco," "laurel colorado" (Mexico, Porto Rico, Ecuador); "adelfa" (Mexico, Porto Rico, Ecuador, Guam); "yaga-quiequeze" (Oaxaca, Zapotec, *Reko*); "narciso" (Guatemala, El Salvador); "berberia" (Venezuela); "rosa laurel" (Mexico, Guam); "adelfa sencilla" (Porto Rico); "laurel rosado" (Porto Rico, Colombia); "flor de Habana" (Colombia).

The oleander is one of the handsomest of cultivated shrubs and is abundantly planted in Mexican parks and gardens. The plant contains alkaloids which act as a powerful cardiac poison, and has been employed in medicine as a heart stimulant and tonic. It has long been used in southern Europe for destroying rats, and sometimes for poisoning people. An infusion of the

leaves in oil has been used as a remedy for cutaneous diseases and to destroy parasites. In Venezuela the juice of the leaves has been employed for keeping away or destroying flies, and also to remove warts.

11. THENARDIA H. B. K. Nov. Gen. & Sp. 3: 210. 1819.

Scandent shrubs; leaves opposite, petiolate; flowers in umbel-like cymes, pseudo-axillary, slender-pedicellate; calyx 5-parted, glandular within; corolla subrotate, the tube very short, the lobes dextrorsely contorted; stamens exerted, the anthers sagittate, connivent, appendaged at base; fruit of 2 elongate follicles.

Corolla about 12 mm. long-----1. *T. floribunda*.
Corolla 6 mm. long-----2. *T. galeottiana*.

1. Thenardia floribunda H. B. K. Nov. Gen. & Sp. 3: 210. *pl.* 240. 1819.

Thenardia suaveolens Mart. & Gal. Bull. Acad. Brux. 11: 359. 1844.

Michoacán to Mexico and Oaxaca; type collected near the City of Mexico.

Large vine, glabrous throughout, the branches slender; leaves slender-petiolate, lance-oblong or ovate-oblong, 5.5 to 13.5 cm. long, acuminate or long-acuminate, obtuse at base; cymes pedunculate, many-flowered, 8 to 11 cm. broad, the flowers greenish white, sometimes tinged with purple; anthers 5 to 6 mm. long. "Petatillo" (Oaxaca).

2. Thenardia galeottiana Baill. Bull. Soc. Linn. Paris 2: 819. 1890.

Guerrero and Oaxaca.

Stems slender, glabrous; leaves lanceolate or narrowly lanceolate, 4 to 7.5 cm. long, attenuate, obtuse or acute at base; cymes few-flowered, about 3 cm. broad, puberulent; anthers 2.5 mm. long.

12. FORSTERONIA Meyer, Prim. Fl. Esseq. 135. 1818.

1. Forsteronia spicata (Jacq.) Meyer, Prim. Fl. Esseq. 135. 1818.

Echites spicata Jacq. Enum. Pl. Carib. 13. 1760.

Michoacán or Guerrero; reported from Campeche. Guatemala; Colombia, the type from Cartagena.

Woody vine; leaves opposite, short-petiolate, oblong to broadly oval, 5 to 15 cm. long, abruptly short-acuminate, rounded or obtuse at base, sparsely pilosulous beneath or glabrate; flowers white, the cymes spiciform, dense, terminal and axillary; calyx lobes ovate, acuminate, corolla 4 to 5 mm. long, pubescent outside and within, the lobes acute.

The writer has seen no Colombian specimens, but the Mexican plant agrees well with the descriptions. The latter may, however, represent a distinct species.

13. PRESTONIA R. Br. Mem. Wern. Soc. 1: 69. 1809.

Scandent shrubs; leaves opposite, petiolate; flowers in cymes, these pseudo-axillary; calyx 5-parted, the segments broad or narrow; corolla salverform, the tube slender, the 5 lobes broad, dextrorsely contorted; anthers sagittate, connivent, semiexserted, appendaged at base; follicles erect or divergent.

Calyx lobes linear or linear-lanceolate.

Leaves velutinous-pubescent beneath-----1. *P. contorta*.

Leaves obscurely puberulent or glabrate beneath-----2. *P. langlassei*.

Calyx lobes ovate or ovate-cordate.

Leaves glabrous-----3. *P. schizadenia*.

Leaves densely sericeous or pilose.

Leaves broadly elliptic or rounded-elliptic-----4. *P. mexicana*.

Leaves ovate-lanceolate-----5. *P. sericea*.

1. *Prestonia contorta* (Mart. & Gal.) Hemsl. Biol. Centr. Amer. Bot. 2: 311. 1881.

Haemadictyon contortum Mart. & Gal. Bull. Acad. Brux. 11: 360. 1844.
Type from Zacatepec, Oaxaca.

Leaves petiolate, oval, acuminate, subcordate at base, pubescent above, velutinous beneath; cymes dense, bifid, longer than the leaves; corolla about 2.5 cm. long, red, the lobes ovate-rounded.

2. *Prestonia langlassei* Standl., sp. nov.

Sinaloa to Guerrero; type from La Correa, Michoacán or Guerrero, altitude 50 meters (*Langlassé* 435; U. S. Nat. Herb. no. 385945).

Stems slender, obscurely puberulent or glabrate; petioles slender, 10 to 16 mm. long; leaf blades oblong-ovate, 5.5 to 10 cm. long, 2.2 to 5 cm. wide, truncate or subcordate at base, acuminate or cuspidate-acuminate at apex, thin, obscurely puberulent, the lateral nerves 6 or 7 on each side; cymes many-flowered, nearly as long as the leaves, pedunculate; pedicels puberulent, 10 to 17 mm. long; calyx lobes linear, about 5 mm. long; corolla blackish red, the tube 18 to 20 mm. long, sparsely villosulous, the lobes about 1 cm. long; anthers conspicuously exserted.

3. *Prestonia schizadenia* (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 312. 1881.

Haemadictyon schizadenium Muell. Arg. Linnaea 30: 431. 1860.

Type from Papantla, Veracruz.

Branches scabrid; leaves short-petiolate, oblong-ovate or oblong-elliptic, 12 to 15 cm. long, 4.5 cm. wide, short-acuminate, rounded or cordate at base; cymes half as long as the leaves; calyx 14 mm. long, glabrous; corolla 2.5 cm. long, glabrous.

4. *Prestonia mexicana* (A. DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 312. 1881.

Haemadictyon mexicanum A. DC. in DC. Prodr. 8: 428. 1844.

Guerrero to San Luis Potosí, Veracruz, and Morelos. Central America.

Large scandent shrub; leaves very short-petiolate, 8 to 16 cm. long, 5 to 12 cm. wide, rounded or obtuse at apex and shortly cuspidate, rounded or subcordate at base, densely covered with fulvous pubescence; calyx 1.5 to 2.5 cm. long, the lobes ovate or lance-oblong; corolla about 4 cm. long, densely pillose; follicles divaricate, about 8 cm. long and nearly 2 cm. thick, densely hispid; seeds with a coma of long soft hairs. "Cacha de chivo" (El Salvador).

5. *Prestonia sericea* Mart. & Gal. Bull. Acad. Brux. 11: 360. 1844.

Type collected in Oaxaca.

Stems villous; leaves sessile, acuminate, subcordate at base, villous above, sericeous-tomentose beneath; calyx lobes cordate-ovate, acuminate; corolla sericeous-villous.

Probably only a form of *P. mexicana*.

14. **MACROSIPHONIA** Muell. Arg. in Mart. Fl. Bras. 6¹: 137. 1860.

Plants erect, low, fruticose or suffrutescent; leaves mostly opposite, sessile or short-petiolate; flowers large and showy, terminal or becoming lateral, short-pedicellate; calyx 5-parted, glandular within, the lobes narrow; corolla funnelform, the tube slender, elongate, enlarged above; anthers oblong or sagittate, appendaged at base; follicles long and slender, erect.

Leaves orbicular or reniform-orbicular, as broad as long-----1. *M. hesperia*.
Leaves linear to oval, longer than broad.

Leaves green beneath, thinly puberulent-----2. *M. brachysiphon*.

Leaves white-tomentose beneath.

Corolla tube 7.5 to 12.5 cm. long-----3. *M. macrosiphon*.
Corolla tube 3 to 5.5 cm. long-----4. *M. hypoleuca*.

1. *Macrosiphonia hesperia* Johnston, Proc. Calif. Acad. 12: 1125. 1924.
Southern Baja California; type from Carmen Island.

Leaves short-petiolate, orbicular or reniform-orbicular, 1.5 to 3 cm. long and broad, rounded at apex and apiculate, truncate or subcordate at base, densely velutinous-pilosulous above, beneath very densely pilose but scarcely tomentose; follicles 6 to 8 cm. long, 3 to 4 mm. thick, densely puberulent.

2. *Macrosiphonia brachysiphon* A. Gray, Syn. Fl. 2¹: 83. 1878.

Northern Sonora, near the boundary. Southern Arizona.

Plants suffrutescent, 60 cm. high or less, puberulent; leaves oblong to broadly elliptic, 2 to 3 cm. long, acute to rounded at apex; flowers fragrant; corolla white, the tube 2.5 to 5 cm. long; follicles 6 cm. long or more.

3. *Macrosiphonia macrosiphon* (Torr.) Heller, Muhlenbergia 1: 2. 1900.

Echites macrosiphon Torr. U. S. & Mex. Bound. Bot. 158. pl. 43. 1859.

Macrosiphonia berlandieri A. Gray, Syn. Fl. 2¹: 83. 1878.

Chihuahua to Tamaulipas, San Luis Potosí, and Durango. Western Texas; type collected along the Rio Grande.

Low shrub; leaves short-petiolate, mostly oval, 2 to 4 cm. long, acute to rounded at apex, truncate or rounded at base, tomentulose or glabrate above; flowers white, sweet-scented; corolla limb 4.5 to 6 cm. wide; follicles 6 to 10 cm. long. "Flor de San Juan" (Durango, Coahuila); "hierba de San Juan" (Coahuila, Tamaulipas).

4. *Macrosiphonia hypoleuca* (Benth.) Muell. Arg. Linnaea 30: 452. 1860.

Echites hypoleuca Benth. Pl. Hartw. 23. 1839.

Echites suaveolens Mart. & Gal. Bull. Acad. Brux. 11: 356. 1844.

Echites lanuginosa Mart. & Gal. Bull. Acad. Brux. 11: 357. 1844.

Macrosiphonia lanuginosa Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Sinaloa to Chihuahua, San Luis Potosí, Hidalgo, and Puebla; type from Aguascalientes.

Shrub, 1 meter high or less; leaves linear to oblong-ovate, 2.5 to 7 cm. long, rounded to acute at apex, green above but puberulent, the margins often revolute; flowers white, very sweet-scented; corolla limb usually 6 to 7 cm. wide; follicles 9 to 16 cm. long. "Flor de San Juan" (Sinaloa, Guanajuato, San Luis Potosí, Jalisco, Durango); "rosa de San Juan" (Sinaloa, Oaxaca, Guerrero, Durango); "güirambo" (Guerrero); "hierba de la cucaracha" (San Luis Potosí); "San Juan" (Durango); "maravilla silvestre" (Sinaloa).

The pulverized plant, mixed with sugar, is said to be useful for poisoning cockroaches. Palmer reports that in San Luis Potosí and Durango a decoction of the plant is employed for pains in the stomach, toothache (applied hot to the tooth), and externally for inflamed eyes.

The species shows great variation in size of flowers and in leaf breadth, but the leaves vary greatly upon the same plant, the lower being often much broader than the upper ones.

15. *RHABDADENIA* Muell. Arg. in Mart. Fl. Bras. 6¹: 173. 1860.

Scandent shrubs; leaves opposite, petiolate; flowers large, in few-flowered racemes; calyx 5-parted, eglandular; corolla funnelform, the tube cylindric, the throat long-campanulate; anthers oblong, obtuse, short-appendaged at base; follicles terete, linear-fusiform; seeds with a terminal tuft of hairs.

Leaves oblong, acute or acutish at base; calyx lobes oblong to oval, obtuse.

1. *R. paludosa*.

Leaves elliptic, rounded or subcordate at base; calyx lobes ovate, acuminate.

2. *R. cordata*.

1. *Rhabdadenia paludosa* (Vahl) Miers, Apocyn. S. Amer. 119. 1878.

Echites paludosa Vahl, Eclog. Amer. 2: 19. pl. 5. 1798.

Yucatán. Southern Florida, West Indies, and South America.

Stout woody vine, glabrous throughout; leaves 4.5 to 10 cm. long, obtuse or rounded at apex, leathery; calyx 6 to 9 mm. long; corolla 6 to 7 cm. long, white or pale yellow. "Clavelitos de sabana," "clavelitos de manglar" (Cuba).

The acrid juice is said to produce blisters upon the skin, and to have purgative and even poisonous properties.

2. *Rhabdadenia cordata* (Mill.) Miers, Apocyn. S. Amer. 122. 1878.

Apocynum cordatum Mill. Gard. Dict. ed. 8. *Apocynum* no. 10. 1768.

Tamaulipas and Veracruz; type from Veracruz.

Stout vine; leaves 5 to 11 cm. long, acute or abruptly short-acuminate, leathery, sparsely pubescent or glabrate; racemes few-flowered; corolla yellow, 6 to 7 cm. long; follicles divaricate, about 11 cm. long and 6 mm. thick.

16. *URECHITES* Muell. Arg. Bot. Zeit. 18: 22. 1860.

Scandent shrubs; leaves opposite; flowers large, racemose; calyx 5-parted, glandular within, the lobes narrow; corolla funnelform, the tube slender, terete, the throat campanulate, the lobes short; anthers sagittate, bearing at the apex a long filiform twisted appendage; follicles terete, erect or divergent; seeds with an apical tuft of hairs.

Leaves densely velutinous-pilosulous beneath; calyx 2 to 3 mm. long.

1. *U. karwinskii*.

Leaves glabrate or sparsely pubescent beneath; calyx 5 to 6 mm. long.

2. *U. andrieuxii*.

1. *Urechites karwinskii* Muell. Arg. Linnaea 30: 440. 1860.

Mandevilla potosina T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 276. 1912.

Guerrero to San Luis Potosí, Veracruz, and Oaxaca; type from "Huefulta" (Huejutla, Hidalgo?). Guatemala.

Leaves petiolate, ovate-oblong to oval-elliptic, 5 to 10 cm. long, acuminate or abruptly short-acuminate, rounded or subcordate at base, sometimes panduriform; corolla white, 3.5 to 5.5 cm. long, the tube very slender; follicles about 12 cm. long. "Loroco" (Guatemala, El Salvador); "quillite" (El Salvador).

The flowers, buds, and young tender shoots are used as a vegetable in Guatemala and El Salvador, being cooked with rice and other substances.

2. *Urechites andrieuxii* Muell. Arg. Linnaea 30: 442. 1860.

Type collected near Tehuantepec, Oaxaca; reported also from Hidalgo.

Leaves petiolate, broadly elliptic or elliptic-ovate, 5 to 6 cm. long, abruptly short-acuminate, rounded at base, glabrous above; corolla 5 cm. long; follicles 17 cm. long and 6 mm. thick.

17. *MANDEVILLA* Lindl. Bot. Reg. pl. 7. 1840.

Scandent shrubs; leaves opposite; flowers small or large, racemose, usually white; calyx 5-parted, glandular within; corolla funnelform, the tube cylindric, the throat campanulate; anthers obtuse or short-acuminate, appendaged at base; follicles erect or nearly so; seeds with an apical tuft of hairs.

The Mexican species are poorly represented in herbaria, and the following treatment is chiefly a mere compilation.

Corolla 12 to 14 mm. long-----1. *M. andrieuxii*.

Corolla 2 cm. long or larger.

Leaves subsessile-----2. *M. foliosa*.

Leaves petiolate.

Leaves tomentose beneath-----3. *M. convolvulacea*.

Leaves hirtellous or glabrous beneath-----4. *M. oaxacana*.

1. *Mandevilla andrieuxii* (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Amblyanthera andrieuxii Muell. Arg. Linnaea 30: 422. 1860.

Type collected at San Francisco, between Huauapan and Oaxaca.

Leaves short-petiolate, narrowly obovate or obovate-lanceolate, 2 to 3 cm. long, subacute at base and apex, soft-pubescent beneath; calyx lobes ovate-lanceolate.

2. *Mandevilla foliosa* (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Amblyanthera foliosa Muell. Arg. Linnaea 30: 427. 1860.

Type collected near the City of Mexico.

Leaves obovate, 9 to 12 cm. long, acuminate, cordate at base, glabrate above, hirtellous beneath along the nerves; corolla 2 cm. long.

3. *Mandevilla convolvulacea* (A. DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Echites convolvulacea A. DC. in DC. Prodr. 8: 451. 1844.

Leaves oval, 7.5 to 10 cm. long, acuminate, obtuse or cordate at base, glabrate above; corolla tube 12 mm. long.

4. *Mandevilla oaxacana* (A. DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881.

Echites oaxacana A. DC. in DC. Prodr. 8: 451. 1844.

Echites glaucescens Mart. & Gal. Bull. Acad. Brux. 11: 358. 1844.

Mesechites hirtellula Miers, Apocyn. S. Amer. 234. 1878.

Mandevilla schumanniana Loesener, Bull. Herb. Boiss. 2: 556. 1894.

Oaxaca.

Scandent shrub; leaves lance-oblong to oblong-ovate, 4 to 6.5 cm. long, acute or acuminate, rounded or subcordate at base, scaberulous or glabrate above; corolla 2.5 to 3 cm. long, the tube slightly shorter than the throat.

DOUBTFUL SPECIES.

MANDEVILLA KARWINSKII (Muell. Arg.) Hemsl. Biol. Centr. Amer. Bot. 2: 316. 1881. *Amblyanthera karwinskii* Muell. Arg. Linnaea 30: 426. 1860. Type from Mexico. The description strongly suggest *Echites coulteri*.

18. *HAPLOPHYTON* A. DC. in DC. Prodr. 8: 412. 1844.

The genus consists of a single species.

1. *Haplophyton cimidum* A. DC. in DC. Prodr. 8: 412. 1844.

Sonora and Chihuahua to Veracruz and Chipas; type from Tehuantepec, Oaxaca. Guatemala; Cuba; southern Arizona.

Plants slender, herbaceous or woody below, usually 30 to 60 cm. high, the stems puberulent; leaves opposite, short-petiolate, ovate or lanceolate, 3 to 5 cm. long, long-acuminate, rounded at base, hispidulous; flowers few, terminal, pedicellate, yellow; calyx eglandular, 5-parted, the lobes linear-subulate; corolla salverform, the lobes 12 to 15 mm. long, longer than the slender tube;

follicles very slender, 6 to 8 cm. long; seeds with deciduous hairs at each end. "Hierba de la cucaracha" (Oaxaca, Morelos); "raíz de la cucaracha" (Oaxaca); "atempatli" ("flea-medicine") or "actimpatli" (Nahuatl).

The plant is well known in Mexico as an insecticide. A decoction of the plant is mixed with cornmeal and used as a poison for cockroaches. The decoction is also applied as a lotion to the human body to kill all sorts of parasites and a lard ointment is employed for the same purpose. Flores states that a sweetened infusion of the plant will attract and kill mosquitoes.

19. *ECHITES* Jacq. Enum. Pl. Carib. 13. 1760.

Scandent shrubs; leaves opposite; flowers small or large, in axillary racemes; calyx 5-parted, glandular within; corolla salverform, the tube cylindric; anthers sagittate, appendaged at base; follicles slender, terete, often torulose; seeds with an apical tuft of silky hairs.

The following names are reported for plants which are said to belong to the genus: "Tijerilla" (Guanajuato); "raíz de cuculillo," "raíz de la cucaracha" (Oaxaca).

Leaves glabrous beneath.

Corolla tube 6 to 12 mm. long.

Calyx lobes linear-lanceolate, one-third as long as the corolla tube or longer.

Corolla tube about 6 mm. long-----1. *E. torosa*.

Corolla tube 10 to 12 mm. long-----2. *E. smithii*.

Calyx lobes triangular, less than one-fifth as long as the corolla tube.

3. *E. tuxtlensis*.

Corolla tube 25 to 50 mm. long.

Calyx lobes obtuse-----4. *E. trifida*.

Calyx lobes acute or acuminate.

Corolla tube about 5 cm. long-----5. *E. umbellata*.

Corolla tube 2.5 to 3.5 cm. long.

Leaves thin, deeply emarginate at base-----11. *E. microcalyx*.

Leaves coriaceous, rounded or subcordate at base-----6. *E. rosea*.

Leaves variously pubescent beneath.

Corolla lobes short, suberect, not spreading-----7. *E. tubiflora*.

Corolla lobes elongate, spreading.

Calyx lobes obtuse-----8. *E. lanata*.

Calyx lobes acuminate.

Calyx lobes one-third as long as the corolla tube or longer.

Leaves mostly obtuse, acute or obtuse at base-----9. *E. coulteri*.

Leaves acute or acuminate, usually subcordate at base.

10. *E. apocynifolia*.

Calyx lobes less than one-fourth as long as the corolla tube.

Flowers 2.5 to 3.5 cm. long-----11. *E. microcalyx*.

Flowers about 1.5 cm. long-----12. *E. mexicana*.

1. *Echites torosa* Jacq. Enum. Pl. Carib. 13. 1760.

Yucatán and Campeche. West Indies; type from Jamaica.

Scandent shrub, glabrous throughout; leaves short-petiolate, lance-oblong, 3.5 to 4.5 cm. long, acute, obtuse or rounded at base, coriaceous; corolla yellow; follicles very slender, about 14 cm. long, torulose.

The juice is said to be poisonous and to have emetic-cathartic properties.

2. *Echites smithii* Greenm. Proc. Amer. Acad. 40: 29. 1904.

Oaxaca; type from Salomá, altitude 1,980 meters.

Stems puberulent; leaves short-petiolate, oblong-lanceolate, 3 to 6 cm. long, acute, subcordate at base, glabrous or puberulent above, glabrous beneath; racemes short, 1 to 3-flowered; calyx 4 to 5 mm. long; corolla yellow, glabrous; follicles pubescent.

3. *Echites tuxtlensis* Standl., sp. nov.

Type from Tuxtla, Chiapas, altitude 720 to 840 meters (*Nelson* 3080; U. S. Nat. Herb. no. 234032).

Stems glabrous; leaves short-petiolate, the petioles puberulent, the blades lance-oblong or linear-oblong, 5 to 10 cm. long, 0.8 to 2.5 cm. wide, acute or acuminate, acute at base, thick, pale, glabrous, the lateral nerves obsolete beneath; racemes slender, few-flowered, longer than the leaves, glabrous, the flowers long-pedicellate; calyx lobes triangular, acute, 1 to 1.5 mm. long; corolla tube 8 mm. long, the lobes 4 to 5 mm. long.

4. *Echites trifida* Jacq. Enum. Pl. Carib. 13. 1760.

Oaxaca. Central America and northern South America; type from Cartagena, Colombia.

Scandent glabrous shrub; leaves petiolate, elliptic-oblong or oval-elliptic, 6 to 11 cm. long, acute or short-acuminate, rounded or obtuse at base; calyx 5 to 6 mm. long; corolla purplish, the tube 2.5 to 3 cm. long; follicles slender, 30 to 35 cm. long, not torulose.

5. *Echites umbellata* Jacq. Enum. Pl. Carib. 13. 1760.

Yucatán and perhaps elsewhere. West Indies.

Leaves petiolate, ovate to oval, 4.5 to 10 cm. long, rounded or abruptly short-acuminate at apex, rounded at base, thick; racemes few-flowered; corolla white or pale yellow; follicles rather stout, 15 to 21 cm. long.

6. *Echites rosea* A. DC. in DC. Prodr. 8: 450. 1844.

Reported from San Luis Potosí, perhaps erroneously. Cuba.

Glabrous vine; leaves ovate-lanceolate, 1 to 2.5 cm. long, acuminate, sessile; peduncles 2 or 3-flowered; corolla purplish, with slender tube; follicles about 7.5 cm. long.

7. *Echites tubiflora* Mart. & Gal. Bull. Acad. Brux. 11: 358. 1844.

Jalisco to Veracruz, Morelos, and Michoacán; type from Jalapa, Veracruz, Guatemala.

Leaves petiolate, lance-oblong to elliptic, 4 to 9 cm. long, acute or short-acuminate, cordate at base, pilosulous or densely whitish-tomentose beneath; racemes secund, usually many-flowered; corolla 12 to 18 mm. long.

8. *Echites lanata* Mart. & Gal. Bull. Acad. Brux. 11: 359. 1844.

Type from Sola, Oaxaca, altitude 1,200 meters.

Stems pubescent; leaves sessile, obovate, coriaceous, acuminate, cordate at base, lanate beneath; racemes longer than the leaves; flowers about 2.5 cm. long.

9. *Echites coulteri* S. Wats. Proc. Amer. Acad. 18: 113. 1883.

Coahuila to San Luis Potosí and Hidalgo; type from the Sierra Madre south of Saltillo, Coahuila.

Plants scandent or suberect; leaves oblong-obovate to oval-elliptic, 2 to 4.5 cm. long, usually rounded at apex but often apiculate, sometimes emarginate, acute to rounded at base, pilosulous or puberulent beneath or finally glabrate; corolla tube about 1 cm. long; follicles 5 to 10 cm. long, torulose.

10. *Echites apocynifolia* A. Gray, Proc. Amer. Acad. **22**: 435. 1887.

Jalisco to Oaxaca; type from Río Blanco, Jalisco.

Plants suberect, puberulent; leaves short-petiolate, ovate-lanceolate to elliptic, acute or obtuse, glabrate in age; racemes few-flowered; corolla yellow, the tube 1 cm. long; follicles torulose.

11. *Echites microcalyx* A. DC. in DC. Prodr. **8**: 456. 1844.

Echites secundiflora A. DC. in DC. Prodr. **8**: 457. 1844.

Echites jasminiflora Mart. & Gal. Bull. Acad. Brux. **11**: 357. 1844.

Sinaloa to Veracruz, Tabasco, and Chiapas. Central America and northern South America; type from Caracas, Venezuela.

Scandent shrub; leaves short-petiolate, oblong to ovate-elliptic or obovate, 3 to 7 cm. long, acute or acuminate, cordate or hastate at base, pilosulous beneath or rarely glabrous, thin; racemes few or many-flowered; corolla yellow; follicles 8 to 20 cm. long, very slender, conspicuously torulose. "Flor del mico" (Guatemala, Honduras).

12. *Echites mexicana* (Muell. Arg.) Miers, Apocyn. S. Amer. 205. 1878.

Amblyanthera mexicana Muell. Arg. Linnaea **30**: 424. 1860.

Type from "Victoria."

Leaves ovate-lanceolate, 4 to 5 cm. long, acuminate, cordate at base, pubescent; racemes few-flowered.

DOUBTFUL SPECIES.

ECHITES ASPERA Mart. & Gal. Bull. Acad. Brux. **11**: 359. 1844. Type from Río de las Vueltas, Oaxaca.

ECHITES CORDATA A. DC. in DC. Prodr. **8**: 451. 1844. Based upon one of Sessé and Mocino's drawings¹ of a Mexican plant.

ECHITES PANDURATA A. DC. in DC. Prodr. **8**: 458. 1844. Type from San Dionisio, Oaxaca.

20. *STREPTOTRACHELUS* Greenm. Proc. Amer. Acad. **32**: 298. 1897.

The genus consists of a single species.

1. *Streptotrachelus pringlei* Greenm. Proc. Amer. Acad. **32**: 298. 1897.

Morelos and Guerrero; type from Cuernavaca, Morelos, altitude 1,560 meters.

Large woody vine; leaves opposite, slender-petiolate, oblong-ovate to ovate-elliptic, 4 to 8 cm. long, short-acuminate, rounded or subcordate at base, puberulent; flowers greenish yellow or purplish, in axillary pedunculate cymes; calyx 5-parted, puberulent, eglandular, about 4 mm. long, the lobes lance-linear; corolla salverform, the tube about 2 cm. long, twisted; anthers sagittate, acuminate, appendaged at base; follicles 20 to 30 cm. long, slender, torulose; seeds with an apical tuft of soft hairs.

21. *SECONDATIA* DC. Prodr. **8**: 445. 1844.

Secondatia difformis (Walt.) Benth. & Hook., a United States species, has been reported from Nuevo León, but probably incorrectly. At least a part of the specimens so labeled belong to the genus *Echites*.

1. *Secondatia stans* (A. Gray) Standl.

Trachelospermum stans A. Gray, Proc. Amer. Acad. **21**: 394. 1886.

Sinaloa to Chihuahua, Querétaro, Guanajuato, and Michoacán; type from the city of Chihuahua.

¹ DC. Calq. Dess. Fl. Mex. pl. 796.

Shrub, erect or nearly so, about a meter high; leaves opposite, petiolate, elliptic to ovate or oblong, 6 to 12 cm. long, abruptly acuminate, rounded at base, puberulent or glabrate beneath; flowers pale yellow, in lax axillary bifid cymes; calyx lobes lance-linear; corolla salverform, glabrous, the tube 10 to 15 mm. long; follicles slender, torulose, 7 to 13 cm. long; seeds with an apical tuft of long silky hairs. "Hierba de la cucaracha" (Durango, Sinaloa, Michoacán).

The flowers are sweet-scented. The plant is used for poisoning cockroaches.

141. ASCLEPIADACEAE. Milkweed Family.

Plants erect or scandent, herbaceous or woody, with milky juice; leaves opposite, rarely verticillate or alternate, entire, estipulate; flowers perfect, regular, usually in cymes, these commonly umbelliform or racemiform; calyx inferior, the tube very short or none; corolla gamopetalous, rotate, campanulate, urceolate, or rarely funnelform or salverform, 5-lobate; corona usually present, adnate to the corolla or to the stamen tube, variously modified; stamens 5, the filaments usually short and connate; anthers basifixed, connivent about the stigma, forming with that and the filaments the gynostegium, 2-celled, the cells usually produced below, the connective often with a membrane at apex; pollen usually coherent in masses known as pollinia; 5 small corpuscles present on the margin of the disk between the anthers, these attached to the pollinia and supporting them after dehiscence of the anthers; ovary of 2 distinct carpels; stigma usually forming a 5-angulate disk; fruit of 2 follicles, one of these usually abortive, sessile, dehiscent; seeds often with a terminal tuft of hairs.

A large family, characterized by flowers of extremely complicated structure. A few genera represented only by herbaceous species occur in Mexico.

Pollen granular; corolla funnelform, 5 to 7 cm. long, pink or purplish.

Scandent shrub, glabrous or nearly so.....1. **CRYPTOSTEGIA**.

Pollen waxy; corolla never funnelform, smaller.

Pollinia borne in the lower part of the anther cell, pendulous from the arms of the corpuscles.

Plants erect.....2. **ASCLEPIAS**.

Plants scandent.

Corona none.....3. **ASTEPHANUS**.

Corona present.

Corona adnate to the corolla.

Corona simple; corolla with a distinct tube.....4. **MACROSCEPIS**.

Corona double; corolla rotate.

Outer corona thin, entire or nearly so.....5. **FUNASTRUM**.

Outer corona fleshy, 5-lobate.....6. **FISCHERIA**.

Corona adnate to the gynostegium.

Corolla lobes valvate in bud.

Corona scales thin, flat.....7. **METASTELMA**.

Corona scales cucullate.....8. **BLEPHARODON**.

Corolla lobes contorted.

Leaves not cordate at base, usually linear to lanceolate, sometimes ovate.

Corona deeply lobate; stigma rostrate.....9. **BASISTELMA**.

Corona shallowly lobate; stigma conic.....10. **CYNANCHUM**.

Leaves ovate-cordate.

Corolla campanulate.....11. **MELlichAMPIA**.

Corolla rotate or nearly so.

Corolla about 2 cm. long, the lobes linear.

12. **OXYPETALUM**.

Corolla much smaller, the lobes broader than linear.

13. **ROULINIELLA**.

Pollinia borne in the upper part of the anther cell, erect or divaricate from the arms of the corpuscles.

Anther cells longitudinally dehiscent; pollinia erect or nearly so.

Plants erect.....14. **NEPHRADENIA**.

Plants scandent.....15. **MARSDENIA**.

Anther cells transversely dehiscent; pollinia usually horizontal.

Corolla lobes with long barbate filiform terminal appendages.

16. **TRICHOSACME**.

Corolla lobes not appendaged.

Corolla campanulate or salverform.

Corolla short-salverform.....17. **LACHNOSTOMA**.

Corolla broadly campanulate.

Corolla long-hirsute within.....18. **MICRODACTYLON**.

Corolla not hirsute within.

Corolla lobes adnate to the corolla.....19. **DICTYANTHUS**.

Corolla lobes free from the corolla.....20. **POLYSTEMMA**.

Corolla rotate.

Stigma produced into a column.....21. **ROTHROCKIA**.

Stigma plane or depressed.

Corolla entire or 5-lobate, the lobes not with lateral appendages.....22. **VINCETOXICUM**.

Corolla with 10 or more lobes, or the outer lobes with filiform lateral appendages.

Corolla covered within with linear-spatulate hairs; corolla of 15 scales.....23. **HIMANTOSTEMMA**.

Corolla lanate in the throat; corolla of 10 scales.

24. **UROSTEPHANUS**.

1. **CRYPTOSTEGIA** R. Br. in Lindl. Bot. Reg. pl. 435. 1819.

1. **Cryptostegia grandiflora** (Roxb.) R. Br. in Lindl. Bot. Reg. pl. 435. 1819.

Nerium grandiflorum Roxb. Hort. Beng. 19. 1814.

Thoroughly naturalized in Sinaloa. Native of India.

Woody vine, glabrous or nearly so; leaves petiolate, oval to elliptic-ovate, 4.5 to 10 cm. long, obtuse or abruptly short-pointed, leathery; flowers few, in terminal cymes, pink or purplish; calyx 5-parted, the lobes lanceolate; corolla funnelform, 5 to 7 cm. long; carpels divaricate, about 12 cm. long and 3.5 cm. thick, acutely 3-angulate. "Clavel de España," "hiedra," "cuaumecate chayote" (Sinaloa).

The milky juice yields rubber, and the plant has been cultivated in some regions on that account. The rubber is said to be of good quality, but it is produced only in small amounts. The stems are said to yield a good quality of fiber. *Cryptostegia madagascariensis* Bojer, of Madagascar, the only other species, is reported to be an important source of rubber, and its bark furnishes a useful fiber.

2. ASCLEPIAS L. Sp. Pl. 214. 1753.

Shrubs or usually herbs; leaves opposite, verticillate, or alternate; flowers in terminal or axillary umbels; calyx 5-parted; corolla 5-parted, the lobes valvate, reflexed in anthesis; corona of 5 concave erect scales, each with a terminal incurved hornlike terminal appendage; follicles usually smooth; seeds with a terminal tuft of hairs.

Numerous herbaceous species of milkweed occur in Mexico.

Stems densely leafy, the leaves mostly scattered-----1. *A. linaria*.

Stems naked or nearly so except when young, the leaves opposite or verticillate.

Corona scales 3 mm. long or less-----2. *A. albicans*.

Corona scales 6 to 7 mm. long-----3. *A. subulata*.

1. *Asclepias linaria* Cav. Icon. Pl. 1: 42. pl. 57. 1791.

Jalisco to Chihuahua, Veracruz, and Oaxaca.

Stems herbaceous or more commonly woody, whitish-pubescent; leaves narrowly linear, 1 to 4 cm. long, glabrate; umbels axillary, pedunculate; flowers green and white, the corona scales 2.5 to 3 mm. long; follicles ovoid or narrowly ovoid, 3.5 to 6 cm. long, glabrous. "Romerillo" (Mexico, Aguascalientes, San Luis Potosí); "plumerillo" (Aguascalientes); "torbisco" (Durango); "mapipitza" (Mexico, San Luis Potosí, *Ramírez*); "Solimán" (Mexico); "teperomero" (Mexico); "tlalayote" (San Luis Potosí, Mexico, *Urbina*); "venenillo" (Mexico, San Luis Potosí); "algodoncillo," "hierba de la punzada" (Durango).

The juice is used locally as a drastic purgative, but its use is dangerous. Palmer reports that in Durango the leaves are applied to the temples to relieve headache.

2. *Asclepias albicans* S. Wats. Proc. Amer. Acad. 24: 59. 1889.

Baja California and Sinaloa; type from Los Angeles Bay, Baja California.

Stems numerous, often woody below, sometimes 3 meters high, whitish, puberulent when young; leaves opposite or ternate, linear, quickly deciduous; corolla greenish white tinged with brown, the corona scales yellowish; follicles slender, about 10 cm. long.

3. *Asclepias subulata* Decaisne in DC. Prodr. 8: 571. 1844.

Baja California, Sonora, and Sinaloa. Southern California and Arizona.

Stems numerous, about 1 meter high, usually woody below, glabrous or nearly so, glaucous; leaves narrowly linear but quickly deciduous; pedicels puberulent; corolla greenish white; follicles slender, 10 to 12 cm. long. "Yamete" (Baja California); "yumete" (Sonora); "candelilla bronca" (Sinaloa).

The milky juice is sometimes employed as an emetic and purgative.

3. ASTEPHANUS R. Br. Mem. Wern. Soc. 1: 54. 1809.**1. *Astephanus pubescens* Greenm. Proc. Amer. Acad. 32: 299. 1897.**

Morelos and Mexico; type collected near Cuernavaca, Morelos, altitude 1,950 meters.

Slender suffrutescent vine, the stems pubescent; leaves petiolate, lanceolate or ovate-lanceolate, 1.5 to 6 cm. wide, acuminate, obtuse at base, pubescent; inflorescence subumbellate, few-flowered, the peduncles 1 to 2 mm. long, the pedicels about 3 mm. long; calyx minute, 5-parted, pubescent; corolla sub-campanulate, about 3 mm. broad, white or purplish, the lobes emarginate.

4. **MACROSCEPIS** H. B. K. Nov. Gen. & Sp. 3: 200. 1819.

Stems scandent, suffrutescent, setose-hirsute; leaves cordate; cymes usually subsessile, the flowers large; calyx 5-lobate, eglandular; corolla short-salverform, the tube ovoid or campanulate, constricted in the throat, the lobes spreading, contorted in bud; corona adnate to the corolla tube, composed of 5 fleshy inflexed subexserted scales; stigma plane or umbonate; follicles fleshy; seeds with an apical tuft of hairs.

Sepals acuminate-----1. **M. obovata**.

Sepals obtuse-----2. **M. rotata**.

1. **Macroscepis obovata** H. B. K. Nov. Gen. & Sp. 3: 201. *pl.* 133. 1819.

San Luis Potosí to Oaxaca, Chiapas, Veracruz, and Campeche; type from Campeche.

Stems fulvous-hirsute; leaves obovate to rounded-obovate, 6 to 17 cm. long, abruptly short-acuminate, deeply cordate at base, hirsute, especially beneath; cymes sessile, few-flowered, the flowers pedicellate; sepals hirsute and ciliate; corolla 2 to 2.5 cm. broad, hirtellous or glabrate outside, glabrous within, the lobes obtuse.

2. **Macroscepis rotata** Decaisne in DC. Prodr. 8: 599. 1844.

Type from Yucatán.

Leaves obovate, short-acuminate, cordate at base; peduncles short, 2 or 3-flowered; sepals ovate; corolla subrotate, the lobes ovate, obtuse.

Perhaps only a form of *M. obovata*. Decaisne states that the sepals are only half as long as in the latter species.

5. **FUNASTRUM** Fourn. Ann. Sci. Nat. VI. 14: 388. 1882.

Plants scandent, herbaceous or fruticose; leaves petiolate; flowers white or purplish, in axillary umbel-like cymes; calyx small, 5-parted; corolla subrotate, 5-lobate, the lobes contorted; exterior corona annular, adnate to the corolla; interior corona of 5 broad fleshy scales; pollinia pendulous; follicles smooth, terete.

Leaves linear or, if broader, obtuse or acute at base (linear leaves sometimes cordate-hastate at base).

Leaves crispate-----1. **F. crispum**.

Leaves plane.

Leaves linear, sometimes hastate-cordate.

Corolla lobes obtuse or acute-----2. **F. cumanense**.

Corolla lobes acuminate-----3. **F. heterophyllum**.

Leaves lance-oblong to elliptic, obtuse at base-----4. **F. clausum**.

Leaves deltoid, ovate, or broader, conspicuously cordate at base.

Leaves white-tomentose beneath.

Leaves orbicular-----5. **F. rotundifolium**.

Leaves ovate or elliptic-----6. **F. pannosum**.

Leaves glabrous or pubescent beneath, never tomentose.

Stems glabrous or nearly so-----7. **F. cynanchoides**.

Stems densely pubescent.

Umbels sessile or subsessile.

Corolla lobes papillose within-----8. **F. lindenianum**.

Corolla lobes not papillose within-----9. **F. bicolor**.

Umbels on conspicuous, usually long peduncles.

Corolla lobes acuminate.....10. *F. dumetorum*.

Corolla lobes obtuse.

Lobes of the inner corona ovate-triangular.....11. *F. bilobum*.

Lobes of the inner corona oval, very obtuse.

Corolla glabrous outside.....12. *F. elegans*.

Corolla pubescent.....13. *F. torreyi*.

1. *Funastrum crispum* (Benth.) Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Sarcostemma crispum Benth. Pl. Hartw. 291. 1841.

Sarcostemma undulatum Torr. U. S. & Mex. Bound. Bot. 161. 1859.

Philibertia crispa Hemsl. Biol. Centr. Amer. Bot. 2: 318. 1881.

Philibertella crispa Vail, Bull. Torrey Club 24: 306. 1897.

Type from Aguascalientes. Western Texas to southern Arizona.

Stems chiefly herbaceous, glabrous or puberulent; leaves linear or lanceolate, 5 to 7 cm. long, attenuate, hastate-cordate at base, pale beneath; umbels pedunculate, few-flowered; corolla dull purple, glabrous within, puberulent outside, the lobes obtuse; follicles 10 to 12 cm. long.

No Mexican specimens have been seen by the writer.

2. *Funastrum cumanense* (H. B. K.) Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Sarcostemma cumanense H. B. K. Nov. Gen. & Sp. 3: 195. 1819.

Sarcostemma arenarium Benth. Bot. Voy. Sulph. 34. 1844.

Philibertia cumanensis Hemsl. Biol. Centr. Amer. Bot. 2: 218. 1881.

Baja California to Colima, Oaxaca, and Tabasco. Central America and northern South America; type from Cumaná, Venezuela.

Stems suffrutescent, or thick and woody at base, pilosulous or glabrate; leaves linear, 3 to 5.5 cm. long, short-petiolate, obtuse or acute at base, glabrate; umbels pedunculate; corolla 10 to 12 mm. broad, sericeous or puberulent outside. "Cuchamperrito," "bejuco de pescado" (El Salvador).

In El Salvador the tough stems are employed by the fishermen as cords on which to string fish.

3. *Funastrum heterophyllum* (Engelm.) Standl.

Sarcostemma lineare Decaisne; Benth. Pl. Hartw. 25. 1840. Not *S. lineare* Spreng. 1822.

Sarcostemma heterophyllum Engelm.; Torr. U. S. Rep. Expl. Miss. Pacif. 5: 362. 1876.

Philibertia linearis A. Gray, Proc. Amer. Acad. 12: 64. 1876.

Philibertella hartwegii Vail, Bull. Torrey Club 24: 308. 1897.

Funastrum hartwegii Schlechter, Repert. Sp. Nov. Fedde 13: 285. 1914.

Baja California to Chihuahua, Coahuila, Querétaro, and Jalisco. Western Texas to southern California; type from Fort Yuma, Arizona.

Slender vine, herbaceous or suffrutescent, glaucescent, pubescent or glabrate; leaves linear, 3 to 6 cm long, acute, obtuse, or cordate-hastate at base; umbels pedunculate, few or many-flowered; corolla purplish, 8 to 10 mm. broad, pubescent outside; follicles 6 to 10 cm. long, pubescent or glabrate. "Hortensia de gufa" (Jalisco).

Said to be used in Sinaloa as a remedy for snake bites.

4. *Funastrum clausum* (Jacq.) Schlechter, Repert. Sp. Nov. Fedde 13: 283. 1914.

Cynanchum clausum Jacq. Stirp. Amer. 1: 87. 1763.

Sarcostemma crassifolium Decaisne in DC. Prodr. 8: 540. 1844.

Philibertia crassifolia Hemsl. Biol. Centr. Amer. Bot. 2: 318. 1881.

Philibertia palmeri A. Gray, Proc. Amer. Acad. 21: 394. 1886.

Cynanchum mexicanum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 380. 1913.

Funastrum crassifolium Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Funastrum palmeri Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914.

Baja California to Chihuahua, Tamaulipas, Morelos, Tabasco, and Oaxaca. Florida, West Indies, Central America, and northern South America.

Stems herbaceous or suffrutescent, usually glabrous; leaves petiolate, 3 to 7 cm. long, acuminate or cuspidate, glabrous or often densely pubescent beneath; umbels long-pedunculate, many-flowered; flowers 10 to 14 mm. broad, whitish, sericeous outside; follicles 5 to 6.5 cm. long, about 1 cm. thick. "Petaquilla" (Tabasco); "bejuco de leche," "quichi-nixi" (Oaxaca, *Seler*); "mata-tórsalo" (Costa Rica).

In Costa Rica the crushed leaves are applied at the point in the skin where a larva of the dipterous insect known as "tórsalo" is located, and the latter is soon killed by the acrid juice.

5. *Funastrum rotundifolium* (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 287. 1914.

Sarcostemma rotundifolium Decaisne in DC. Prodr. 8: 540. 1844.

Philibertia rotundifolia Hemsl. Biol. Centr. Amer. Bot. 2: 320. 1881.

Type from "Guasacualcos."

Leaves orbicular, abruptly acuminate, puberulent above, white-tomentose beneath; umbels long-pedunculate, many-flowered; corolla lobes acute, puberulent outside.

Probably not distinct from the next species.

6. *Funastrum pannosum* (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914.

Sarcostemma pannosum Decaisne in DC. Prodr. 8: 540. 1844.

Philibertia pavoni Hemsl. Biol. Centr. Amer. Bot. 2: 319. 1881.

Philibertia pannosa Hemsl. Biol. Centr. Amer. Bot. 2: 320. 1881.

Funastrum pavoni Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914.

Sonora to San Luis Potosí, Querétaro, and Oaxaca.

Stems herbaceous or frutescent, glabrate; leaves petiolate, 3 to 10 cm. long, acute, acuminate, or cuspidate, green above and puberulent, usually deeply cordate at base; umbels long-pedunculate, many-flowered; corolla white, 1.5 to 2 cm. broad, the lobes obtuse or subacute, puberulent outside. "Talayotillo" (Sinaloa).

7. *Funastrum cynanchoides* (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Sarcostemma cynanchoides Decaisne in DC. Prodr. 8: 540. 1844.

Philibertia cynanchoides A. Gray, Proc. Amer. Acad. 12: 64. 1876.

Philibertia cynanchoides Vail, Bull. Torrey Club 24: 207. 1897.

Sonora, Chihuahua, Coahuila, and Nuevo León; type from Matamoros, Coahuila. Western Texas to Arizona.

Stems chiefly herbaceous; leaves petiolate, deltoid-cordate or sagittate, 2.5 to 5.5 cm. long, acute or acuminate, usually glabrous; umbels many-flowered, long-pedunculate; corolla white, about 1 cm. broad, the lobes puberulent outside, ciliate, acute.

Philibertia cynanchoides subtruncata Robins. & Fern.¹, described from Fronteras, Sonora, is a form with narrow leaves which are mostly truncate at base.

¹ Proc. Amer. Acad. 30: 19. 1894.

8. *Funastrum lindenianum* (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914.

Sarcostemma lindenianum Decaisne in DC. Prodr. 8: 541. 1844.

Philibertia lindeniana Hemsl. Biol. Centr. Amer. Bot. 2: 318. 1881.

Type from Yucatán.

Stems pubescent; leaves cordate or subtruncate-cordate, rounded and short-cuspidate at apex, pubescent; pedicels about as long as the leaves; corolla lobes subobtusate.

9. *Funastrum bicolor* (Decaisne) Standl.

Sarcostemma bicolor Decaisne in DC. Prodr. 8: 541. 1844.

Philibertia bicolor A. Gray, Proc. Amer. Acad. 21: 395. 1886.

San Luis Potosí, Querétaro, Mexico, and Puebla; type from Tehuacán, Puebla.

Stems chiefly herbaceous; leaves petiolate, oblong-cordate or triangular-cordate, 2 to 5.5 cm. long, rounded and apiculate or cuspidate or long-acuminate, pubescent; umbels mostly few-flowered; corolla 2 to 2.5 cm. broad, greenish yellow and brownish purple, the lobes obtuse, puberulent outside, ciliate.

10. *Funastrum dumetorum* (T. S. Brandeg.) Standl.

Philibertia dumetorum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 380. 1913.

Type from Baños del Carrizal, Veracruz.

Stems retrorse-pubescent; leaves orbicular-ovate, 5.5 cm. long or less, obtuse, acuminate, or emarginate, deeply cordate at base, pubescent; corolla lobes 5 mm. long.

Not seen by the writer.

11. *Funastrum bilobum* (Hook. & Arn.) Standl.

Sarcostemma bilobum Hook. & Arn. Bot. Beechey Voy. 438. 1841.

Type from Acapulco, Guerrero.

Plants glabrous; leaves cordate-ovate, 3.5 to 5 cm. long, acuminate; umbels many-flowered, the peduncles longer than the leaves.

12. *Funastrum elegans* (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 284. 1914.

Sarcostemma elegans Decaisne in DC. Prodr. 8: 541. 1844.

Philibertia elegans Hemsl. Biol. Centr. Amer. Bot. 2: 318. 1881.

Philibertia ervendbergii A. Gray, Proc. Amer. Acad. 21: 395. 1886.

Philibertella elegans Vail, Bull. Torrey Club 24: 310. 1897.

Funastrum ervendbergii Schlechter, Repert. Sp. Nov. Fedde 13: 285. 1914.

Veracruz, Hidalgo, Mexico, Oaxaca, Chiapas, and Yucatán; type collected near the City of Mexico.

Stems chiefly herbaceous; leaves long-petiolate, broadly ovate-cordate, 4 to 7 cm. long, rounded at apex and usually short-cuspidate, deeply cordate at base, pubescent; corolla white or greenish, about 1 cm. broad. "Biná" (Oaxaca, Seler).

13. *Funastrum torreyi* (A. Gray) Schlechter, Repert. Sp. Nov. Fedde 13: 287. 1914.

Philibertia torreyi A. Gray, Proc. Amer. Acad. 12: 64. 1876.

Philibertella torreyi Vail, Bull. Torrey Club 24: 309. 1897.

Chihuahua and Coahuila to Guanajuato. Western Texas.

Stems slender, densely pubescent; leaves lance-cordate, 2 to 4 cm. long, acuminate or long-acuminate, deeply cordate at base, thick, densely pubescent; corolla 1 to 2 cm. broad, white or purplish.

DOUBTFUL SPECIES.

FUNASTRUM LURIDUM (Decaisne) Schlechter, Repert. Sp. Nov. Fedde 13: 286. 1914. *Sarcostemma luridum* Kunze, Linnaea 20: 26. 1847; *Philibertia lurida* Hemsl. Biol. Centr. Amer. Bot. 2: 319. 1881. Described from cultivated plants of Mexican origin.

PHILIBERTIA TOMENTELLA T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 90. 1910. Type from the Cape Region of Baja California.

6. FISCHERIA DC. Cat. Hort. Monsp. 112. 1813.

Stems scandent, usually fruticose below; leaves cordate; cymes umbelliform or short-racemiform, pedunculate; calyx 5-parted, glandular within, the segments usually narrow; corolla subrotate, the lobes contorted in bud; outer corona annular, fleshy, adnate to the corolla, the interior corona of 5 fleshy obtuse scales; stigma depressed.

Calyx lobes obovate, obtuse; cymes short-pedunculate.

1. **F. aristolochiaefolia.**

Calyx lobes linear; cymes on long peduncles-----2. **F. oaxacana.**

1. **Fischeria aristolochiaefolia** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 190. 1915.

Type from Cerro del Boquerón, Chiapas.

Stems long-hirsute; leaves ovate-cordate or oblong-cordate, 6 to 16 cm. long, acuminate, hirsute beneath; peduncles 1.5 cm. long or less, about 6-flowered; calyx nearly glabrous; corolla about 7 mm. long.

2. **Fischeria oaxacana** Standl., sp. nov.

Type from Santo Domingo, Oaxaca, altitude 480 meters (*Nelson* 2713; U. S. Nat. Herb. no. 908027).

Stems stout, densely hirtellous and very sparsely hirsute; leaves petiolate, elliptic-ovate, 7.5 to 15 cm. long, 4 to 9 cm. wide, acute to rounded at apex and short-cuspidate, cordate at base with a short closed sinus, minutely setulose above, densely setulose-pilosulous beneath; peduncles 4.5 to 10 cm. long, many-flowered, the flowers short-racemose, the pedicels 1.5 to 2.5 cm. long, viscid-hirtellous and sparsely hirsute; calyx lobes about 1 cm. long, linear or narrowly oblong-lanceolate, cuspidate-attenuate; corolla about 1 cm. long, hirtellous outside, the lobes ovate-oblong, subacute, hirtellous within; outer corona fleshy, rugose, the scales of the inner corona large and very thick, abruptly contracted at about the middle, the upper portion broadly rounded.

7. METASTELMA R. Br. Mem. Wern. Soc. 1: 52. 1809.

Slender vines, herbaceous or suffrutescent; leaves small; cymes umbelliform, sessile or short-pedunculate, the flowers very small, whitish; calyx 5-lobate, usually minutely glandular within; corolla campanulate or subrotate, deeply 5-lobate, the lobes valvate, usually papillose or villous within; corona scales membranaceous, ovate to linear; stigma plane or apiculate; follicles terete, smooth.

Corolla lobes merely puberulent within.

Leaves subcordate at base-----1. **M. subcordatum.**

Leaves obtuse or acute at base.

Calyx lobes subulate-----2. **M. schaffneri.**

Calyx lobes ovate, obtuse.

Corolla lobes linear, glabrous within or nearly so-----3. **M. cuneatum.**

Corolla lobes oblong, densely puberulent within.

Umbels long-pedunculate-----4. **M. macropodum.**

Umbels sessile or nearly so-----5. **M. palmeri.**

Corolla lobes villous or barbate within.

Gynostegium distinctly stalked, the column about as long as the anthers.

Leaves lance-linear-----6. *M. multiflorum*.

Leaves lance-oblong to oval.

Umbels sessile or nearly so-----7. *M. schlechtendahl*ii.

Umbels pedunculate-----8. *M. pedunculare*.

Gynostegium sessile or short-stipitate.

Corolla lobes linear.

Calyx lobes acuminate-----9. *M. watsonianum*.

Calyx lobes obtuse-----10. *M. barbigerum*.

Corolla lobes oblong or ovate.

Corona scales lanceolate-----11. *M. lanceolatum*.

Corona scales linear or subulate.

Flowers 1.5 mm. long or less-----12. *M. latifolium*.

Flowers 2 to 4 mm. long.

Corona scales much exceeding the gynostegium----13. *M. pringlei*.

Corona scales about equaling the gynostegium----14. *M. chiapense*.

1. *Metastelma subcordatum* Benth. Bot. Voy. Sulph. 33. *pl.* 18. 1844.

Type from Magdalena Bay, Baja California.

Slender vine, fruticose below, glabrous; leaves ovate-oblong, acuminate-mucronate; umbels subsessile, the pedicels glabrous; corolla lobes ovate; corona scales lanceolate, acutish, slightly longer than the sessile gynostegium.

2. *Metastelma schaffneri* A. Gray, Proc. Amer. Acad. 21: 396. 1886.

Type collected near San Luis Potosí.

Stems glabrous; leaves lanceolate, obtuse at base; corolla lobes oblong-ovate; corona scales linear-subulate, exceeding the gynostegium.

3. *Metastelma cuneatum* T. S. Brandeg. Zoe 5: 216. 1905.

Type collected at Yerba Buena, near Altata, Sinaloa.

Stems very slender, bifariously puberulent; leaves lanceolate, 1.5 to 3 cm. long, acuminate, obtuse or rounded at base; nearly glabrous; umbels 4 to 9-flowered, subsessile; corolla 2 mm. long, the lobes acute; corona scales minute.

4. *Metastelma macropodium* Greenm. Proc. Amer. Acad. 33: 481. 1898.

Puebla and Oaxaca; type from Tomellín Canyon, Oaxaca, altitude 1,540 meters.

Stems slender, bifariously puberulent; leaves oblong-linear or linear-lanceolate, 1.5 to 2.5 cm. long, acute, obtuse at base, glabrous or nearly so; peduncles 3 to 18 mm. long; corolla 3 to 4 mm. long, yellowish white; corona scales about equaling the gynostegium.

5. *Metastelma palmeri* S. Wats. Proc. Amer. Acad. 18: 115. 1883.

Coahuila and San Luis Potosí. Western Texas; type from Laredo.

Stems suffrutescent, slender; leaves linear-lanceolate or oblong-linear, 1 to 3 cm. long, acute, obtuse or acute at base, nearly glabrous; corolla about 2 mm. long; corona scales lanceolate, acuminate, slightly exceeding the gynostegium; follicles about 4.5 cm. long.

6. *Metastelma multiflorum* S. Wats. Proc. Amer. Acad. 25: 158. 1890.

Jalisco to Morelos and Oaxaca; type collected near Guadalajara.

Stems glabrous or nearly so, suffrutescent below; leaves 1 to 3.5 cm. long, attenuate, obtuse at base, the upper ones much reduced; umbels sessile; flowers about 2 mm. long; calyx lobes acute or acuminate; corona lobes linear-lanceolate, exceeding the stigma.

7. *Metastelma schlechtendahl*i Decaisne in DC. Prodr. 8: 513. 1844.

Metastelma parviflorum Schlecht. Linnaea 6: 731. 1831. Not *M. parviflorum* R. Br. 1809.

Veracruz, Oaxaca, and Yucatán; type from Hacienda de la Laguna, Veracruz.

Stems slender, suffrutescent below, hirtellous or glabrate; leaves mostly oblong-ovate or oval, 1 to 3 cm. long, obtuse and mucronate, rounded or subcordate at base, glabrate; flowers about 3 mm. long; calyx lobes obtuse; corona scales linear-subulate, exceeding the gynostegium.

8. *Metastelma pedunculare* Decaisne in DC. Prodr. 8: 514. 1844.

Oaxaca. Guatemala and El Salvador; type from Cuesta de Pinula, Guatemala.

Stems bifariously puberulent; leaves slender-petiolate, ovate-lanceolate to oval, 1.5 to 3 cm. long, acute or mucronate, rounded or subcordate at base, nearly glabrous; flowers 2 to 3 mm. long, sweet-scented; corona scales ligulate. "Cuchamperrito," "cuchamper de zope," "ojo de pescado" (El Salvador).

9. *Metastelma watsonianum* Standl.

Metastelma albiflorum S. Wats. Proc. Amer. Acad. 24: 60. 1889. Not *M. albiflorum* Griseb. 1861.

Type from Guaymas, Sonora.

Stems puberulent or glabrate; leaves oblong or oblong-linear, 1 to 2 cm. long, acute or obtuse and mucronate; flowers white, about 4 mm. long; corona scales exceeding the anthers.

10. *Metastelma barbigerum* Scheele, Linnaea 21: 760. 1848.

Coahuila, Nuevo León, and Tamaulipas. Western Texas.

Stems puberulent or glabrate; leaves petiolate, lance-oblong to oval, 1 to 3 cm. long, acute at apex or rounded and apiculate, broadly rounded at base; umbels sessile or short-pedunculate; flowers 4 to 5 mm. long, white, sweet-scented; corona scales subulate. "Talayote" (Tamaulipas).

11. *Metastelma lanceolatum* Schlechter, Bull. Herb. Boiss. II. 6: 840. 1906.

Guerrero to San Luis Potosí and Chiapas; type from Zoquitlán. Distrito de Tlacolula, Oaxaca.

Stems puberulent or glabrate, woody below; leaves lanceolate to oblong or lance-linear, 1 to 3.5 cm. long, acute or obtuse, puberulent or glabrate; cymes few-flowered, sessile or nearly so; corolla 2 mm. long; follicles 6 cm. long.

12. *Metastelma latifolium* Rose, Contr. U. S. Nat. Herb. 1: 106. 1891.

Type from Alamos, Sonora.

Woody vine, the stems glabrous or nearly so; leaves oblong or lance-oblong, 1 to 2.5 cm. long, acute to rounded at apex, mucronate, obtuse or rounded at base, puberulent above; umbels sessile or short-pedunculate.

13. *Metastelma pringlei* A. Gray, Proc. Amer. Acad. 21: 396. 1886.

Chihuahua, Coahuila, and Durango; Baja California (?); type from Chihuahua.

Stems slender, fruticose below, glabrous or nearly so; leaves linear or lance-linear, 1 to 3 cm. long, acute or obtuse, obtuse at base; umbels sessile or nearly so; calyx lobes obtuse; follicles 5 cm. long.

14. *Metastelma chiapense* A. Gray, Proc. Amer. Acad. 21: 397. 1886.

?*Metastelma selerianum* Schlechter, Bull. Herb. Boiss. II. 6: 841. 1906.

Oaxaca and Chiapas; type from Chiapas.

Stems glabrous or nearly so; leaves linear, 1 to 5 cm. long, acute; umbels sessile, 3 to 6-flowered; calyx lobes obtuse.

Reported by Hemsley as *M. cubense* Decaisne.

8. BLEPHARODON Decaisne in DC. Prodr. 8: 603. 1844.

1. Blepharodon mucronatum (Schlecht.) Decaisne in DC. Prodr. 8: 603. 1844.

Astephanus mucronatus Schlecht. Linnaea 8: 518. 1833.

Philibertia anomala T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 277. 1912.

Blepharodon anomalum Schlechter, Repert. Sp. Nov. Fedde 13: 283. 1914.

San Luis Potosí and Veracruz to Oaxaca and Chiapas; type from Hacienda de la Laguna, Veracruz. Central America.

Glabrous vine, herbaceous or suffrutescent; leaves short-petiolate, oblong to elliptic, 2.5 to 7.5 cm. long, cuspidate, obtuse or rounded at base, pale beneath and with conspicuous venation, leathery; cymes pedunculate, umbel-like, the pedicels filiform; corolla rotate, about 1 cm. broad, the lobes lance-oblong, obtuse, glabrous outside, papillose within above, ciliate; corona lobes oval, obtuse, shorter than the gynostegium.

9. BASISTELMA Bartlett, Proc. Amer. Acad. 44: 631. 1909.

Plants scandent, herbaceous or suffrutescent; leaves linear or nearly so, short-petiolate; flowers small, axillary, solitary or in few-flowered cymes; calyx 5-lobate, the lobes narrow, acute; corolla campanulate, the lobes pilose within below the middle, dextrorsely contorted; corona lobes fleshy, lanceolate or triangular-subulate; pollinia pendulous; stigma produced into a cylindric beak.

Only the two following species are known.

Beak of stigma short; anther appendages recurved-----1. *B. mexicanum*.

Beak of stigma elongate; anther appendages not recurved-2. *B. angustifolium*.

1. Basistelma mexicanum (T. S. Brandeg.) Bartlett, Proc. Amer. Acad. 44: 632. 1909.

Melinia mexicana T. S. Brandeg. Zoe 5: 216. 1905.

Type from Cerro Colorado, Sinaloa.

Stems slender, sparsely pubescent; leaves narrowly linear, 2.5 cm. long; peduncles about 4-flowered, 3 mm. long; corolla 2.5 mm. long, the lobes linear; follicles 4 cm. long, 7 mm. thick, glabrous.

2. Basistelma angustifolium (Torr.) Bartlett, Proc. Amer. Acad. 44: 632. 1909.

Metastelma angustifolium Torr. U. S. & Mex. Bound. Bot. 159. 1859.

Melinia angustifolia A. Gray, Proc. Amer. Acad. 12: 73. 1877.

Pattalias angustifolius S. Wats. Proc. Amer. Acad. 24: 60. 1889.

Sonora; type from Santa Cruz. Southern Arizona.

Stems slender, glabrous or nearly so; leaves 2 to 4 cm. long, acute; peduncles 1 to 3-flowered, very short, the pedicels mostly shorter than the flowers; corolla 2.5 mm. long; follicles about 5 cm. long and 6 mm. thick, glabrous.

10. CYNANCHUM L. Sp. Pl. 212. 1753.

Plants scandent, herbaceous or suffrutescent, glabrous or pubescent; leaves petiolate or sessile; flowers small, in umbelliform cymes, yellowish green; calyx 5-parted, often glandular, the lobes acute or obtuse; corolla campanulate-rotate, the lobes contorted; corona attached to the stamen tube, shallowly lobate; pollinia pendulous; stigma conic; follicles smooth.

Leaves sessile.

- Corolla 8 mm. long-----1. *C. peninsulare*.
 Corolla 3 mm. long-----2. *C. palmeri*.

Leaves distinctly petiolate.

- Leaves linear or lance-linear, 5 mm. wide or less-----3. *C. kunthii*.
 Leaves lanceolate or ovate, mostly 10 to 35 mm. wide.
 Flowers about 3 mm. long-----4. *C. astephanoides*.
 Flowers 1.5 mm. long or less-----5. *C. sepium*.

1. *Cynanchum peninsulare* Blake, Contr. Gray Herb. 52: 83. 1917.

Type from the west coast of the Cape Region, Baja California.

Stems pubescent at the nodes; leaves linear, 3 to 8 cm. long, sparsely appressed-pubescent on the margins; umbels 2 to 7-flowered, subsessile, the pedicels 2 mm. long; corolla glabrous or nearly so; follicles glabrous, about 10 cm. long.

2. *Cynanchum palmeri* (S. Wats.) Blake, Contr. Gray Herb. 52: 83. 1917.

Pattalias palmeri S. Wats. Proc. Amer. Acad. 24: 60. 1889.

Type from Mulejé, Baja California.

Stems sparsely puberulent or glabrate; leaves linear, 1.5 to 5 cm. long, acute; umbels 2 to 6-flowered, sessile, the pedicels 2 to 3 mm. long; flowers yellow; follicles about 10 cm. long and 6 mm. thick.

3. *Cynanchum kunthii* (Decaisne) Standl.

Cynanchum lanceolatum H. B. K. Nov. Gen. & Sp. 3: 203. 1819. Not *C. lanceolatum* Poir. 1811.

Orthosia kunthii Decaisne in DC. Prodr. 8: 527. 1844.

Metastelma angustifolium Turcz. Bull. Soc. Nat. Moscou 1852²: 315. 1852.

Vincetoxicum kunthii Hemsl. Biol. Centr. Amer. Bot. 2: 328. 1881.

Vincetoxicum mexicanum S. Wats. Proc. Amer. Acad. 18: 115. 1883.

Chihuahua to Veracruz, Oaxaca, and Durango. Type locality given doubtfully as "Nova Andalusia" (Venezuela), but this probably is incorrect.

Very slender vine, chiefly herbaceous, the stems bifariously puberulent or glabrous; leaves 1 to 5 cm. long, acute, glabrate; umbels few-flowered, sessile or short-pedunculate, the flowers about 2 mm. long; follicles slender, about 5.5 cm. long.

4. *Cynanchum astephanoides* (A. Gray) Standl.

Vincetoxicum astephanoides A. Gray, Proc. Amer. Acad. 22: 435. 1887.

Type from barranca near Guadalajara, Jalisco.

Coarse woody vine; leaves long-petiolate, ovate or lance-ovate, 5 to 7.5 cm. long, acuminate, thin, puberulent; umbels short-pedunculate, several-flowered; corolla white, the lobes hairy within.

5. *Cynanchum sepium* (Decaisne) Standl.

Vincetoxicum sepium Decaisne in DC. Prodr. 8: 526. 1844.

Type from mountains of Oaxaca; reported from Hidalgo. Guatemala.

Slender woody vine, the branches sparsely puberulent; leaves lanceolate or ovate-lanceolate, 2.5 to 5 cm. long, acuminate, rounded at base, thin, sparsely puberulent above; umbels pedunculate or subsessile, 4 to 6-flowered.

11. **MELlichAMPIA** A. Gray, Proc. Amer. Acad. 22: 437. 1887.

The genus consists of a single species.

1. *Mellichampia ligulata* (Benth.) Vail, Bull. Torrey Club 26: 425. 1899.

Enslenia ligulata Benth. Pl. Hartw. 290. 1848.

Mellichampia rubescens A. Gray, Proc. Amer. Acad. 22: 437. 1887.

Roulinia sinaloensis T. S. Brandeg. Zoe 5: 243. 1908.

Roulinia ligulata Pittier, Contr. U. S. Nat. Herb. 13: 111. 1910.

Sinaloa to Michoacán; type from Aguascalientes.

Slender vine, chiefly herbaceous, the stems glabrous or nearly so; leaves long-petiolate, ovate-cordate, 5 to 8.5 cm. long, acuminate, deeply cordate at base, thin, puberulent beneath along the nerves; cymes raceme-like or umbel-like, few-flowered; calyx lobes linear; corolla campanulate, 12 to 15 mm. long, purple, glabrous outside, pubescent within, the lobes lance-linear, recurved above; corona simple, tubular, the lobes ovate, caudate-attenuate, nearly equaling the corolla.

12. OXYPETALUM R. Br. Mem. Wern. Soc. 1: 41. 1809.

1. *Oxypetalum cordifolium* (Vent.) Schlechter in Urban, Symb. Ant. 1: 269. 1899.

Gothofreda cordifolia Vent. Choix Pl. Cels. 7. pl. 60. 1803.

Oxypetalum riparium H. B. K. Nov. Gen. & Sp. 3: 197. 1819.

San Luis Potosí, Veracruz, and Oaxaca. West Indies; Central and South America.

Plants scandent, herbaceous or suffrutescent; leaves long-petiolate, ovate-cordate, 6 to 10 cm. long, acuminate, deeply cordate at base, pubescent; cymes few-flowered, pedunculate, shorter than the leaves, the pedicels filiform; calyx lobes linear-lanceolate; corolla lobes narrowly linear, about 2 cm. long, puberulent; corona lobes oblong-ligulate, truncate.

13. ROULINIELLA Vail, Bull. Torrey Club 29: 662. 1902.

REFERENCE: Vail, Bull. Torrey Club 29: 662-668. 1902.

Plants scandent, herbaceous or fruticose, glabrous or puberulent; leaves cordate, long-petiolate, thin; cymes racemiform, the flowers whitish or greenish; calyx 5-parted, glandular within; corolla subrotate, the lobes contorted or subvalvate; corona scales connected by a membranaceous ring, erect, acuminate or caudate; follicles smooth.

Corona scales not exceeding the stigma-----1. *R. unifaria*.

Corona scales much exceeding the stigma.

Buds globose-----2. *R. palmeri*.

Buds ovoid, pointed.

Corona scales gradually narrowed into the terminal ligule---3. *R. lignosa*.

Corona scales abruptly contracted into the terminal ligule---4. *R. foetida*.

1. *Rouliniella unifaria* (Scheele) Vail, Bull. Torrey Club 29: 663. 1902.

Gonolobus unifarius Scheele, Linnaea 21: 760. 1848.

Roulinia unifaria Engelm.; Torr. U. S. & Mex. Bound. Bot. 160. 1850.

Cynanchum racemosum T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 331. 1920.

Nuevo León, Tamaulipas, and Veracruz. Western Texas; type from New Braunfels.

Stems slender, chiefly herbaceous, glabrous or nearly so; leaves deltoid to broadly ovate-cordate, 2.5 to 7 cm. long, acuminate, usually deeply cordate at base, glabrous; inflorescence equaling or exceeding the leaves, 7 to 12-flowered; buds globose; corolla white, 4 to 6 mm. long; corona scales obscurely 3-lobate; follicles 6 cm. long. "Talayote" (Tamaulipas).

2. *Rouliniella palmeri* (S. Wats.) Vail, Bull. Torrey Club 29: 664. 1902.

Roulinia palmeri S. Wats. Proc. Amer. Acad. 18: 115. 1883.

Coahuila; type from mountains northeast of Monclova.

Stems bifariously puberulent or glabrous; leaves deltoid-cordate, 3 to 8 cm. long, acute or acuminate, glabrous; peduncles equaling or shorter than the leaves, 5 to 9-flowered; corolla greenish white; follicles 5 to 10 cm. long.

3. *Rouliniella lignosa* Vail, Bull. Torrey Club 29: 666. f. 5. 1902.

Jalisco to Morelos and Oaxaca; type from Río Blanco, Jalisco.

Stems glabrous or nearly so, often fruticose; leaves ovate-cordate or deltoid-cordate, 3.5 to 8.5 cm. long, acute or acuminate, truncate to deeply cordate at base, glabrous or nearly so; peduncles equaling or shorter than the leaves, few-flowered; corolla 5 to 6 mm. long; follicles about 9 cm. long.

4. *Rouliniella foetida* (Cav.) Vail, Bull. Torrey Club 29: 667. 1902.

Asclepias foetida Cav. Icon. Pl. 2: 45. pl. 158. 1793.

Roulinia jacquini Decaisne in DC. Prodr. 8: 517. 1844.

Rouliniella jaliscana Vail, Bull. Torrey Club 29: 668. f. 7. 1902.

Jalisco to Oaxaca and Yucatán.

Stems bifariously puberulent or glabrous; leaves ovate-cordate, 3 to 12 cm. long, acuminate or cuspidate-acuminate, deeply cordate at base, glabrous; peduncles equaling or shorter than the leaves, with 9 to 12 or more flowers; corolla 4 to 7 mm. long, greenish white.

14. **NEPHRADENIA** Decaisne in DC. Prodr. 8: 604. 1844.

1. *Nephradenia neriifolia* (Decaisne) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 336. 1882.

Blepharodon neriifolium Decaisne in DC. Prodr. 8: 604. 1844.

Oaxaca; type from Totontepec. Guatemala.

Glabrous erect shrub; leaves short-petiolate, linear-lanceolate, 8 to 14 cm. long, 1 to 3 cm. wide, long-acuminate, acute at base; umbels few-flowered, axillary, short-pedunculate; calyx lobes ovate or suborbicular, ciliate; corolla campanulate, brownish, about 1 cm. broad, the lobes obtuse; corona scales laterally compressed.

15. **MARSDENIA** R. Br. Mem. Wern. Soc. 1: 28. 1809.

REFERENCE: Rothe, Über die Gattung *Marsdenia* R. Br. und die Stamm pflanze der Condurangorinde, Bot. Jahrb. Engler 52: 354-434. 1915.

Plants scandent, usually fruticose or suffrutescent; flowers small or of medium size, in umbelliform cymes; calyx 5-parted, glandular within, the segments acute or obtuse; corolla campanulate, the throat usually villous, the lobes contorted, appendages sometimes present in the sinuses of the lobes; corona scales 5, adnate to the stamen tube; stigma depressed or rostrate; follicles thick, usually smooth.

Marsdenia cundurango Reichenb. f., of Peru and Ecuador, furnishes "cundurango" or "condorango" bark, which has been employed in the treatment of syphilitic affections. In Ecuador it is considered a remedy for snake bites, there being a popular belief that the condor eats the leaves to cure itself of wounds and snake bites, hence the name "condorango" or "condor-vine."

Leaves glabrous beneath except sometimes along the costa, rarely with a few hairs over the surface when very young.

Leaves oblong, 5 mm. wide or less.....1. *M. parvifolia*.

Leaves mostly ovate to oval, 1.5 to 6 cm. wide or larger.

Lobes of the corolla nearly twice as long as the tube.....2. *M. pringlei*.

Lobes little if at all exceeding the corolla tube.

Corolla throat densely barbate; leaves often acute or decurrent at base. 3. *M. edulis*.

Corolla throat very sparsely or not at all barbate; leaves rounded or subcordate at base.

Stamen scales exceeding the apical membrane of the anther.

4. *M. zimapanica*.

Stamen scales shorter than the membrane-----5. *M. macrophylla*.

Leaves pubescent beneath, usually densely so, even at maturity.

Leaves acute or acutish at base.

Beak of the stigma about 1.5 mm. long; corolla greenish, with purple spots and stripes-----6. *M. trivirgulata*.

Beak about 0.7 mm. long; corolla purplish, striped with yellowish green.

7. *M. peraffinis*.

Leaves rounded or cordate at base.

Leaves soon glabrous on the upper surface-----8. *M. propinqua*.

Leaves densely pubescent on the upper surface even in age.

Corolla glabrous outside.

Stigma obtuse-----9. *M. bourgeana*.

Stigma pointed-----10. *M. coulteri*.

Corolla sparsely or densely pubescent outside.

Corolla with appendages in the sinuses of the lobes; calyx lobes linear, acute-----11. *M. gilgiana*.

Corolla not appendaged; calyx lobes ovate, obtuse--12. *M. mexicana*.

1. *Marsdenia parvifolia* T. S. Brandeg. Zoe 5: 235. 1906.

Puebla and Oaxaca.

Stems slender, fruticose, puberulent or glabrate; leaves short-petiolate, 8 to 15 mm. long, obtuse or subacute, rounded at base; corolla lobes oblong, obtuse; style elongate.

2. *Marsdenia pringlei* S. Wats. Proc. Amer. Acad. 25: 158. 1890.

Nuevo León; type collected in the Sierra de la Silla, near Monterrey.

Woody vine; leaves slender-petiolate, oval to ovate-elliptic, 5 to 11 cm. long, abruptly acuminate, thin, glabrous; umbels few or many-flowered, the pedicels 3 to 8 mm. long; calyx lobes obtuse; corolla white, 7 to 10 mm. long, glabrous.

3. *Marsdenia edulis* S. Wats. Proc. Amer. Acad. 24: 61. 1889.

Sonora and Sinaloa; type from Guaymas, Sonora.

Stems woody, the larger ones with corky bark; leaves slender-petiolate, lance-ovate to oval, 4 to 13 cm. long, acuminate; umbels many-flowered, subsessile; calyx lobes obtuse, ciliate; corolla cream-colored, about 5 mm. long; fruit ovoid, smooth, 6.5 to 10 cm. long. "Talayote" (Sonora).

The young fruit is eaten. One specimen from Sinaloa has the leaves minutely pubescent beneath and may represent a distinct species.

4. *Marsdenia zimapanica* Hemsl. Biol. Centr. Amer. Bot. 2: 338. 1882.

Hidalgo, Puebla, and Oaxaca; type from Zimapán, Hidalgo.

Woody vine, glabrous or nearly so, the leaves sometimes pilose when young; leaves petiolate, elliptic-oblong to oval, acuminate; umbels sessile or nearly so, the flowers 8 to 10 mm. long; calyx lobes obtuse; corolla glabrous outside; stigma pointed.

According to Flores, the plant is known in Hidalgo as "tequampatl" or "tecuampatl," and the root is mixed with meat and used to poison coyotes. The names may, however, apply rather to some other plant.

5. *Marsdenia macrophylla* (Humb. & Bonpl.) Fourn. in Mart. Fl. Bras. 6⁴: 321. 1885.

Asclepias macrophylla Humb. & Bonpl.; Roem. & Schult. Syst. Veg. 6: 86. 1820.

Marsdenia maculata Hook. in Curtis's Bot. Mag. pl. 4299. 1847.

Jalisco to Tamaulipas, San Luis Potosí, and Yucatán. Lesser Antilles, Central America, and northern South America; type from Venezuela.

Woody vine, nearly glabrous; leaves ovate to elliptic or oval, 7 to 14 cm. long, acute or acuminate, often subcordate at base, pale beneath; cymes many-flowered, short-pedunculate, calyx lobes obtuse; corolla yellowish, 5 to 6 mm. long. "Talayote" (Tamaulipas).

6. *Marsdenia trivirgulata* Bartlett, Proc. Amer. Acad. 44: 652. 1909.

Type from Iguala Canyon, Guerrero, altitude 900 meters.

Stems slender, suffruticose, bifariously puberulent; leaves slender-petiolate, elliptic, 2.5 to 5 cm. long, acuminate, puberulent; cymes subsessile, few-flowered; calyx lobes obtuse; corolla 6 mm. long.

7. *Marsdenia peraffinis* Blake, Contr. Gray Herb. 53: 48. 1918.

Guerrero and perhaps Michoacán; type from Baqueta, altitude 150 meters.

Stems woody, when young sparsely hispidulous; leaves ovate or elliptic, 3 to 6.5 cm. long, acute or acuminate, puberulent; cymes 8 to 15-flowered, sessile or nearly so; calyx lobes obtuse; corolla about 5 mm. long, glabrous outside.

8. *Marsdenia propinqua* Hemsl. Biol. Centr. Amer. Bot. 2: 337. 1882.

Tamaulipas and Veracruz; type from the region of Orizaba.

Woody vine; leaves slender-petiolate, ovate to rounded-elliptic, 8 to 17 cm. long, acuminate or abruptly short-pointed, tomentose beneath; cymes very dense, many-flowered, short-pedunculate; calyx lobes obtuse; corolla 7 to 8 mm. long, red, pubescent outside; follicles 11 to 15 cm. long, smooth.

9. *Marsdenia bourgeana* (Baill.) Rothe, Bot. Jahrb. Engler 52: 408. 1915.

Pseudomarsdenia bourgeana Baill. Hist. Pl. 10: 268. 1890.

Veracruz and Oaxaca; type from Hacienda de Cuspango.

Woody vine; leaves broadly ovate, 5 to 7 cm. long, acuminate, rounded or truncate at base, densely pubescent; cymes branched, many-flowered; calyx lobes obtuse or acute; corolla barbate within; fruit ovoid, woody.

10. *Marsdenia coulteri* Hemsl. Biol. Centr. Amer. Bot. 2: 336. 1882.

Marsdenia selerorum Loesener, Bull. Herb. Boiss. 2: 557. 1894.

Coahuila to Veracruz, Yucatán, Puebla, and Oaxaca; type from Zimapán, Hidalgo.

Coarse woody vine; leaves slender-petiolate, ovate-oblong to broadly ovate or rounded-deltoid, 3 to 7.5 cm. long, obtuse to acuminate, densely pubescent; cymes dense, many-flowered short-pedunculate; calyx lobes obtuse; corolla whitish, about 3 mm. long; fruit 6 to 13 cm. long, smooth, glabrous. "Talayote" (Tamaulipas).

11. *Marsdenia gilgiana* Rothe, Bot. Jahrb. Engler 52: 410. 1915.

Ecliptostelma molle T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 371. 1917.

Veracruz; type from Zacuapan. Guatemala.

Scandent shrub, the young stems densely pilose; leaves ovate to rounded-ovate, 9 to 15 cm. long, obtuse to short-acuminate, densely pilosulous, or

tomentose beneath; cymes pedunculate, lax, many-flowered, repeatedly dichotomous; flowers about 5 mm. long.

12. Marsdenia mexicana Decaisne in DC. Prodr. 8: 617. 1844.

Guerrero, Oaxaca, Morelos, and Mexico; type from Tlacolula, Oaxaca.

Large woody vine; leaves broadly cordate, 8 to 16 cm. long, acute or short-acuminate, tomentose beneath, densely pubescent above; cymes pedunculate, many-flowered, repeatedly branched; corolla about 4 mm. long; follicles 7 to 9 cm. long, densely pilose.

16. TRICHOSACME Zucc. Abh. Akad. Wiss. München 4³: 11. 1845.

A single species is known.

1. Trichosacme lanata Zucc. Abh. Akad. Wiss. München 4²: 11. 1845.

Described from Mexico.

Scandent shrub, densely white-lanate throughout except on the corolla; leaves ovate-cordate, acute or acuminate, petiolate; umbels axillary, dense, pedunculate, recurved; calyx lobes linear-lanceolate; corolla rotate, brown-purple, the lobes ovate, bearing at the apex a long filiform drooping barbate appendage, this much longer than the lobes; corona annular; follicles cylindric, tomentose.

17. LACHNOSTOMA H. B. K. Nov. Gen. & Sp. 3: 198. 1819.

1. Lachnostoma gonoloboides Greenm. Proc. Amer. Acad. 39: 84. 1903.

Type collected near Seven Star Mine, in the Sierra Madre of Chihuahua, altitude 2,400 meters.

Stems twining, chiefly herbaceous, densely pubescent; leaves long-petiolate, oblong-hastate, 5 to 9.5 cm. long, short-acuminate, cordate at base, thinly hirtellous; umbels short-pedunculate, mostly 2 to 4-flowered, the pedicels 2 to 3 cm. long; calyx lobes oblong-lanceolate; corolla white, narrowly campanulate, 1.5 to 2 cm. long, the lobes erect, acute; crown crenate.

18. MICRODACTYLON T. S. Brandeg. Zoe 5: 252. 1909.

The genus consists of a single species.

1. Microdactylon ovatum T. S. Brandeg. Zoe 5: 252. 1909.

Type from Barranca de Tlacuilosto, near San Luis Tultitlanapa, Puebla.

Stems fruiticose, scandent, hirsute and hirtellous; leaves slender-petiolate, ovate-cordate or oblong-ovate, 3 to 7 cm. long, rounded to acuminate at apex, pubescent; cymes racemiform, long-pedunculate; calyx lobes lanceolate; corolla purple-black, shallowly campanulate, about 2 cm. broad, hirtellous outside, long-hirsute within, the lobes deltoid-ovate, obtuse; corona adnate to the stamen tube, the scales unguiculate, divided above the middle into 2 long liguliform lobes, also with 2 shorter interior lobes.

19. DICTYANTHUS Decaisne in DC. Prodr. 8: 604. 1844.

Plants scandent or suberect, herbaceous or suffrutescent; leaves cordate; cymes few-flowered, racemiform or reduced to a single flower; flowers large, the corolla reticulate-veined; calyx 5-parted, glandular within, the lobes narrow; corolla broadly campanulate, the lobes spreading; corona scales attached to the base of the stamen tube and radiating from it, adnate dorsally to the corolla.

Corolla lobes broadly ovate, obtuse or acutish, the margins not revolute.

1. *D. stapeliaeflorus*.

Corolla lobes deltoid to linear-lanceolate, acuminate, the margins revolute.

Throat of the corolla vertically striped, not reticulate or reticulate only at base.

Corolla about 13 mm. long-----2. *D. tuberosus*.

Corolla 2.5 to 4 cm. long-----3. *D. pavonii*.

Throat of corolla reticulate or with horizontal stripes.

Corolla less than 1.5 cm. long-----4. *D. parviflorus*.

Corolla 2 to 5 cm. long.

Corolla throat horizontally striped-----5. *D. tigrinus*.

Corolla throat densely reticulate-----6. *D. ceratopetalus*.

1. *Dictyanthus stapeliaeflorus* Reichenb. Sel. Sem. Hort. Dresd. 4. 1850.

Type from the Sierra Madre of Durango; specimens from Guerrero probably belong here.

Stems scandent, sparsely hirsute; leaves ovate-cordate or deltoid-cordate, acute or acuminate; peduncles 1 or few-flowered; corolla 3.5 to 5 cm. broad, yellowish green, veined with purple, the veins of the lobes reticulate, those in the upper part of the throat concentric and distinct.

2. *Dictyanthus tuberosus* Robinson. Proc. Amer. Acad. 27: 180. 1892.

Jalisco; type from Guadalajara.

Stems suberect, suffrutescent, hirsute; leaves broadly cordate-ovate, 2 to 4 cm. long, acute or acuminate, pubescent; umbels 1 to 4-flowered, sessile or short-pedunculate; corolla campanulate, brown-purple; follicles about 5 cm. long, armed with short stout spines.

3. *Dictyanthus pavonii* Decaisne in DC. Prodr. 8: 605. 1844.

Tympananthe suberosa Hassk. Flora 30: 758. 1847.

Dictyanthus campanulatus Reichenb. Sel. Sem. Hort. Dresd. 4. 1850.

Rytidoloma reticulatum Turcz. Bull. Soc. Nat. Moscou 25²: 320. 1852.

Dictyanthus reticulatus Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 329. 1882.

Sinaloa to Jalisco and Morelos.

Stems scandent, hirsutulous or glabrate; leaves long-petiolate, ovate-cordate, often broadly so, 5 to 12 cm. long, obtuse to acuminate, minutely pilose; cymes racemiform, 1 to few-flowered; corolla 4 to 7 cm. wide, broadly campanulate, the lobes reticulate-veined with brown-purple.

4. *Dictyanthus parviflorus* Hemsl. Biol. Centr. Amer. Bot. 2: 329. 1882.

Dictyanthus prostratus T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 329. 1920.

Morelos and Veracruz; type probably from Cuernavaca. El Salvador.

Stems suberect or scandent, suffrutescent below, hirsute; leaves ovate-cordate, often broadly so, 1 to 3.5 cm. long, acute, deeply cordate at base, pubescent; flowers mostly solitary, short-pedicellate; corolla 1 to 2 cm. broad, brown-purple; follicles glabrate, tuberculate. "Yulpate" (El Salvador).

5. *Dictyanthus tigrinus* Conzatti & Standl., sp. nov.

Oaxaca and Veracruz; type from Laguna de Ojitlán, Distrito de Tuxtepec, Oaxaca, altitude 350 meters (Conzatti 3760; U. S. Nat. Herb. 1014030).

Stems scandent, sparsely hirsutulous with recurved hairs; leaves long-petiolate, ovate-cordate, 9 to 10 cm. long, 6 to 7 cm. wide, long-acuminate, deeply cordate at base, minutely puberulent; peduncles 1 to 1.5 cm. long, 1 to 4-flowered; calyx lobes lanceolate or lance-oblong, 13 mm. long, long-acuminate; corolla about 7 cm. broad, minutely puberulent, the lobes lance-

linear, with recurved margins, closely brown-reticulate, the throat covered with close concentric brown-purple stripes; lobes of the corona linear, 8 mm. long; ovary glabrous.

6. *Dictyanthus ceratopetalus* Donn. Smith, Bot. Gaz. 18: 208. 1893.

Morelos, Puebla, and Oaxaca. Guatemala and El Salvador; type from plains of Santa Rosa, Guatemala.

Stems scandent, hirsute, woody below; leaves ovate-cordate, 2 to 7 cm. long, acute, densely pubescent; cymes 1 or few-flowered, short-pedunculate; corolla 2.5 to 4.5 cm. broad, brown-purple, closely reticulate throughout.

20. *POLYSTEMMA* Decaisne in DC. Prodr. 8: 602. 1844.

Stems twining, suffrutescent below, hirsute; leaves long-petiolate, ovate-cordate; cymes umbelliform, few-flowered; calyx 5-parted; corolla short-campanulate or subrotate, the throat naked; corona adnate to the gynostegium, composed of 5 ligulate scales and 20 smaller filiform ones; stigma plane.

Leaves with a closed basal sinus-----1. *P. viridiflora*.

Leaves with a broad open shallow sinus.

Corolla about 8 mm. long-----2. *P. scopulorum*.

Corolla about 20 mm. long-----3. *P. rupestris*.

1. *Polystemma viridiflora* Decaisne in DC. Prodr. 8: 602. 1844.

Veracruz; type from Orizaba.

Leaves hirtellous; peduncles as long as the leaves, 3 or 4-flowered; corolla green, puberulent.

2. *Polystemma scopulorum* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 189. 1915.

Type from San Gerónimo, Oaxaca.

Leaves ovate-cordate, 8 cm. long or less, acuminate, sparsely hirsute; cymes few-flowered, the peduncles about 2.5 cm. long; corolla rotate, reticulate; larger corona scales narrowly oblong, tridentate at apex.

3. *Polystemma rupestris* T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 330. 1920.

Type from Barranca de Panoaya, Veracruz.

Leaves ovate-cordate, 5 to 8 cm. long, acuminate, sparsely hirsute; cymes few-flowered, about as long as the leaves; corolla campanulate, reticulate within, the lobes acute or acuminate; larger corona scales deeply trilobate, the smaller ones filiform; follicles smooth.

21. *ROTHROCKIA* A. Gray, Proc. Amer. Acad. 20: 295. 1885.

Plants scandent, herbaceous or suffrutescent; leaves long-petiolate, cordate; cymes pedunculate, umbelliform or racemiform; calyx 5-parted; corolla rotate, the lobes narrow; corona simple, 5-lobate; stigma produced into a column; follicles smooth.

The following are the only species known.

Corona lobes 2-dentate, not appendaged, with 2 short lateral teeth.

1. *R. cordifolia*.

Corona lobes with caudate lateral processes, or with long exterior filiform appendages.

Corolla yellowish green; corona scales with lateral caudate processes about 1.5 mm. long-----2. *R. umbellata*.

Corolla purple-black; corona scales with exterior filiform appendages about 4 mm. long-----3. *R. fruticosa*.

1. *Rothrockia cordifolia* A. Gray, Proc. Amer. Acad. 20: 295. 1885.

Baja California and Sonora. Southern Arizona; type from Santa Catalina Mountains.

Stems usually suffrutescent, hirsute and puberulent; leaves broadly ovate-cordate, 2 to 8 cm. long, acute or acuminate, deeply cordate at base, pubescent; inflorescence umbellate or racemiform, few-flowered; corolla greenish white, 8 to 12 mm. long, the lobes oblong. "Talayote" (Baja California).

Brandegge reports that in Baja California the young pods are eaten raw.

2. *Rothrockia umbellata* T. S. Brandeg. Zoe 5: 165. 1903.

Cape Region of Baja California.

Stems hirsute; leaves ovate-cordate, 3 to 8 cm. long, acuminate, deeply cordate at base, hirsute and puberulent; cymes racemiform, 1 to 6-flowered; corolla 3.5 cm. broad, the lobes ovate-oblong, papillose within; follicles 12 to 15 cm. long, glabrous.

3. *Rothrockia fruticosa* T. S. Brandeg. Zoe 5: 165. 1903.

Type collected near Santa Anita, Cape Region of Baja California.

Stems fruticose below, hirsute; leaves ovate-cordate, 3 to 7 cm. long, acute or acuminate, deeply cordate at base, pubescent; flowers solitary or umbellate, the terminal pedicel 2 to 3.5 cm. long; corolla lobes about 12 mm. long, narrowly oblong; follicles 15 cm. long, glabrous.

22. *VINCETOXICUM* Walt. Fl. Carol. 104. 1788.

Plants usually scandent, fruticose or herbaceous; leaves mostly cordate; flowers small or large, green, brown, or nearly black; calyx 5-parted, glandular within; corolla rotate, shallowly or deeply lobate, often reticulate-veined; corona annular, adnate to the corolla, entire, dentate, or lobate; stigma depressed; follicles smooth or muricate; seeds usually with an apical tuft of hairs.

Besides the species listed below, several herbaceous ones, with erect or subscandent stems, occur in Mexico. Of a number of the species listed, no specimens have been seen, and it may be, consequently, that some names are incorrectly placed in the key.

The following vernacular names are reported for plants of this genus: "Chimicuro" (Oaxaca); "gueto de venado" (Oaxaca); "tlalayote" (Oaxaca). The name most commonly used is "talayote." The young fruits are eaten either raw or coked. Sweetmeats are sometimes made by boiling them in sirup.

Corolla glabrous within.

Leaves mostly about 1 cm. long-----1. *V. hastulatum*.

Leaves mostly 3 cm. long or larger.

Corolla about 3 mm. long-----2. *V. saepimentorum*.

Corolla 5 mm. long or more.

Corolla lobes suborbicular, oval, or broadly deltoid.

Stems puberulent or glabrate.

Peduncles about as long as the petioles; corolla glabrous outside.

3. *V. lutescens*.

Peduncles usually more than twice as long as the petioles; corolla puberulent outside-----4. *V. cavanillesii*.

Stems hirsute or hirtellous.

Leaves mostly lance-oblong, obtuse or rounded at base.

5. *V. stenophyllum*.

Leaves all or mostly ovate to oval, cordate at base.

Corolla glabrous outside.

Pedicels glabrous-----6. *V. littorale*.

Pedicels hirsute-----7. *V. diadematum*.

Corolla variously pubescent outside.

Peduncles equaling or longer than the petioles.

Peduncles 1 or 2-flowered-----8. *V. tingens*.

Peduncles several-flowered.

Corolla about 4 cm. broad-----9. *V. magnifolium*.

Corolla 1 to 2.5 cm. broad.

Corolla about 1 cm. broad, the lobes longer than broad.

10. *V. reticulatum*.

Corolla 1.5 to 2.5 cm. broad, the lobes about as broad
as long-----11. *V. velutinum*.

Peduncles much shorter than the petioles.

Corolla yellowish green-----12. *V. suberiferum*.

Corolla brown-purple-----13. *V. congestum*.

Corolla lobes oblong-linear to lance-oblong.

Leaves mostly acute at base-----22. *V. caudatum*.

Leaves cordate at base.

Calyx nearly as long as the corolla-----14. *V. triflorum*.

Calyx much shorter than the corolla.

Corolla glabrous outside.

Corolla lobes ovate-oblong, fuscous-----15. *V. fuscum*.

Corolla lobes lance-linear, pale-----16. *V. petiolare*.

Corolla puberulent or papillose outside.

Calyx more than half as long as the corolla; stems puberulent.

17. *V. fraternum*.

Calyx half as long as the corolla or usually shorter; stems
usually hirsute or hirtellous.

Corolla green or yellowish.

Corolla lobes ovate-lanceolate, long-acuminate.

18. *V. striatum*.

Corolla lobes oblong, obtuse-----19. *V. chrysanthum*.

Corolla purple, brown-purple, or fuscous.

Cymes shorter than the petioles-----20. *V. stenopetalum*.

Cymes equaling or longer than the petioles.

Corolla lobes oblong-linear-----21. *V. asperum*.

Corolla lobes lance-oblong.

Lobes of the outer corona crenulate--27. *V. crenatum*.

Lobes of the outer corona lacerate-dentate.

26. *V. pilosum*.

Corolla papillose or variously pubescent within, at least in the throat.

Leaves acute or decurrent at base-----22. *V. caudatum*.

Leaves all or mostly cordate at base.

Corolla merely papillose or puberulent within.

Corolla glabrous outside-----23. *V. chloranthum*.

Corolla puberulent or hirtellous outside.

Corolla lobes oval, abruptly short-acuminate, in bud overlapping for
about half their breadth-----24. *V. macranthum*.

Corolla lobes mostly oblong or lance-oblong, obtuse at the apex or gradually attenuate, in bud only slightly overlapping.

Corolla greenish-----25. *V. oaxacanthum*.

Corolla brown-purple or blackish.

Lobes of the outer corona lacerate-dentate-----26. *V. pilosum*.

Lobes of the outer corona crenulate or obscurely denticulate.

Corolla lobes conspicuously veined-----27. *V. crenatum*.

Corolla lobes without conspicuous venation--28. *V. grayanum*.

Corolla barbate or pilose within, at least in the throat.

Corolla lobes oval or suborbicular, rounded at apex----29. *V. calcicola*.

Corolla lobes narrow or, if broad, acute or acuminate.

Leaves glabrous beneath or nearly so.

Calyx about equaling the corolla. Leaves about as broad as long-----30. *V. cyclophyllum*.

Calyx much shorter than the corolla.

Corolla lobes often barbate for their whole length with soft interlaced hairs-----31. *V. barbatum*.

Corolla barbate only at the base with short stiff hairs.

32. *V. pectinatum*.

Leaves pilose or hirtellous beneath, usually densely so.

Corolla lobes linear-----33. *V. angustilobum*.

Corolla lobes lance-oblong or broader.

Corolla glabrous outside or nearly so-----34. *V. uniflorum*.

Corolla puberulent or hirtellous outside.

Corolla 2 to 2.5 cm. long-----35. *V. erianthum*.

Corolla 1 cm. long or less.

Peduncles much longer than the petioles, long-hirsute.

36. *V. nigrescens*.

Peduncles mostly shorter than the petioles, puberulent or hirtellous.

Stems short-pilose or puberulent; leaves broadest near the base.

Corolla 1.5 to 2 cm. broad-----37. *V. nemorosum*.

Corolla 6 to 8 mm. broad-----38. *V. jaliscense*.

Stems long-hirsute; leaves broadest above the middle.

39. *V. xanthotrichum*.

1. *Vincetoxicum hastulatum* (A. Gray) Heller, *Muhlenbergia* 1: 2. 1900.

Lachnostoma hastulatum A. Gray Proc. Amer. Acad. 11: 87. 1876.

Gonolobus hastulatus A. Gray, Proc. Amer. Acad. 12: 78. 1876.

Baja California; type from Taptillas Canyon.

Stems slender, chiefly herbaceous, finely pubescent; leaves hastate, slender-petiolate, pubescent; flowers mostly solitary, short-pedicellate, whitish; corolla lobes oblong-linear; follicles fusiform, 5 to 6 cm. long, smooth or with few short tubercles.

2. *Vincetoxicum saepimentorum* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 381. 1913.

Type from Baños del Carrizal, Veracruz.

Stems glabrous or nearly so; leaves ovate-cordate, 4 to 6 cm. long, acuminate, glabrous or nearly so; inflorescence racemiform, equaling or longer than the leaves; corolla lobes oblong, obtuse.

3. Vincetoxicum lutescens Standl.

Gonolobus luteolus Decaisne in DC. Prodr. 8: 593. 1844. Not *Vincetoxicum luteolum* Jord. & Fourr. 1866.

Type from Teapa, Tabasco.

Leaves ovate-cordate, short-acuminate or attenuate, sparsely short-pilose or glabrate; flowers subracemose; sepals glabrous; corolla lobes ovate, acutish.

4. Vincetoxicum cavanillesii Standl.

Cynanchum nigrum Cav. Icon. Pl. 2: pl. 459, 1793. Not *Vincetoxicum nigrum* Moench, 1794.

Gonolobus niger R. Br. Mem. Wern. Soc. 1: 35. 1809.

San Luis Potosí and Veracruz.

Leaves ovate-cordate, 4 to 7.5 cm. long, acuminate or cuspidate-acuminate, puberulent; inflorescence umbelliform, few-flowered, the flowers slender-pedicellate; corolla blackish, the lobes obtuse, about 5 mm. long.

5. Vincetoxicum stenophyllum Standl.

Gonolobus lanceolatus Decaisne in DC. Prodr. 8: 598. 1844. Not *Vincetoxicum lanceolatum* Kuntze, 1891.

Veracruz; type collected near the city of Veracruz.

Stems retrorse-pilose; leaves short-petiolate, lance-oblong or ovate-lanceolate, 5.5 to 8 cm. long, acuminate, densely velutinous-pubescent; peduncles very short, few-flowered; corolla about 2 cm. broad, the lobes rounded, green, spotted with white.

6. Vincetoxicum littorale (Decaisne) Standl.

Gonolobus littoralis Decaisne in DC. Prodr. 8: 596. 1844.

Type from sandhills near Veracruz.

Stems hirtellous and pilose; leaves cordate, attenuate at apex, sparsely pilose above, more densely so beneath; peduncles shorter than the petioles, few-flowered; corolla greenish, the lobes ovate-deltoid.

7. Vincetoxicum diadematum (Edwards) Standl.

Gonolobus diadematus Edwards, Bot. Reg. 3: pl. 252. 1817.

Described from cultivated plants of Mexican origin; reported by Robinson and Greenman¹ from Tepic.

Stems fruticose, with corky bark, the young ones hirsute; leaves elliptic-oblong, 5 to 7.5 cm. long or larger, acuminate, cordate at base, hirsute; umbels short-pedunculate, few-flowered; corolla greenish yellow; fruit 5-angulate.

8. Vincetoxicum tingens (Decaisne) Standl.

Gonolobus tingens Decaisne in DC. Prodr. 8: 592. 1844.

Type from Zimapán, Hidalgo.

Stems hirtellous; leaves ovate-cordate, acuminate, pubescent; peduncles equaling the petioles; calyx lobes ovate, subotuse; corolla lobes ovate, obtuse, velutinous outside, green and fuscous.

9. Vincetoxicum magnifolium (Pittier) Standl.

Gonolobus magnifolius Pittier, Contr. U. S. Nat. Herb. 13: 104. f. 13. 1910.

Oaxaca. Costa Rica; type from forests of Las Vueltas de Tucurrique.

Large woody vine, the stems hirtellous and puberulent; leaves rounded-cordate, 13 to 24 cm. long, acute or acuminate, densely pubescent; cymes few-flowered; calyx lobes broadly elliptic, 10 to 14 mm. long, obtuse; corolla brownish or greenish, the lobes rounded-oval, rounded at apex.

¹ Proc. Amer. Acad. 29: 389. 1894.

10. *Vincetoxicum reticulatum* (Engelm.) Heller, Bot. Expl. Texas 79. 1895.
Gonolobus reticulatus Engelm.; A. Gray, Proc. Amer. Acad. 12: 75. 1876.
Nuevo León and San Luis Potosí; reported from Sonora. Western Texas to southern Arizona.

Stems hirsute: leaves ovate-cordate, 4 to 10 cm. long, acuminate, hirsute; umbels 5 to 9-flowered; corolla green, with purplish venation, the lobes obtuse; follicles 7 to 12 cm. long, muricate.

11. *Vincetoxicum velutinum* (Schlecht.) Standl.

Gonolobus velutinus Schlecht. Linnaea 13: 521. 1833.

Veracruz; type from Jalapa.

Stems hirsute and puberulent; leaves rounded-cordate, 4.5 to 13.5 cm. long, rounded to short-acuminate at apex, velutinous; peduncles few-flowered, the flowers greenish.

12. *Vincetoxicum suberiferum* (Robinson) Standl.

Gonolobus suberiferus Robinson, Proc. Amer. Acad. 27: 181. 1892.

Type from San José Pass, San Luis Potosí.

Stems woody, covered with pale yellowish corky bark, hirsute when young; leaves ovate, 3.5 to 5 cm. long, acuminate, pubescent; peduncles 1-flowered; corolla 3 cm. broad, the lobes ovate, obtuse; follicles slender, smooth, 7.5 cm. long or more.

13. *Vincetoxicum congestum* (Decaisne) Standl.

Gonolobus congestus Decaisne in DC. Prodr. 8: 597. 1844.

Jalisco to Oaxaca; type from Oaxaca, altitude 1,500 meters.

Stems hirsute; leaves ovate-cordate, 4 to 11 cm. long, acute or acuminate, pilose; cymes dense, few-flowered, subsessile; corolla about 1 cm. broad, the lobes deltoid-ovate.

Gonolobus sidaefolius Mart. & Gal.,¹ described from Veracruz, may be a synonym.

14. *Vincetoxicum triflorum* (Mart. & Gal.) Standl.

Gonolobus triflorus Mart. & Gal. Bull. Acad. Brux. 11¹: 365. 1844.

Type from Peñoles, Mixteca Alta, Oaxaca, altitude 1,950 meters.

Stems pubescent; leaves cordate-ovate or ovate-lanceolate, acuminate, pubescent; peduncles 3-flowered, shorter than the petiole; corolla greenish, the lobes ovate-lanceolate.

Perhaps a synonym of *V. uniflorum*.

15. *Vincetoxicum fuscum* (Decaisne) Standl.

Gonolobus fuscus Decaisne in DC. Prodr. 8: 592. 1844.

Type from Arumbaro, near Morelia, Michoacán, altitude 1,050 meters.

Stems hirtellous; leaves ovate, attenuate at apex, appressed-pilose, or subvelutinous beneath; peduncles shorter than the leaves.

16. *Vincetoxicum petiolare* (A. Gray) Standl.

Gonolobus petiolaris A. Gray, Proc. Amer. Acad. 21: 397. 1886.

Chihuahua and Sinaloa; type from Batopilas, Chihuahua.

Stems woody below, covered with corky bark, hirsute when young; leaves ovate-cordate or oblong-cordate, 5 to 11 cm. long, acuminate, pubescent; peduncles few-flowered, equaling or shorter than the petioles; corolla about 13 mm. long; follicles slender, smooth, 18 cm. long or less.

¹ Bull. Acad. Brux. 11¹: 367. 1844.

17. Vincetoxicum fraternum (Schlecht.) Standl.*Gonolobus fraternus* Schlecht. *Linnaea* 13: 521. 1833.

San Luis Potosí and Veracruz; type from Hacienda de la Laguna, Veracruz.

Leaves oblong-ovate, 4 to 7 cm. long, acute or short-acuminate, cordate at base, with a broad sinus, glabrate above, pubescent beneath; peduncles shorter than the petioles, few-flowered; corolla 8 to 10 mm. long.

18. Vincetoxicum striatum (Mart. & Gal.) Standl.*Gonolobus striatus* Mart. & Gal. *Bull. Acad. Brux.* 11¹: 365. 1844.

Type from El Sabino.

Stems pubescent-hirtous; leaves cordate-ovate, acuminate, about 5 cm. long, pubescent; peduncles about 3-flowered, scarcely longer than the petioles; corolla about 2.5 cm. broad.

19. Vincetoxicum chrysanthum (Greenm.) Standl.*Gonolobus chrysanthus* Greenm. *Proc. Amer. Acad.* 32: 299. 1897.

Mexico, Morelos, Oaxaca, and Michoacán; type from Pátzcuaro, Michoacán.

Stems hirsute and puberulent; leaves oblong-ovate, 5 to 10 cm. long, acuminate, cordate at base, hirtellous or hirsute; peduncles loosely few-flowered, equaling or shorter than the petioles; corolla 1.5 to 2.5 cm. broad, yellow.

20. Vincetoxicum stenopetalum (A. Gray) Standl.*Gonolobus stenopetalus* A. Gray, *Proc. Amer. Acad.* 21: 398. 1886.

Chihuahua; type collected near the city of Chihuahua.

Stems suberect, woody at base, hirsute; leaves ovate-cordate, 5 to 10 cm. long, acuminate, puberulent and hispidulous; corolla 8 to 12 mm. long; follicles ovoid, muricate and hispidulous; seeds without coma.

21. Vincetoxicum asperum (Decaisne) Standl.*Gonolobus asper* Decaisne in DC. *Prodr.* 8: 595. 1844.*Gonolobus purpusii* T. S. Brandeg. *Univ. Calif. Publ. Bot.* 3: 387. 1909.

Oaxaca and Puebla; type from Cerro San Felipe, Oaxaca.

Stems hirtellous; leaves cordate-ovate, obtuse to acuminate, rough above, papillose beneath and sparsely hirsute; peduncles few-flowered; corolla 18 to 25 mm. long.

22. Vincetoxicum caudatum (A. Gray) Standl.*Gonolobus caudatus* A. Gray, *Proc. Amer. Acad.* 21: 399. 1886.*Gonolobus caudatus trachyanthus* Greenm. *Proc. Amer. Acad.* 33: 482. 1898.

Chihuahua to Puebla and Oaxaca; type from Hacienda San José, south of Batopilas, Chihuahua.

Stems woody, erect, sparsely puberulent or glabrate; leaves slender-petiolate, lanceolate, caudate-acuminate, glabrous or nearly so, 4 cm. long or less; peduncles 1-flowered; corolla fuscous, 5 to 8 mm. long.

In the typical form the corolla is glabrous within; in *G. caudatus trachyanthus* it is granular-puberulent.**23. Vincetoxicum chloranthum** (Schlecht.) Standl.*Gonolobus chloranthus* Schlecht. *Linnaea* 13: 520. 1833.

Veracruz; type from Jalapa.

Stems retrorse-pilose; leaves ovate-oblong, acuminate, shallowly cordate at base, pubescent; peduncles shorter than the leaves, several-flowered; corolla about twice as long as the calyx.

24. Vincetoxicum macranthum (Kunze) Standl.*Gonolobus macranthus* Kunze, *Linnaea* 20: 27. 1847.*Fischeria alta* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 276. 1912.

Nuevo León to Veracruz; type from Hacienda de la Laguna, Veracruz. Guatemala.

Stems densely pilosulous; leaves ovate-cordate or ovate-oblong, 5 to 9 cm. long, acuminate, pubescent; peduncles 1 to 3-flowered; corolla about 3.5 cm. broad, greenish, reticulate-veined.

25. Vincetoxicum oaxacanum Standl.

Gonolobus tristis Decaisne in DC. Prodr. 8: 596. 1844. Not *Vincetoxicum triste* Griseb. 1844.

Oaxaca; type from mountains of Oaxaca, altitude 2,100 meters.

Stems glandular-papillose and sparsely hirtellous; leaves ovate-cordate, 4.5 to 8 cm. long, acuminate, glandular-puberulent beneath and sparsely hirtellous; corolla about 1 cm. long.

26. Vincetoxicum pilosum (Benth.) Standl.*Gonolobus pilosus* Benth. Pl. Hartw. 289. 1848.

Jalisco to San Luis Potosí, Morelos, and Puebla; type from León, Guanajuato.

Stems pilosulous; leaves ovate-cordate, 4 to 8 cm. long, acuminate, pubescent; peduncles few-flowered, equaling or longer than the petioles; corolla 1.5 to 2.5 cm. long; follicles slender, smooth, about 10 cm. long. "Flor del muerto" (Guanajuato, *Dugès*).

27. Vincetoxicum crenatum Vail, Bull. Torrey Club 26: 429. 1899.

Type from Cuernavaca, Morelos.

Stems retrorsely pilose; leaves cordate-ovate, 5 to 8 cm. long, acuminate, papillose-puberulent; peduncles few-flowered, longer than the petioles; corolla 13 to 14 mm. long.

28. Vincetoxicum grayanum Standl.

Gonolobus atratus A. Gray, Proc. Amer. Acad. 22: 436. 1887. Not *Vincetoxicum atratum* Morr. & Decaisne, 1836.

Jalisco; type from Río Blanco.

Stems woody, hirsute when young; leaves oblong-ovate, 5 to 7 cm. long, acuminate, cordate at base, viscid-puberulent beneath; peduncles few-flowered, mostly longer than the petioles; corolla 3.5 to 4 cm. broad, black.

29. Vincetoxicum calcicola (Greenm.) Standl.*Gonolobus calcicola* Greenm. Proc. Amer. Acad. 40: 30. 1904.

Type from Jojutla, Morelos.

Stems woody below, hirtellous and papillose-puberulent; leaves ovate-cordate, 3 to 6 cm. long, acuminate, granular-puberulent beneath; peduncles few-flowered, shorter than the petioles; corolla about 2 cm. broad, brown-purple.

30. Vincetoxicum cyclophyllum Standl., sp. nov.

Type from Cañón de la Mano Negra, near Iguala, Guerrero (*Rose, Painter & Rose* 9355; U. S. Nat. Herb. 452841).

Stems stout, glabrous, rising from a thick woody root; leaves long-petiolate, reniform-cordate, 6 to 11.5 cm. long, 6 to 10 cm. wide, rounded at apex and abruptly short-acuminate, deeply cordate at base, glabrous or sparsely puberulent beneath near the base; cymes sessile, few-flowered, the flowers on stout puberulent pedicels; calyx lobes linear-lanceolate, 10 to 14 mm. long, glabrous; corolla brown-purple, about 1 cm. long, the lobes deltoid-ovate, subacute, barbate within; outer corona entire or nearly so.

31. Vincetoxicum barbatum (H. B. K.) Standl.*Gonolobus barbatus* H. B. K. Nov. Gen. & Sp. 3: 209. pl. 239. 1819.*Gonolobus sororius* A. Gray, Proc. Amer. Acad. 22: 437. 1887.

Sinaloa to Oaxaca and Yucatán; type from Campeche. Guatemala and El Salvador.

Stems puberulent or glabrate; leaves ovate-cordate or deltoid-cordate, 2 to 5.5 cm. long, acuminate, with broad shallow sinus at base; cymes sessile or short-pedunculate, the pedicels long and slender; corolla about 1 cm. long; fruit ovoid, 8 to 12 cm. long, longitudinally winged, glabrous. "Matacoyote," "cuchamper de zope" (El Salvador).

32. Vincetoxicum pectinatum (T. S. Brandeg.) Standl.*Gonolobus pectinatus* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 387. 1909.

Puebla and Oaxaca; type from San Luis Tultitlanapa, Puebla.

Stems puberulent and sparsely hirtellous or glabrate; leaves broadly ovate-cordate, 3 to 6 cm. long, short-acuminate; cymes short-pedunculate, few-flowered, the pedicels long and slender; corolla greenish, about 13 mm. long; fruit ovoid, about 9 cm. long, 5-winged.

33. Vincetoxicum angustilobum (Robins. & Greenm.) Standl.*Gonolobus angustilobus* Robins. & Greenm. Proc. Amer. Acad. 29: 388. 1894.

Type collected near Tepic.

Stems puberulent and hirsute; leaves ovate-cordate, 5 to 6 cm. long, acuminate, pubescent beneath; peduncles shorter than the petioles, 1-flowered; calyx lobes ovate, acute; corolla green, about 2.5 cm. broad.

34. Vincetoxicum uniflorum (H. B. K.) Standl.*Gonolobus uniflorus* H. B. K. Nov. Gen. & Sp. 3: 207. pl. 238. 1819.

Veracruz, Mexico, Morelos, Puebla, and Oaxaca; type collected near the city of Mexico.

Stems puberulent and pilose; leaves ovate-cordate or ovate-oblong, 4 to 8 cm. long, acuminate, pubescent; peduncles shorter than the petioles, 1 or few-flowered, the flowers long-pedicellate; corolla greenish, 3.5 to 4.5 cm. broad. "Rosa verde" (Ramírez).

Gonolobus virescens Decaisne,¹ described from Regla, Hidalgo, appears to be closely related.

35. Vincetoxicum erianthum (Decaisne) Standl.*Gonolobus erianthus* Decaisne in DC. Prodr. 8: 592. 1844.

Jalisco to Veracruz and Oaxaca; type from Oaxaca. Guatemala.

Stems retrorse-pilose or puberulent, woody below; leaves mostly oblong-ovate, 4 to 11 cm. long, acuminate, cordate at base, pubescent; peduncles short, few-flowered; corolla greenish, reticulate-veined. "Talayote," "flor del muerto" (Guanajuato, Dugès); "cachayumbo" (Oaxaca).

36. Vincetoxicum nigrescens (Schlecht.) Standl.*Gonolobus nigrescens* Schlecht. Linnaea 8: 522. 1833.

San Luis Potosí and Veracruz; type from Hacienda de la Laguna, Veracruz.

Stems hirsute; leaves ovate-cordate, 4 to 10 cm. long, acute, velutinous; peduncles slender, often longer than the leaves, hirsute, few-flowered; corolla blackish, about 8 mm. broad, long-pilose within.

37. Vincetoxicum nemorosum (Decaisne) Standl.*Gonolobus nemorosus* Decaisne in DC. Prodr. 8: 596. 1844.

Oaxaca; type from Mixteca Alta.

¹ In DC. Prodr. 8: 596. 1844.

Branchlets retrorse-pilose or puberulent; leaves oblong-ovate or lance-oblong, 4 to 9 cm. long, acuminate, sparsely or densely pubescent beneath; peduncles short, few-flowered; corolla greenish, reticulate-veined; fruit ovoid, coarsely muricate.

38. Vincetoxicum jaliscense (Robins. & Greenm.) Standl.

Gonolobus jaliscensis Robins. & Greenm. Proc. Amer. Acad. **29**: 389. 1894.

Jalisco to Morelos; type from Guadalajara.

Stems retrorse-pubescent; leaves oblong or ovate-oblong, 3 to 7 cm. long, acuminate, cordate or truncate at base, densely pubescent beneath; peduncles very short, few-flowered; corolla yellowish green; follicles fusiform, striate.

39. Vincetoxicum xanthotrichum (T. S. Brandeg.) Standl.

Gonolobus xanthotrichus T. S. Brandeg. Zoe **5**: 251. 1908.

Veracruz and Oaxaca; type from Zacuapan, Veracruz.

Stems densely hirsute; leaves short-petiolate, oblong-obovate, 8 to 11 cm. long, abruptly acuminate, rounded or shallowly cordate at base, hirsute; umbels sessile or subsessile, the pedicels long and slender; corolla about 1 cm. long, hirsute outside, barbate in the throat.

DOUBTFUL SPECIES.

GONOLOBUS ALTATENSIS T. S. Brandeg. Zoe **5**: 244. 1908. Type from Altata, Sinaloa.

GONOLOBUS GRACILIS Decaisne in DC. Prodr. **8**: 596. 1844. Type from Oaxaca.

GONOLOBUS INCONSPICUUS T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 387. 1909. Type from Puebla.

VINCETOXICUM ATROCORONATUM T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 372. 1917. Type from Barranca de las Pilas, Puebla.

VINCETOXICUM CHIAPENSE T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 190. 1915. Type from Cerro del Boquerón, Chiapas.

VINCETOXICUM MEGACARPUM T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 381. 1913. Type from Baños del Carrizal, Veracruz.

VINCETOXICUM PUEBLENSE T. S. Brandeg. Univ. Calif. Publ. Bot. **4**: 91. 1910. Type from Puebla.

23. HIMANTOSTEMMA A. Gray, Proc. Amer. Acad. **20**: 294. 1885.

A single species is known.

1. Himantostemma pringlei A. Gray, Proc. Amer. Acad. **20**: 294. 1885.

Baja California and Sonora; type collected south of Altar, Sonora.

Vine, woody below, the stems hirtellous; leaves long-petiolate, ovate-cordate or deltoid cordate, 2 to 4.5 cm. long, acute, hirtellous and puberulent; peduncles short, mostly 2-flowered; calyx lobes linear-lanceolate; corolla rotate, 7 to 8 mm. long, 5-parted, brown-purple, the lobes lanceolate, covered within with numerous long linear-spatulate hairs; corona simple, of 10 long linear stipitate scales and of 5 short ones; follicles about 8 cm. long, 1.5 to 2 cm. thick, glabrous, covered with long spinelike appendages.

24. UROSTEPHANUS Robins. & Greenm. Amer. Journ. Sci. III. **50**: 159. 1895.

The genus consists of a single species.

1. Urostephanus gonoloboides Robins. & Greenm. Amer. Journ. Sci. III. **50**: 159. 1895.

Type collected on hills near Oaxaca, altitude 1,800 meters.

Stems scandent, chiefly herbaceous, fulvous-hirsute; leaves ovate-cordate, 4 to 6.5 cm. long, acuminate, hirsute, slender-petiolate; cymes umbelliform, sub-

sessile; calyx 5-parted, the lobes ovate-lanceolate, 4 mm. long; corolla rotate, brown-purple or green, 10 to 12 mm. long, the lobes lance-oblong, pilose outside, lanate in the throat; corona tubular, with 5 internal hornlike processes and with 5 alternating external lobes, these each produced externally into 2 filiform flexuous appendages; stigma depressed.

DOUBTFUL GENERA.

IRMISCHIA FLORIBUNDA Schlecht. *Linnaea* 19: 739. 1845. Type from tropical Mexico.

MICROSTELMA Baill. *Hist. Pl.* 10: 286. 1891. The genus is said to consist of two Mexican species, neither of which is given a name.

PACHYSTELMA CORDATUM T. S. Brandeg. *Univ. Calif. Publ. Bot.* 7: 330. 1920. Type from Acasonica, Veracruz.

STELMAGONUM HAHNIANUM Baill. *Hist. Pl.* 10: 287. 1891. Type from Mexico.

TRICHOSTELMA CILIATUM Baill. *Hist. Pl.* 10: 288. 1891. Type from Mexico.

142. CONVULVULACEAE. Morning-glory Family.

Plants erect or scandent, woody or herbaceous; leaves alternate, simple or digitately compound, often lobate, estipulate; flowers regular, perfect, usually large and showy, commonly cymose; calyx inferior, 5-parted, the sepals free or nearly so, strongly imbricate; corolla gamopetalous, funnelform, salverform, or campanulate, the limb 5-lobate, commonly induplicate-valvate; stamens 5, inserted on the corolla tube; style simple or bifid, the stigma or stigmas capitate or bifid; fruit capsular, 2 to 5-celled, the cells 1 or 2-seeded.

Several genera of the family are represented in Mexico only by herbaceous species.

Style bifid..... 1. **BREWERIA**.

Style simple below the stigma.

Sepals small at first, in age accrescent and leaflike..... 2. **PORANA**.

Sepals not accrescent or, if so, not becoming leaflike.

Stigma with 2 elongate lobes..... 3. **JACQUEMONTIA**.

Stigma entire or with 2 subglobose lobes.

Anthers spirally twisted..... 4. **OPERCULINA**.

Anthers not twisted.

Stamens more or less exserted.

Corolla salverform, with broad limb, white or purple.

5. **CALONYCTION**.

Corolla tubular, with very narrow limb, usually red or yellow.

6. **EXOGONIUM**.

Stamens included.

Capsule dehiscent, usually with 2 or more seeds..... 7. **IPOMOEA**.

Capsule indehiscent, 1-seeded..... 8. **TURBINA**.

1. **BREWERIA** R. Br. *Prodr. Fl. Nov. Holl.* 487. 1810.

Shrubs or herbs, scandent or erect; leaves entire; cymes axillary or terminal, or the flowers solitary; sepals subequal or the outer larger; corolla campanulate, the limb plicate, 5-angulate; ovary 2-celled, 4-ovulate; style bifid or the stigmas 2 and distinct.

Flowers in cymes..... 1. **B. sulphurea**.

Flowers solitary.

Leaves linear-lanceolate; stems erect..... 2. **B. multicaulis**.

Leaves ovate or oval; stems prostrate..... 3. **B. ovalifolia**.

1. *Breweria sulphurea* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 384. 1913.

Type from Baños del Carrizal, Veracruz.

Stems suffrutescent, scandent; leaves elliptic-oblong to oval-ovate, 4 to 7.5 cm. long, rounded and mucronulate at apex, rounded at base, fulvous-tomentose beneath, petiolate; flowers mostly long-pedicellate; sepals 1 to 1.5 cm. long; corolla 1.5 cm. long, hirsute.

2. *Breweria multicaulis* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 185. 1911.

Type from Sierra del Rey, Coahuila.

Stems stout, suffrutescent, densely white-tomentose; leaves sessile, 1 to 2.5 cm. long, acute or attenuate, acute at base, densely pubescent; flowers subsessile; sepals 10 to 14 mm. long; corolla 3.5 cm. long, blue, hirsute.

3. *Breweria ovalifolia* (Torr.) A. Gray, Syn. Fl. 2¹: 217. 1878.

Evolvulus ovalifolius Torr. U. S. & Mex. Bound. Bot. 150. 1859.

Type collected along the Rio Grande below San Carlos, Coahuila.

Plant probably herbaceous, sericeous-canescens; leaves about 2.5 cm. long, subcordate at base; peduncles very short; capsule globose, 12 mm. in diameter.

2. **PORANA** Burm. Fl. Ind. 51. 1768.

The other species are natives of the Old World.

1. *Porana velutina* (Mart. & Gal.) Hallier, Bot. Jahrb. Engler 16: 538. 1893.

Dufourea velutina Mart. & Gal. Bull. Acad. Brux. 12²: 259. 1845.

Breweria mexicana Hemsl. Biol. Centr. Amer. Bot. 2: 400. 1882.

Morelos, Puebla, and Oaxaca; type collected near La Venta de Aragón, between Tehuacán and Oaxaca, altitude 900 meters.

Scandent shrub; leaves petiolate, oblong-ovate to broadly ovate, 4 to 9 cm. long, acuminate, rounded or obtuse at base, entire, sericeous, especially beneath, or in age glabrate; flowers in axillary, few or many-flowered cymes, slender-pedicellate; sepals very unequal, the 3 outer ones larger, oval, becoming as much as 18 mm. long, rounded at apex, glabrate; corolla funnel-form, about 1.5 cm. long, sericeous outside; stamens included; ovary 2-celled, 4-ovulate; style filiform, unequally bifid, the stigmas capitate.

3. **JACQUEMONTIA** Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 476. 1833.

Stems usually scandent, herbaceous or fruticose; leaves entire, usually cordate; flowers blue or white, cymose or capitate, axillary; sepals subequal or the outer ones larger; corolla broadly or narrowly campanulate, the limb plicate, 5-angulate; ovary 2-celled, 4-ovulate; style filiform, the stigmas 2, ovate or oblong; seeds usually glabrate.

All the Mexican species are listed here, but some of them are wholly herbaceous.

Flowers in headlike clusters, the bracts foliaceous.

Bracts, except the outermost, linear.....1. *J. tamnifolia*.

Bracts all broad.

Corolla glabrous outside; pubescence of the leaves spreading.

.....2. *J. pycnocephala*.

Corolla hirsute; pubescence of the leaves appressed.....3. *J. perryana*.

Flowers in loose or dense cymes, the bracts small.

Sepals rounded or obtuse at apex, not apiculate.

Sepals glabrous.....4. *J. nodiflora*.

Sepals pubescent.

Corolla about 12 mm. long.....5. *J. simulata*.

Corolla about 40 mm. long.....6. *J. nelsoni*.

Sepals acute or acuminate, or at least apiculate.

Sepals glabrous-----7. *J. oaxacana*.

Sepals variously pubescent.

Inflorescence glandular-pilose-----8. *J. azurea*.

Inflorescence without glandular pubescence.

Cymes many-flowered, usually dense.

Sepals very densely pubescent. Leaves densely pubescent on both surfaces-----9. *J. abutiloides*.

Sepals sparsely pubescent or glabrate.

Leaves acute or acuminate, glabrate-----10. *J. pentantha*.

Leaves rounded at apex and mucronate or cuspidate, densely pubescent beneath-----11. *J. apiculata*.

Cymes mostly 3 or 4-flowered.

Sepals all of equal length-----12. *J. palmeri*.

Sepals unequal, the outer ones slightly longer.

Sepals densely pilosulous. Leaves mostly obtuse, densely pubescent-----9. *J. abutiloides*.

Sepals sparsely pubescent or glabrate, or minutely tomentulose.

Leaves acute to acuminate, the upper ones slender-petiolate.

13. *J. pringlei*.

Leaves obtuse or rounded at apex and mucronate, the upper ones usually subsessile-----14. *J. smithii*.

1. *Jacquemontia tamnifolia* (L.) Griseb. Fl. Brit. W. Ind. 474. 1861.

Ipomoea tamnifolia L. Sp. Pl. 162. 1753.

Jacquemontia macrocephala T. S. Brandeg. Zoe 5: 219. 1905.

Thyella macrocephala House, Muhlenbergia 5: 68. 1909.

Sinaloa. Southern United States, West Indies, South America, and tropical Africa.

Stems herbaceous, pilose; leaves ovate or ovate-cordate, slender-petiolate, acuminate; flower heads long-pedunculate, many-flowered, hirsute; corolla blue, about 12 mm. long.

2. *Jacquemontia pycnocephala* Benth. Bot. Voy. Sulph. 137. 1844.

Thyella pycnocephala House, Bull. Torrey Club 33: 314. 1906.

Guerrero, the type from Acapulco.

Stems densely fulvous-pilose; leaves long-petiolate, broadly ovate-cordate, 2.5 to 5 cm. long, cuspidate-mucronate, densely pubescent; heads on long or short peduncles, the bracts rounded-ovate or deltoid-ovate; corolla about 1.5 cm. long, blue.

3. *Jacquemontia perryana* Duchass. & Walp. Linnaea 23: 751. 1850.

Ipomoea lactescens Seem. Bot. Voy. Herald 171. 1854.

Oaxaca. Panama; type collected near the city of Panama.

Stems chiefly or wholly herbaceous, hirsute or glabrate; leaves long-petiolate, broadly ovate-cordate, 4.5 to 8 cm. long, acuminate; heads long-pedunculate, very dense, hirsute; corolla white, about 3.5 cm. long.

4. *Jacquemontia nodiflora* (Desr.) Don, Hist. Dichl. Pl. 4: 283. 1838.

Convolvulus nodiflorus Desr. in Lam. Encyl. 3: 557. 1789.

Sinaloa to Oaxaca and Veracruz. West Indies; Central and South America.

Stems often suffrutescent, tomentose; leaves short-petiolate, oblong-lanceolate to broadly ovate-cordate, 3 to 5.5 cm. long, acute or acuminate, densely tomentose beneath; cymes many-flowered, short-pedunculate; corolla white, about 12 mm. long.

5. *Jacquemontia simulata* House, Bull. Torrey Club 33: 314. 1906.

Yucatán.

Stems woody below, tomentose when young; leaves broadly ovate-cordate, 2 to 6 cm. long, obtuse and mucronate, densely tomentose beneath; cymes dense, many-flowered; corolla white, about 12 mm. long.

This has been reported from Yucatán as *J. abutiloides*.

6. *Jacquemontia nelsoni* House, Muhlenbergia 5: 67. 1909.

Type collected between Nopala and Mixistepec, Oaxaca.

Stems pubescent; leaves short-petiolate, ovate or oblong-ovate, 3 to 4 cm. long, acuminate, rounded at base, hirtellous beneath; cymes long-pedunculate, many-flowered; sepals about 8 cm. long; corolla white (?).

7. *Jacquemontia oaxacana* (Meisn.) Hallier, Bot. Jahrb. Engler 16: 543. 1893.

Jacquemontia parviflora oaxacana Meisn. in Mart. Fl. Bras. 7: 297. 1869.

Sinaloa to Veracruz and Oaxaca; type from mountains of Oaxaca.

Stems pubescent or glabrate; leaves ovate-cordate, 3 to 5.5 cm. long, acuminate, pilose beneath or finally glabrate; peduncles usually much longer than the leaves, the cymes many-flowered; corolla blue, 1 to 1.5 cm. long.

8. *Jacquemontia azurea* (Desr.) Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 476. 1833.

Convolvulus azureus Desr. in Lam. Encyl. 3: 554. 1789.

Convolvulus sphaerostigma Cav. Icon. Pl. 5: 54. pl. 481. 1799.

Convolvulus apocynoides Schlecht. & Cham. Linnaea 5: 117. 1830.

Jacquemontia hirsuta Choisy, Mém. Soc. Phys. Hist. Nat. Genève 8: 63. 1838.

Convolvulus secundiflorus Fernald, Proc. Amer. Acad. 33: 90. 1897.

Jacquemontia pauciflora T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 384. 1913.

Veracruz, Oaxaca, and Chiapas. Central and South America.

Stems chiefly or wholly herbaceous, glandular-pilose, slender; leaves ovate-oblong to rounded-ovate, 1 to 4 cm. long, mostly long-acuminate, pilose; cymes mostly 3-flowered, the flowers short-pedicellate; corolla blue, about 1 cm. long.

9. *Jacquemontia abutiloides* Benth. Bot. Voy. Sulph. 34. 1844.

Baja California and Sonora; type from Magdalena Bay, Baja California.

Woody vine, usually densely tomentose almost throughout; leaves short-petiolate, ovate or rounded-ovate, 1 to 4 cm. long, rounded to acuminate at apex, mucronate, usually deeply cordate at base; cymes on long or short peduncles, dense, usually few-flowered; corolla blue, 1.2 to 1.5 cm. long.

10. *Jacquemontia pentantha* (Jacq.) Don, Hist. Dichl. Pl. 4: 283. 1838.

Convolvulus pentanthus Jacq. Coll. Bot. 4: 210. 1790.

Convolvulus violaceus Vahl, Symb. Bot. 3: 29. 1794.

Jacquemontia violacea Choisy, Mém. Soc. Phys. Hist. Nat. Genève 8: 61. 1838.

Sinaloa to Veracruz and Yucatán. Southern Florida, West Indies, Central and South America.

Stems chiefly herbaceous, pubescent or glabrate; leaves ovate or ovate-cordate, 2 to 9 cm. long; peduncles mostly longer than the leaves; corolla 1.2 to 2 cm. long, blue or rarely white.

11. *Jacquemontia apiculata* House, Muhlenbergia 5: 66. 1909.

Chihuahua and Tamaulipas; type from Victoria, Tamaulipas.

Stems thinly tomentose; leaves rounded-cordate, 2 to 5 cm. long, shallowly cordate at base; peduncles longer than the leaves, the cymes lax, the flowers mostly long-pedicellate; corolla blue, about 2 cm. long. "Enredadera" (Tamaulipas).

12. *Jacquemontia palmeri* S. Wats. Proc. Amer. Acad. 24: 63. 1889.

Jacquemontia palmeri varians T. S. Brandeg. Zoe 5: 170. 1903.

Baja California and Sonora; type from Guaymas, Sonora.

Stems herbaceous, thinly tomentose or pilose; leaves ovate-cordate, 1.5 to 4.5 cm. long, obtuse or acute, pilose or glabrate; peduncles slender, longer than the leaves; corolla blue, 7 to 8 mm. long.

13. *Jacquemontia pringlei* A. Gray, Proc. Amer. Acad. 17: 227. 1882.

Jacquemontia pringlei glabrescens A. Gray, Proc. Amer. Acad. 21: 402. 1886.

Chihuahua and Sonora; Oaxaca (?). Type from Santa Catalina Mountains, Arizona; also in El Salvador.

Slender vine, woody below, the stems pubescent or glabrate; leaves broadly ovate-cordate, 1.5 to 6 cm. long, pubescent or glabrate; peduncles equaling or longer than the leaves; corolla 1.5 to 2.5 cm. long, pale blue or white. "Campanilla" (El Salvador).

14. *Jacquemontia smithii* Robins. & Greenm. Amer. Journ. Sci. 50: 160. 1895.

Puebla and Oaxaca; type from Culcatlán, Oaxaca, altitude 540 meters.

Stems erect or nearly so, woody below, puberulent; leaves broadly ovate, 1 to 5 cm. long, usually subcordate at base, puberulent or tomentulose; peduncles longer than the leaves; corolla blue, 12 to 15 mm. long.

EXCLUDED SPECIES.

JACQUEMONTIA CHIAPENSIS T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 60. 1914. This plant, described from Tonalá, Chiapas, is *Aniseia martinicensis* (Jacq.) Cholsy.

4. OPERCULINA Manso, Enum. Subst. Bras. 16. 1836.

REFERENCE: House, Bull. Torrey Club 33: 495-503. 1906.

Stems scandent, herbaceous or fruticose; leaves varying from entire to digitately compound; calyx large, pyriform, constricted above, the sepals scarious or chartaceous; corolla campanulate or funnelform; anthers spirally twisted; capsule large, 2-celled and 4-seeded or imperfectly 4-celled; seeds usually glabrous.

Leaves entire.

Peduncles conspicuously winged-----1. *O. alatipes*.

Peduncles not at all or only obscurely winged.

Leaves lance-linear-----2. *O. lancifolia*.

Leaves ovate-cordate or rounded-cordate.

Sepals 2 to 2.5 cm. long; corolla tube twice as long as the calyx.

3. *O. rhodocalyx*.

Sepals 3 cm. long or more; corolla tube little exceeding the calyx.

4. *O. discoidesperma*.

Leaves lobed or digitately compound.

Leaves digitately compound, divided to the petiole.

Plants hirsute-----5. *O. aegyptia*.

Plants glabrous.

Corolla yellow-----6. *O. aurea*.

Corolla white or whitish.

Leaflets long-acuminate-----7. *O. palmeri*.

Leaflets obtuse-----8. *O. platyphylla*.

Leaves pinnately lobed or deeply palmate-lobed, but not divided to the petiole.

Corolla yellow; capsule 3 to 4 cm. in diameter-----9. *O. tuberosa*.

Corolla white or whitish; capsule 1 to 2 cm. in diameter.

Plants hirsute-----10. *O. dissecta*.

Plants glabrous.

Leaves deeply lobed, the lobes extending nearly to the costa.

11. *O. ornithopoda*.

Leaves lobed less than halfway to the costa-----12. *O. pectinata*.

1. *Operculina alatipes* (Hook.) House, Bull. Torrey Club 33: 499. 1906.

Ipomoea alatipes Hook. in Curtis's Bot. Mag. pl. 5330. 1862.

Ipomoea alata Rose, Contr. U. S. Nat. Herb. 1: 108. 1891. Not *I. alata* R. Br. 1810.

Operculina rubicunda House, Bull. Torrey Club 33: 498. 1906.

Sonora to Chiapas. Central America and Colombia.

Plants glabrous, chiefly herbaceous; leaves lanceolate to broadly ovate-cordate, 3 to 8 cm. long, acuminate; sepals about 2.5 cm. long; corolla red, the tube 4 to 5 cm. long; seeds black, glabrous. "Mechoacán," "campanilla," "quiebra cajete" (El Salvador).

2. *Operculina lancifolia* House, Muhlenbergia 5: 68. 1909.

Type from Valley of Jiquipilas, Chiapas, altitude 660 to 840 meters.

Plants glabrous, herbaceous; leaves 5 to 7 cm. long, 4 to 8 mm. wide, sagittate-cordate at base; peduncles 1-flowered; sepals about 2 cm. long; corolla pink, 5 cm. long.

3. *Operculina rhodocalyx* (A. Gray) House, Bull. Torrey Club 33: 498. 1906.

Ipomoea rhodocalyx A. Gray, Proc. Amer. Acad. 22: 439. 1887.

Sinaloa and Jalisco; type from Tequila, Jalisco.

Plants glabrous; leaves ovate-cordate, 5 to 10 cm. long, acuminate; peduncles 1 or 2-flowered; calyx reddish; corolla yellow, 5 to 6 cm. long; seeds glabrous.

4. *Operculina discoidesperma* (Donn. Smith) House, Muhlenbergia 5: 68. 1909.

Ipomoea discoidesperma Donn. Smith, Bot. Gaz. 14: 27. 1889.

Coahuila to Guanajuato and Chiapas. Guatemala; type from Pansamalá.

Plants glabrous; leaves rounded-cordate, 6 to 15 cm. long, acuminate; peduncles 2 or 3-flowered; corolla yellow, about 5 cm. long; capsule about 2.5 cm. in diameter, 1-seeded, the seed compressed, 1 cm. broad, densely pubescent.

5. *Operculina aegyptia* (L.) House, Bull. Torrey Club 33: 502. 1906.

Ipomoea aegyptia L. Sp. Pl. 162. 1753.

Convolvulus pentaphyllus L. Sp. Pl. ed. 2. 233. 1763.

Ipomoea pentaphylla Jacq. Coll. Bot. 2: 297. 1788.

Ipomoea sinaloensis T. S. Brandeg. Zoe 5: 217. 1905.

Merremia aegyptia Urban, Symb. Antill. 4: 505. 1910.

Sinaloa to Chiapas and Yucatán. Widely distributed in the tropics of both hemispheres.

Stems chiefly herbaceous; leaflets 5, elliptic or obovate, 4 to 10 cm. long, acuminate; calyx densely hirsute; corolla white, about 2.5 cm. long; seeds glabrous.

6. *Operculina aurea* (Kellogg) House, Muhlenbergia 5: 68. 1909.

Aniseia aurea Kellogg, Proc. Calif. Acad. 5: 83. 1873.

Ipomoea aurea Kellogg; Curran, Bull. Calif. Acad. 1: 143. 1885.

Baja California.

Woody vine; leaflets obovate, elliptic, or lance-ovate, 1 to 4 cm. long, obtuse to acuminate; sepals in fruit 3 to 3.5 cm. long; corolla about 5 cm. long; seeds densely pubescent.

7. *Operculina palmeri* (S. Wats.) House, Bull. Torrey Club 33: 502. 1906.

Ipomoea palmeri S. Wats. Proc. Amer. Acad. 24: 63. 1889.

Sonora and Sinaloa; type from Guaymas, Sonora.

Woody vine; leaflets linear-lanceolate, 9 cm. long or less, acute at base; sepals in fruit 4 cm. long; corolla about 6.5 cm. long; seeds densely pubescent.

8. *Operculina platyphylla* (Fernald) House, Bull. Torrey Club 33: 502. 1906.

Ipomoea palmeri platyphylla Fernald, Proc. Amer. Acad. 33: 90. 1897.

Type from Acapulco, Guerrero.

Stems suffrutescent; leaflets elliptic or obovate; sepals in fruit 3.5 cm. long; corolla 7 cm. long.

9. *Operculina tuberosa* (L.) Meisn. in Mart. Fl. Bras. 7: 212. 1869.

Ipomoea tuberosa L. Sp. Pl. 160. 1753.

Campeche. Central and South America, West Indies, and Old World tropics; type from Jamaica.

Plants glabrous, climbing over trees; leaves mostly 7-lobate, 5 to 12 cm. long, the lobes acuminate, entire; sepals in fruit as much as 6 cm. long; corolla 4 to 5.5 cm. long; seeds densely pubescent.

10. *Operculina dissecta* (Jacq.) House, Bull. Torrey Club 33: 500. 1906.

Convolvulus dissectus Jacq. Obs. Bot. 2: 4. 1767.

Ipomoea sinuata Ortega, Hort. Matr. Dec. 84. 1798.

Merremia dissecta Hallier, Bot. Jahrb. Engler 18: 114. 1894.

Sinaloa to Coahuila, Tamaulipas, San Luis Potosí, and Oaxaca. Florida and Texas; West Indies; Central and South America.

Stems chiefly herbaceous; leaves mostly 5-lobate, the lobes 2 to 8 cm. long, deeply lobate; sepals in fruit about 3 cm. long; corolla 3.5 to 4 cm. long; seeds black, glabrous.

11. *Operculina ornithopoda* (Robinson) House, Bot. Gaz. 43: 414. 1907.

Ipomoea ornithopoda Robinson, Proc. Amer. Acad. 27: 183. 1892.

Operculina roseana House, Bull. Torrey Club 33: 500. 1906.

Operculina angustiloba House, Bull. Torrey Club 33: 501. 1906.

Ipomoea megacarpa T. S. Brandeg. Zoe 5: 218. 1905.

Operculina ornithopoda megacarpa Robinson, Proc. Amer. Acad. 51: 530. 1916.

Sinaloa to Tamaulipas, Veracruz, Yucatán, and Chiapas; type from Las Canoas, San Luis Potosí.

Stems chiefly herbaceous; leaves mostly 5-lobate, the lobes linear to ovate or rhombic, entire or lobate, usually acute or acuminate; sepals in fruit about 1.5 cm. long; corolla 4 to 5 cm. long; seeds glabrous.

In the typical form the lobes of the leaves are linear. The more common form with broad lobes is *O. ornithopoda megacarpa* (T. S. Brandeg.) Robinson.

12. *Operculina pectinata* House, Muhlenbergia 5: 69. 1909.

San Luis Potosí and Oaxaca; type from Lagunas, Oaxaca.

Stems chiefly herbaceous; leaves 4 to 7 cm. long, long-acuminate, truncate at base, coarsely pectinate-dentate or lobate; sepals 12 to 14 mm. long; corolla 3.5 to 4.5 cm. long.

DOUBTFUL SPECIES.

OPERCULINA AMPLIATA (Choisy) House, Bull. Torrey Club 33: 503. 1906.
Ipomoea ampliata Choisy in DC. Prodr. 9: 361. 1845. Type from Campeche.
 Leaves said to be subtrilobate.

5. **CALONYCTION** Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 440. 1833.

Plants scandent, usually glabrous; leaves cordate, entire or lobate; flowers large, white or purple, axillary, cymose or solitary; sepals unequal; corolla salverform, with long slender tube and broad limb; stamens exserted; stigma capitate, bilobate; fruit 2-celled.

Corolla purple-----1. *C. muricatum*.

Corolla white.

Outer sepals with stout hornlike appendages-----2. *C. aculeatum*.

Outer sepals not appendaged-----3. *C. tastense*.

1. **Calonyction muricatum** (L.) Don, Hist. Dichl. Pl. 4: 264. 1838.

Convolvulus muricatus L. Mant. Pl. 1: 44. 1767.

Ipomoea muricata Jacq. Pl. Hort. Schönbr. 3: 40. 1798.

Ipomoea spinulosa T. S. Brandeg. Zoe 5: 169. 1903.

Baja California to Sinaloa, Chihuahua, and Yucatán. Northern South America.

Plants glabrous, the stems usually armed with short stout recurved prickles; leaves broadly cordate-ovate, 5 to 16 cm. long, acuminate, deeply cordate at base; flowers solitary or in few-flowered cymes, the pedicels thickened above; outer sepals subulate-cuspidate; corolla tube 3 to 5 cm. long; seeds glabrous.

2. **Calonyction aculeatum** (L.) House, Bull. Torrey Club 31: 590. 1904.

Convolvulus acuteatus L. Sp. Pl. 155. 1753.

Ipomoea alba L. Sp. Pl. 161. 1753.

Ipomoea bona-nox L. Sp. Pl. ed. 2. 228. 1762.

Calonyction speciosum Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 441. 1833.

Calonyction bona-nox Bojer, Hort. Maur. 227. 1837.

Ipomoea aculeata Kuntze, Rev. Gen. Pl. 2: 442. 1891.

Baja California and Sinaloa to Veracruz, Yucatán, and Chiapas. Widely distributed in tropical regions of both hemispheres.

Stems herbaceous or suffrutescent, often armed with recurved prickles; leaves 5 to 15 cm. long or larger, entire or 3 to 5-lobate, acuminate, glabrous; peduncles 1 or few-flowered, the pedicels much thickened in age; corolla tube 8 to 12 cm. long, the limb 6 to 10 cm. broad; capsules about 2 cm. long; seeds shining, dark brown or nearly black, minutely pubescent. "Bejuco de puerco," "bejuco de vaca" (Porto Rico); "galán de noche," "bejuco de tabaco," "garza," "pitoreta" (El Salvador).

The vine is commonly cultivated under the name of "moonflower." The large, very showy flowers open late in the evening. The milky juice is employed in tropical America for coagulating the latex of *Castilla*, the rubber tree. In India the young seeds are eaten, and the plant is there a popular remedy for snake bites. In El Salvador the stems are employed for hanging tobacco to dry.

3. **Calonyction tastense** (T. S. Brandeg.) House, Bull. Torrey Club 33: 318. 1906.

Ipomoea tastensis T. S. Brandeg. Zoe 5: 168. 1903.

Type from the Sierra El Taste, Baja California.

Glabrous woody vine; leaves broadly cordate, 6 to 8 cm. long, long-acuminate, entire or coarsely dentate; corolla 10 to 14 cm. long, the limb 8 to 10 cm. broad; seeds finely pubescent.

6. **EXOgonium** Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 443. 1833.

REFERENCE: House, The genus *Exogonium*, Bull. Torrey Club 35: 97-107. pl. 1, 2. 1908.

Woody vines; leaves usually entire; flowers solitary or in axillary cymes or racemes, the bracts often large and colored; sepals equal or unequal; corolla subtubular, red, white, or yellow, the tube long, the limb very narrow; stamens and style protruding; ovary 2-celled, 4-ovulate; stigma capitate, bilobate; seeds usually hairy.

Corolla yellow. Bracts inconspicuous-----1. *E. luteum*.
Corolla red or pink.

Bracts cordate, purple or pink-----2. *E. bracteatum*.

Bracts never cordate, green or minute and caducous.

Flowers sessile in the upper axils-----3. *E. velutifolium*.

Flowers pedicellate, in cymes.

Corolla glabrous outside-----4. *E. argentifolium*.

Corolla pubescent outside-----5. *E. conzattii*.

1. *Exogonium luteum* House, Bull. Torrey Club 35: 103. pl. 2, f. c. 1908.

Type from Cuesta de Chiquihuetlán, Oaxaca, altitude 990 meters.

Stems minutely pubescent; leaves deltoid-ovate, 5 to 8 cm. long, acuminate, pubescent; cymes long-pedunculate, many-flowered; corolla 3 to 5 cm. long.

2. *Exogonium bracteatum* (Cav.) Choisy; Don, Hist. Dichl. Pl. 4: 264. 1838.

Ipomoea bracteata Cav. Icon. Pl. 5: 51. pl. 447. 1799.

Ipomoea spicata H. B. K. Nov Gen. & Sp. 3: 112. 1819.

Ipomoea cincta Roem. & Schult. Syst. Veg. 4: 254. 1819.

Convolvulus obvallatus Spreng. Syst. Veg. 1: 595. 1825.

Exogonium olivae Bárcena, Viaje Cav. Cacahuam. 29. 1874.

Convolvulus bractiflorus Sessé & Moc. Pl. Nov. Hisp. 23. 1887.

Baja California to Chihuahua, Morelos, and Oaxaca; type from Mazatlán (Guerrero?).

Woody vine, glabrous throughout; leaves ovate-cordate, 6 to 9 cm. long, long-acuminate; flowers racemose, the bracts reniform, 2 to 3.5 cm. long, imbricate, obtuse or acute, prominently veined; corolla 3 to 3.5 cm. long. "Jícama" (Sonora); "bejuco blanco" (Sinaloa); "azalea de la barranca" (Jalisco); "carnestolenda" (Guerrero, *Langlassé*); "gallinitas del cerro," "empadonilla" (Oaxaca, *Reko*); "flor de candelaria" (Guerrero).

When in flower the plant is very showy, rivaling *Bougainvillea*, which it strongly suggests. The leaves are usually but not always absent at the time of flowering. The roots are large, watery, and sweet, and they are often eaten along the Pacific coast, either raw or cooked. The plant is illustrated by Hernández.¹

Exogonium bracteatum pubescens (Robins. & Greenm.) House,² described from Guadalajara, is a pubescent form.

¹ Thesaurus 388. 1651.

² Bull. Torrey Club 35: 101. 1908. *Ipomoea bracteata pubescens* Robins. & Greenm. Amer. Journ. Sci. 50: 160. 1895.

3. *Exogonium velutifolium* House, Bull. Torrey Club 35: 100. 1908.

Type from west side of Valley of Cuicatlán, Oaxaca.

Leaves short-petiolate, oblong-ovate, 1 to 3 cm. long, obtuse, densely pubescent; bracts linear-lanceolate; corolla crimson, 3 cm. long, glabrous.

4. *Exogonium argentifolium* (A. Rich.) House, Bull. Torrey Club 35: 102. 1908.

Ipomoea argentifolia A. Rich. in Sagra, Hist. Cuba 11: 131. 1850.

Puebla and Oaxaca. Cuba; type from Isle of Pines.

Leaves petiolate, oblong-lanceolate to elliptic-oblong, 2 to 10 cm. long, acute or obtuse, acute or rounded at base, whitish-tomentose or finally glabrate; cymes many-flowered; corolla about 4.5 cm. long.

5. *Exogonium konzattii* (Greenm.) House, Bull. Torrey Club 35: 102. 1908.

Ipomoea konzattii Greenm. Field Mus. Bot. 2: 258. 1907.

Guerrero and Oaxaca; type from Almoloyas, Guerrero.

Cymes many-flowered, the pedicels white-tomentose; sepals tinged with red, obtuse; corolla about 3 cm. long.

7. *IPOMOEA* L. Sp. Pl. 159. 1753.

REFERENCE: House, The North American species of the genus *Ipomoea*, Ann. N. Y. Acad. Sci. 18: 181-263. 1908.

Plants erect or scandent, usually herbaceous but sometimes woody; leaves entire, dentate, or lobate, sometimes digitately compound; flowers solitary, racemose, or cymose; sepals membranaceous or herbaceous; corolla usually funnelform, the limb spreading; stamens included; ovary 2 to 5-celled.

Numerous herbaceous species of the genus occur in Mexico. The best-known representative of the genus is the sweet-potato ("camote"), *Ipomoea batatas* (L.) Lam., which is widely cultivated in Mexico. Other species, known as "morning-glories," or in Spanish as "campanilla," are often grown as ornamental vines because of their beautiful flowers.

Plants erect, stout; leaves usually not cordate at base.

Plants large shrubs or trees; leaves entire.

Corolla pink or purple; seeds densely black-hairy-----1. *I. crassicaulis*.

Corolla white; seeds white-hairy only on the angles.

Corolla and sepals densely lanate outside-----2. *I. murucoides*.

Corolla and sepals glabrous or pubescent, not lanate.

Leaves densely pubescent beneath, with prominent venation.

Leaves mostly ovate, cordate at base-----3. *I. arborescens*.

Leaves mostly lance-oblong, rounded at base--4. *I. cuernavacensis*.

Leaves glabrous beneath or nearly so, the venation not prominent.

Sepals hairy within, 12 to 16 mm. long-----5. *I. intrapilosa*.

Sepals glabrous within, 8 to 12 mm. long.

Leaves mostly 7 to 13 cm. long-----6. *I. wolcottiana*.

Leaves 2 to 4 cm. long-----7. *I. calva*.

Plants low, 30 to 60 cm. high, fruticose only at base; leaves often trilobate.

8. *I. ciervensis*.

Plant scandent; leaves usually cordate at base.

Sepals herbaceous, often elongate; ovary usually 3-celled.

Inflorescence capitate or leafy-bracted.

Stems minutely pubescent or tomentose.

Leaves silvery-sericeous beneath; stems tomentose----9. *I. maireti*.

Leaves glabrate beneath; stems nearly glabrous----10. *I. invicta*.

Stems hirsute.

Corolla 7 to 9 cm. long-----11. *I. lambli*.

Corolla 4 to 6 cm. long.

Pubescence of the stems retrorse-----12. *I. hirtiflora*.

Pubescence of the stems spreading-----13. *I. igualensis*.

Inflorescence cymose, the bracts inconspicuous-----14. *I. ampullacea*.

Sepals coriaceous or membranaceous, not elongate; ovary usually 2 or 4-celled.

Seeds with long dorsal or marginal hairs, these longer than the seed or the seeds covered with long hairs.

Inflorescence racemose; seeds covered on all surfaces with long hairs.

15. *I. bombycina*.

Inflorescence cymose; seeds with dorsal or marginal hairs only.

Sepals hirsute, tomentose, or sericeous.

Sepals hirsute-----16. *I. crinita*.

Sepals tomentose or sericeous.

Corolla white-----17. *I. praecana*.

Corolla purple-----18. *I. carnea*.

Sepals glabrous or nearly so.

Sepals about 7 mm. long-----19. *I. populina*.

Sepals 10 to 20 mm. long-----20. *I. scopulorum*.

Seeds glabrous or finely pubescent.

Sepals very unequal.

Sepals cuspidate.

Stems pilose-----21. *I. purpusi*.

Stems glabrous-----22. *I. jicama*.

Sepals obtuse or acutish.

Leaves subsessile-----23. *I. sagittula*.

Leaves long-petiolate.

Leaves 3 or 5-lobate-----24. *I. vulsa*.

Leaves entire or dentate.

Corolla yellow-----25. *I. Lindenii*.

Corolla white or purple.

Corolla white, 4 to 5 cm. long-----26. *I. anisomeres*.

Corolla purple, 2 cm. long-----27. *I. oligantha*.

Sepals equal or nearly so.

Corolla salverform-----28. *I. chenopodiifolia*.

Corolla funnelform or campanulate-funnelform.

Corolla blue or purple-----29. *I. morelii*.

Corolla white.

Leaves rounded at base-----30. *I. robinsonii*.

Leaves cordate at base-----31. *I. dimorphophylla*.

1. *Ipomoea crassicaulis* (Benth.) Robinson, Proc. Amer. Acad. 51: 530. 1916.

Batatas crassicaulis Benth. Bot. Voy. Sulph. 134. 1844.

Ipomoea fistulosa Mart.; Choisy in DC. Prodr. 9: 349. 1845.

Ipomoea texana Coulter, Contr. U. S. Nat. Herb. 1: 45. 1890.

Sinaloa to Nuevo León, Tamaulipas, Veracruz, and Chiapas, probably only naturalized northward. Texas; Central and South America.

Shrub, usually 1 to 2 meters high; leaves ovate-cordate to lance-cordate, 8 to 26 cm. long, long-acuminate, minutely puberulent or glabrous, entire; corolla 5 to 8 cm. long. "Hiedra de la India" (Sinaloa); "barós" (Tamaulipas, Wootton); "palo santo de Castilla" (Sinaloa); "chilco," "campanilla," "campanola" (El Salvador).

It is reported from Brazil that the leaves are poisonous to goats.

2. *Ipomoea murucoides* Roem. & Schult. Syst. Veg. 4: 248. 1819.*Convolvulus macranthus* H. B. K. Nov. Gen. & Sp. 3: 95. 1819.*Ipomoea macrantha* Don, Hist. Dichl. Pl. 4: 267. 1838. Not *I. macrantha* Roem. & Schult. 1819.

Michoacán to Oaxaca, Puebla, Mexico, and Querétaro; type from Guana-juato. Guatemala.

Large or small tree, the branchlets densely white-tomentose; leaves oblong-lanceolate, 7 to 20 cm. long, rounded or obtuse at base, long-acuminate, entire, tomentose or glabrate beneath; sepals 2 to 2.8 cm. long; corolla 7 to 8 cm. long. "Palo del muerto" (Mexico, Oaxaca); "micaquahuitl" (Nahuatl); "casahuate," "cazazuete" (Mexico, Oaxaca; from the Nahuatl *cuau-zahuatl*, "mangy-tree"); "árbol del muerto" (Morelos, Mexico); "casahuate prieto" (Morelos); "palo bobo" (Morelos, Oaxaca, Querétaro); "palo de ozote," "ozote" (Oaxaca); "cazahuate blanco," "árbol del venado" (*Seler*); "siete camisas," "siete pellejos," "tutumuste" (Guatemala, *Pittier*).

The vernacular names doubtless apply also to the related species. A decoction of the wood is employed locally in the form of baths as a remedy for paralysis. The juice is milky. The ashes are employed in Guatemala as a substitute for soap in washing clothes. The fallen flowers are eaten by deer.

3. *Ipomoea arborescens* (Humb. & Bonpl.) Don, Hist. Dichl. Pl. 4: 267. 1838.*Convolvulus arborescens* Humb. & Bonpl.; Willd. Enum. Pl. 1: 204. 1809.*Argyrea oblonga* Benth. Bot. Voy. Sulph. 133. 1844.*Convolvulus quahutzehuatl* Sessé & Moc. Pl. Nov. Hisp. 23. 1887.*Ipomoea murucoides glabrata* Rose, Contr. U. S. Nat. Herb. 1: 107. 1891.

Sonora, Sinaloa, Morelos, and Veracruz. El Salvador.

Large tree with smooth white bark; leaves 8 to 18 cm. long, obtuse or acute; sepals 6 to 10 mm. long, pubescent on both sides; corolla about 5 cm. long; seeds black. "Palo blanco" (Sonora, Sinaloa); "palo del muerto," "casahuate," "quauhzuatl," "casahuate blanco" (Morelos); "palo santo" (Sonora); "palo bobo" (Morelos, El Salvador); "tutumushte," "siete pellejos," "siete camisas" (El Salvador).

When in flower the tree is a very showy one. It blooms when leafless. In some localities it forms extensive forests known as "casahuateras." In Morelos there is a popular belief that the tree causes imbecility and other cerebral affections, and for this it is necessary only to drink the water running at the foot of the trees. It is reputed also to be poisonous to horses and cattle. In Sinaloa the bark is used as a remedy for bites of rattlesnakes and other poisonous animals, and for diseases of the spleen.

4. *Ipomoea cuernavacensis* House, Bot. Gaz. 43: 410. 1907.*Convolvulus arboreus* Sessé & Moc. Pl. Nov. Hisp. 23. 1887. Not *C. arboreus* Balb. 1841.

Type from Cuernavaca.

Similar to *I. arborescens*; leaves 10 to 16 cm. long, acuminate.Probably only a variant of *I. arborescens*.5. *Ipomoea intrapilosa* Rose, Gard. & For. 7: 367. 1894.*Ipomoea murucoides glabrata* A. Gray, Proc. Amer. Acad. 22: 440. 1887.

Sonora to Oaxaca, Morelos, Zacatecas, and Durango; type from Chapala. Jalisco.

Large or small tree, nearly glabrous; leaves linear-lanceolate to ovate, 5 to 25 cm. long, acute to attenuate, obtuse to truncate at base; corolla 4 to 5 cm. long, the limb 7 to 8 cm. broad. "Cazahuate blanco" (Jalisco); "palo blanco" (Durango); "palo bobo," "zozote" (Jalisco); "pájaro bobo" (Oaxaca).

6. *Ipomoea wolcottiana* Rose, Gard. & For. 7: 367. 1894.

Colima to Chiapas and Morelos; type from Manzanillo, Colima.

Small or medium-sized tree; leaves ovate to rounded-ovate, obtuse to long-acuminate, rounded to subcordate at base; corolla 6 to 7 cm. long. "Pájaro bobo" (Chiapas); "acote" (Colima).

A decoction of the bark is used as a remedy for kidney diseases.

7. *Ipomoea calva* House, Bot. Gaz. 43: 410. f. 1. 1907.

Type from La Junta, Guerrero.

Leaves lanceolate, long-acuminate, obtuse at base; corolla about 5 cm. long.

Probably only a form of *I. wolcottiana*.

8. *Ipomoea ciervensis* Painter; House, Bot. Gaz. 43: 408. 1907.

Type from Hacienda del Ciervo, Querétaro.

Stems erect, suffrutescent at base, stout, 30 to 60 cm. high, densely pubescent; leaves sessile or nearly so, elliptic or elliptic-ovate, 4 to 6.5 cm. long, obtuse or acute, often shallowly trilobate; peduncles 1-flowered; corolla white, about 6 cm. long, white-pilose outside.

9. *Ipomoea maireti* Choisy in DC. Prodr. 9: 374. 1845.

Tepic and Durango to Oaxaca and Veracruz. Guatemala.

Stems suffrutescent below; leaves rounded-cordate, 7 to 15 cm. long, acuminate, entire, pilosulous or glabrate above; peduncles 1 to 3-flowered, the bracts large, ovate; sepals about 2 cm. long; corolla 7 to 10 cm. long, pink or blue.

10. *Ipomoea invicta* House, Ann. N. Y. Acad. Sci. 18: 193. 1908.

Type from San Sebastián, Jalisco.

Leaves broadly ovate-cordate, 8 to 14 cm. long, acuminate or cuspidate, glabrate above, entire; peduncles 2 or 3-flowered, nearly as long as the leaves; bracts large, colored; corolla about 6 cm. long, blue.

11. *Ipomoea lambii* Fernald, Bot. Gaz. 20: 535. 1895.

Type from Zopilote, Tepic.

Stems retrorse-hirsute; leaves broadly ovate-cordate, 7 to 15 cm. long, acuminate, often 3-lobate; peduncles elongate, 2 to 4-flowered; corolla rose-purple.

12. *Ipomoea hirtiflora* Mart. & Gal. Bull. Acad. Brux. 12²: 264. 1845.

Type from Chinantla, Oaxaca. Guatemala.

Leaves rounded-cordate 6 to 17 cm. long, often 3-lobate, sericeous beneath, hirsute above; peduncles about as long as the leaves, several-flowered; corolla purple, hirsute.

13. *Ipomoea igualensis* Weatherby, Proc. Amer. Acad. 45: 427. 1910.

Type from Iguala Canyon, Guerrero, altitude 760 meters.

Leaves broadly ovate-cordate, 8 to 12 cm. long, acuminate, hirsute, entire; peduncles elongate, 3-flowered; sepals 13 mm. long; corolla pale purple.

14. *Ipomoea ampullacea* Fernald, Proc. Amer. Acad. 33: 89. 1897.

Type from Acapulco, Guerrero.

Woody vine, the stems retrorse-hispidulous; leaves rounded-cordate, acute, entire or trilobate, appressed-hirsutulous; corolla white, about 6 cm. long, appressed-setulose; seeds finely pubescent.

15. *Ipomoea bombycina* (Choisy) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 384. 1882.

Bombycospermum mexicanum Presl, Reliq. Haenk. 2: 137. pl. 71. 1836.

Batatas bombycina Choisy in DC. Prodr. 9: 340. 1845.

Guerrero.

Large woody vine; leaves ovate or elliptic, 5 to 10 cm. long, glabrate above, sericeous beneath, acute or acuminate, obtuse or rounded at base; racemes many-flowered; sepals 4 to 6 mm. long, obtuse; corolla 4.5 cm. long, purplish, sericeous.

16. *Ipomoea crinita* T. S. Brandeg. Zoe 5: 216. 1905.

Type from Culiacán, Sinaloa.

Stems woody below, hirsute; leaves 3-lobate; peduncles longer than the leaves, several-flowered; sepals 7 mm. long; corolla white, about 6.5 cm. long.

17. *Ipomoea praecana* House, Ann. N. Y. Acad. Sci. 18: 227. 1908.

Morelos and Oaxaca; type from Reyes, Oaxaca. Guatemala.

Large woody vine, the young branches white-tomentose; leaves suborbicular, 8 to 22 cm. long, subcordate at base, tomentose beneath; peduncles short, 3 to 5-flowered; corolla white, 6 to 9 cm. long.

18. *Ipomoea carnea* Jacq. Enum. Pl. Carib. 13. 1760.

Yucatán. West Indies; Central and South America; type from Cartagena, Colombia.

Stout woody vine; leaves rounded-cordate, obtuse or acute, densely pubescent beneath; peduncles short, few or many-flowered; corolla about 8 cm. long.

19. *Ipomoea populina* House, Ann. N. Y. Acad. Sci. 18: 226. 1908.

Guerrero; type from Acapulco.

Stems woody, glabrous; leaves ovate-cordate, 5 to 8 cm. long, acuminate, glabrous; peduncles elongate, several-flowered; corolla white, tinged below with magenta, 6 cm. long.

20. *Ipomoea scopulorum* T. S. Brandeg. Zoe 5: 169. 1903.

Baja California and Sinaloa; type from Cape Region of Baja California.

Stems suffrutescent below; leaves ovate-cordate, 6 to 7 cm. long, acute, pubescent; peduncles 1 to few-flowered; corolla white, 6 to 8 cm. long.

21. *Ipomoea purpusi* House, Ann. N. Y. Acad. Sci. 18: 248. 1908.

Type from Zacuapan, Veracruz.

Leaves broadly ovate-cordate, deeply trilobate, 5 to 8 cm. long, densely appressed-hirsute; peduncles elongate, 1 to 5-flowered; corolla about 3 cm. long.

22. *Ipomoea jicama* T. S. Brandeg. Bull. Calif. Acad. II. 2: 188. 1889.

Baja California.

Glabrous vine with slender woody stems; leaves broadly cordate-ovate, small, acute or acuminate, entire or dentate; corolla 5 to 6 cm. long. "Jícama."

23. *Ipomoea sagittula* House, Ann. N. Y. Acad. Sci. 18: 244. 1908.

Type collected between San Sebastián and Las Palmas, Jalisco.

Slender woody vine, glabrous or nearly so; leaves oblong-sagittate, 4 to 7 cm. long, acute or acuminate, mucronate; peduncles slender, 1 to 5-flowered; corolla white, about 3 cm. long.

24. *Ipomoea vulsa* House, Muhlenbergia 3: 45. pl. 1, f. A, b. 1907.

Type from Orizaba, Veracruz.

Glabrous vine; leaves with oblong or obovate-lanceolate, obtuse lobes; peduncles elongate, 1 or 2-flowered; corolla purplish, 3 to 4 cm. long.

25. *Ipomoea lindenii* Mart. & Gal. Bull. Acad. Brux. 12²: 264. 1845.

Type from Zacuapan, Veracruz.

Glabrous woody vine; leaves ovate, 5 to 10 cm. long, acuminate, shallowly cordate at base; peduncles short, 1 to 3-flowered; corolla 3 to 5 cm. long.

26. *Ipomoea anisomeres* Robins. & Bartl. Proc. Amer. Acad. 43: 57. 1907.
Puebla. Guatemala; type from Gualán.
Glabrous vine; leaves ovate-cordate, 6 to 11 cm long, acute; peduncles elongate, many-flowered; corolla 6.5 to 7 cm. long, white with purple throat.
27. *Ipomoea oligantha* Choisy in DC. Prodr. 9: 380. 1845.
Oaxaca. South America; type from Peru.
Stems puberulent; leaves deltoid-ovate, 5 to 10 cm. long, caudate-acuminate, deeply cordate at base, the basal lobes acute; peduncles 3 to 5-flowered.
28. *Ipomoea chenopodiifolia* (Mart. & Gal.) Hemsl. Biol. Centr. Amer. Bot. 2: 385. 1882.
Calonyction chenopodiifolium Mart. & Gal. Bull. Acad. Brux. 12²: 269. 1845.
Type from Juquila, Jalisco.
Stems woody, muricate, hirsute; leaves 8 to 12 cm. long, pilose beneath, hastate at base; peduncles short, 1-flowered; corolla purple, 5 to 8 cm. long.
29. *Ipomoea morelii* Duchass. & Walp. Linnaea 23: 752. 1850.
Chiapas. Panama (type locality) and Colombia.
Glabrous vine, the stems often woody; leaves ovate-cordate, 6 to 9 cm. long, long-acuminate, often hastate-lobate; peduncles elongate, 1 to 5-flowered; corolla 5 to 6 cm. long.
30. *Ipomoea robinsonii* House, Ann. N. Y. Acad. Sci. 18: 257. 1908.
Type from Cuernavaca, Morelos.
Woody glabrous vine; leaves elliptic-oblong, 6 to 8 cm. long, obtuse; peduncles short, 1-flowered; corolla 6 to 8 cm. long.
31. *Ipomoea dimorphophylla* Greenm. Proc. Amer. Acad. 33: 482. 1898.
Morelos and Oaxaca; type from Cuernavaca, Morelos.
Slender vine, fruticose below, more or less pubescent; leaves ovate-cordate, 4 to 10 cm. long, entire or lobate; peduncles short, 1 or several-flowered; corolla 6 to 8 cm. long.

8. **TURBINA** Raf. Fl. Tellur. 4: 81. 1836.

1. *Turbina corymbosa* (L.) Raf. Fl. Tellur. 4: 81. 1836.
Convolvulus corymbosus L. Syst. Nat. ed. 10. 923. 1759.
Convolvulus sidaefolius H. B. K. Nov. Gen. & Sp. 3: 99. 1819.
Ipomoea sidaefolia Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 459. 1833.
Ipomoea antillana Millsp. Field Mus. Bot. 2: 84. 1900.
Sinaloa to Tamaulipas, Yucatán, Tabasco, and Oaxaca. Widely distributed in tropical America.
Woody vine; leaves long-petiolate, broadly ovate-cordate, 4 to 8 cm. long, short-acuminate, entire, glabrous or pubescent; peduncles few or many-flowered, sepals scarious, about 1 cm. long; corolla white, campanulate, 2 to 3 cm. long; stamens included; seed 1, finely pubescent. "Pascua," "flor de Pascua" (Tabasco); "aguinaldo de Pascua" (Cuba); "campanilla" (El Salvador).

143. **POLEMONIACEAE.** Jacob's-ladder Family.

REFERENCE: Brand in Engl. Pflanzenreich IV. 250. 1907.

Shrubs or usually herbs; leaves alternate or opposite, entire, dentate, pinnatifid, or palmatifid; flowers perfect, terminal or axillary; calyx 5-lobate, inferior; corolla gamopetalous; stamens 5, inserted on the corolla; style filiform, with 3 stigmas; fruit a capsule, 3-celled, loculicidal.

Several genera of the family are represented in Mexico only by herbaceous species.

- Corolla regular, not bilabiate.....1. **GILIA**.
 Corolla bilabiate.
 Calyx whitish-membraneous below the sinuses.....2. **LOESELIA**.
 Calyx green, herbaceous.....3. **BONPLANDIA**.

1. **GILIA** Ruiz & Pav. Fl. Peruv. Chil. Prodr. 25. 1794.

Shrubs or usually herbs; leaves opposite or alternate, entire or divided; flowers solitary or in thyrsiform panicles; corolla usually salverform, the limb 5-lobate; stigmas 3, filiform; capsule loculicidally 3-valvate.

Numerous herbaceous species occur in northern Mexico.

Leaves alternate.

Leaves linear, entire.....1. *G. palmeri*.

Leaves pinnatifid.

Lobes of the corolla much longer than the tube.....2. *G. rigidula*.

Lobes of the corolla shorter than the tube.....3. *G. gloriosa*.

Leaves opposite.

Lobes of the leaves linear, not rigid.....4. *G. floribunda*.

Lobes of the leaves acerose, rigid.....5. *G. veatchii*.

1. *Gilia palmeri* S. Wats. Proc. Amer. Acad. 24: 61. 1889.

Baja California; type from Los Angeles Bay.

Plants essentially annual but sometimes becoming suffrutescent below, pubescent; leaves 3.5 cm. long or less; flowers slender-pedicellate; corolla violaceous, about 1 cm. long.

2. *Gilia rigidula* Benth. in DC. Prodr. 9: 312. 1845.

Gilia rigidula acerosa A. Gray, Proc. Amer. Acad. 8: 280. 1870.

Chihuahua to San Luis Potosí, Zacatecas, and Durango. Western Texas to Arizona; type from San Antonio, Texas.

Plants 30 cm. high or less, usually herbaceous but often woody; leaves pinnatifid or bipinnatifid, the lobes linear or acerose, sharp-pointed; corolla blue, 3.5 cm. broad or less, the tube very short.

Gilia rigidula acerosa is a form with acerose, very stiff leaf segments.

3. *Gilia gloriosa* T. S. Brandeg. Proc. Calif. Acad. II. 2: 184. pl. 9. 1889.

Baja California; type from Ubl.

Densely branched shrub, about 1 meter high, forming broad rounded clumps, glandular-pubescent; leaves rigid, the lobes acerose; corolla 3 to 4 cm. long, pale pink or nearly white.

4. *Gilia floribunda* A. Gray, Proc. Amer. Acad. 8: 267. 1870.

Mountains of Baja California and Chihuahua. New Mexico to southern California.

Plants about 30 cm. high, fruticose at base, slender, pubescent; leaves parted to the base, the lobes 2 cm. long or less, spreading or reflexed; flowers corymbose-cymose at the ends of the branches; corolla white, 1 to 1.5 cm. long.

5. *Gilia veatchii* Parry; Greene, Bull. Calif. Acad. 2: 198. 1885.

Cedros Island, Baja California.

Densely branched shrub, 60 cm. high or less, with shredded bark; leaves parted to the base, 7 mm. long or less, glandular-pubescent; corolla about 1 cm. long, ochroleucous, purplish outside.

2. *LOESELIA* L. Sp. Pl. 628. 1753.

Plants annual or perennial, herbaceous or often woody, at least at base; leaves alternate or opposite, entire, pinnatifid, or dentate; flowers axillary; corolla more or less bilabiate, tubular or salverform; style exserted; seeds 3 to many.

The species listed here are the only ones known.

Leaves narrowly linear and entire, or pinnatifid into linear lobes; bracts inconspicuous.

Leaves pinnatifid-----1. *L. havardii*.

Leaves entire.

Stamens exserted-----2. *L. tenuifolia*.

Stamens not exserted.

Corolla tube much exceeding the calyx-----3. *L. guttata*.

Corolla tube scarcely exceeding the calyx-----4. *L. effusa*.

Leaves broader than linear or, if linear, dentate; bracts large and conspicuous.

Corolla normally red-----5. *L. mexicana*.

Corolla blue or white.

Flowers solitary-----6. *L. pumila*.

Flowers mostly in several-flowered inflorescences.

Bracts scarious, not green, entire-----7. *L. purpusii*.

Bracts green and herbaceous or, if scarious, dentate.

Bracts all linear-lanceolate-----8. *L. glandulosa*.

Bracts all or mostly ovate.

Leaves mostly cordate-clasping-----9. *L. amplexans*.

Leaves not cordate-clasping.

Stamens pilose-----10. *L. scariosa*.

Stamens glabrous.

Flowers partly solitary and partly in 2 to 4-flowered racemes-----11. *L. caerulea*.

Flowers capitate-----12. *L. ciliata*.

1. *Loeselia havardii* A. Gray, Proc. Amer. Acad. 19: 87. 1883.

Gilia havardii A. Gray, Syn. Fl. ed. 2. 2¹: 411. 1886.

Western Texas, the type from Presidio del Norte, on the Rio Grande, and doubtless occurring on the Mexican side of the river.

Plants perennial, fruticose below, villous; lobes of the leaves sharp-pointed; flowers pedicellate; corolla purplish, 12 mm. long, the tube twice as long as the calyx.

2. *Loeselia tenuifolia* A. Gray, Proc. Amer. Acad. 11: 86. 1875.

Gilia tenuifolia A. Gray, Syn. Fl. ed. 2. 2¹: 411. 1886.

Southern California, the type from the Cantillas Mountains, and doubtless extending into northern Baja California.

Plants 30 cm. high or less, woody at base, nearly glabrous; leaves about 15 mm. long; flowers pedicellate; corolla red, about 2 cm. long, the tube more than twice as long as the calyx, the lobes tridentate.

3. *Loeselia guttata* A. Gray, Proc. Amer. Acad. 20: 302. 1885.

Gilia guttata A. Gray, Syn. Fl. ed. 2. 2¹: 411. 1886.

Type from northern Baja California.

Plants 40 cm. high or less, woody at base, glabrous; corolla purplish, 15 to 20 mm. long, the lobes tridentate.

4. *Loeselia effusa* A. Gray, Proc. Amer. Acad. 11: 86. 1875.

Gilia dunnii Kellogg, Pacif. Rural Press, May 31, 1879.

Northern Baja California. Southern California.

Plants 30 cm. high or less, nearly glabrous; leaves about 8 mm. long; corolla purplish, 12 mm. long, the lobes entire.

5. *Loeselia mexicana* (Lam.) Brand in Engl. Pflanzenreich IV. 250: 174. 1907.

Hoitzia mexicana Lam. Encycl. 3: 134. 1789.

Hoitzia coccinea Cav. Icon. Pl. 4: 44. pl. 365. 1797.

Cantua hoitzia Willd. Sp. Pl. 1: 878. 1797.

Loeselia coccinea Don, Hist. Dichl. Pl. 4: 247. 1837.

Chihuahua and Sinaloa to Oaxaca, Puebla, and San Luis Potosí.

Shrub, 1.5 meters high or less, glandular-pubescent; leaves subsessile, lanceolate to lance-ovate, obtuse or acute, cuneate at base, sharply serrate; flowers solitary; corolla about 2.5 cm. long, the lobes entire, much shorter than the tube; calyx lobes entire. "Huachichile" "huichichile," "guachichile" (Sinaloa, Aguascalientes, Jalisco, San Luis Potosí, Durango; from the Nahuatl *huitzitzil-xochitl*, "hummingbird-flower"); "espinosilla" (Guanajuato, Querétaro, Mexico, Tepic, San Luis Potosí, Oaxaca); "hierba de San Antonio" (Durango); "intzquillitzin" (*Seler*); "flor del chupamirto," "flor de colibrí" (*Robelo*); "cuachile" (*Ramírez*); "chuparroza" (Mexico); "huicicilo" (*Ramírez*); "mirto silvestre" (*Ramírez*); "huitzizilin" (Mexico, *Bárcena*); "hierba de la virgen" (*Flores*).

The shrub is a handsome one when in full flower. A form with yellow flowers, growing about the City of Mexico, is *L. mexicana lutea* Brand.¹ A specimen from Tlaxcala is said to have nearly white flowers.

A decoction of the leaves is much used in Mexico as a remedy for fevers, and is said to have emetic, purgative, diuretic, and sudorific properties. It is employed also as a wash to prevent falling of the hair. The plant is said to contain an alkaloid, loeseline. The early inhabitants used the plant like soap, crushing it in water until a suds was formed.²

6. *Loeselia pumila* (Mart. & Gal.) Walp. Repert. Bot. 6: 527. 1846.

Hoitzia pumila Mart. & Gal. Bull. Acad. Brux 12²: 275. 1845.

Loeselia intermedia Loesener, Bull. Herb. Boiss. 7: 567. 1899.

San Luis Potosí to Guerrero, Puebla, and Oaxaca.

Plants glandular-pilose, annual but sometimes suffrutescent, 45 cm. high or less; leaves short-petiolate, oblong to broadly ovate; calyx lobes 5-dentate; corolla blue or bluish, about 1 cm. long, the lobes entire.

7. *Loeselia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 389. 1909.

Type from San Luis Tlaxitlanapa, Puebla.

Small shrub, sparsely puberulent; leaves oblong-elliptic, obtuse or acute, cuneate at base, sharply serrate, lustrous, subsessile; calyx lobes minutely serrulate; corolla about 2 cm. long, pale purple.

8. *Loeselia glandulosa* (Cav.) Don, Hist. Dichl. Pl. 4: 248. 1837.

Hoitzia glandulosa Cav. Icon. Pl. 4: 45. pl. 367. 1797.

Hoitzia cervantesii H. B. K. Nov. Gen. & Sp. 3: 128. 1819.

Hoitzia conglomerata H. B. K. Nov. Gen. & Sp. 3: 128. 1819.

Hoitzia capitata Willd.; Roem. & Schult. Syst. Veg. 4: 370. 1819.

Hoitzia spicata Willd.; Roem. & Schult. Syst. Veg. 4: 370. 1819.

Hoitzia nepetifolia Schlecht. & Cham. Linnaea 6: 385. 1831.

¹ In Engl. Pflanzenreich IV. 250: 176. 1907.

² See Marcial Oropeza, La espinosilla, Naturaleza 3: 3-7. 1876.

Hoitzia elata Hook. & Arn. Bot. Beechey Voy. 441. 1841.

Hoitzia ramosissima Mart. & Gal. Bull. Acad. Brux. 12²: 273. 1845.

Hoitzia scabra Mart. & Gal. Bull. Acad. Brux. 12²: 274. 1845.

Sonora and Chihuahua to Veracruz and Chiapas. Southern Arizona; Guatemala to Colombia and Venezuela.

Plants pubescent or glabrate, annual but often suffrutescent, slender, 1 meter high or less; leaves lanceolate or ovate, sharply serrate, short-petiolate; corolla bluish, about 15 mm. long. "Verbena" (Chiapas); "clarincillo silvestre" (Guatemala).

Brand separates several varieties, which differ chiefly in pubescence.

9. *Loeselia amplexans* (Hook. & Arn.) Benth. in DC. Prodr. 9: 320. 1845.

Hoitzia amplexans Hook. & Arn. Bot. Beechey Voy. 441. 1841.

Loeselia cordifolia Hemsl. & Rose in Hook. Icon. Pl. 26: pl. 2551. 1899.

Tepic to Guerrero; type collected between San Blas and Tepic.

Plants slender, puberulent or glabrate, chiefly herbaceous; leaves ovate-cordate or lance-cordate, sessile, serrate, prominently veined; bracts large and leaflike; corolla white or purplish, about 15 mm. long.

10. *Loeselia scariosa* (Mart. & Gal.) Walp. Repert. Bot. 6: 527. 1846.

Hoitzia scariosa Mart. & Gal. Bull. Acad. Brux. 12²: 274. 1845.

Loeselia greggii S. Wats. Proc. Amer. Acad. 18: 117. 1883.

Chihuahua and Coahuila to Puebla; type from Puebla.

Plants slender, pubescent, suffrutescent; leaves oblong to ovate, sessile or short-petiolate, aristate-dentate, cuneate at base; corolla bluish or pink, about 1 cm. long. "Huachichile" (Coahuila).

Palmer reports that in Coahuila the plant is used as a remedy for ague.

11. *Loeselia caerulea* (Cav.) Don, Hist. Dichl. Pl. 4: 248. 1837.

Hoitzia caerulea Cav. Icon. Pl. 4: 45. pl. 366. 1797.

Loeselia rupestris Benth. in DC. Prodr. 9: 319. 1845.

Hoitzia floribunda Mart. & Gal. Bull. Acad. Brux. 12²: 275. 1845.

Chihuahua to Jalisco and Oaxaca.

Plants pubescent, annual but often suffrutescent, 45 cm. high or less; leaves linear-lanceolate to ovate, sessile, dentate; bracts purplish-reticulate; corolla blue, 10 to 12 mm. long. "Banderilla," "jarritos," "guachichil" (Brand).

12. *Loeselia ciliata* L. Sp. Pl. 628. 1753.

Hoitzia aristata H. B. K. Nov. Gen. & Sp. 3: 128. 1819.

Hoitzia loeselia Spreng. Syst. Veg. 1: 626. 1825.

Loeselia involucrata Don, Hist. Dichl. Pl. 4: 248. 1837.

Hoitzia lupulina Hook. & Arn. Bot. Beechey Voy. 441. 1841.

Baja California to Chihuahua, Veracruz, and Guerrero; type from Veracruz. Central America.

Plants pubescent or glabrate, slender, annual but sometimes suffrutescent; leaves mostly ovate or broadly ovate, petiolate, dentate; bracts large and leaflike, cordate, aristate-dentate; corolla blue or white, about 1 cm. long. "Lenteja," "lentejilla" (El Salvador).

Loeselia involucrata is maintained by Brand as distinct from *L. ciliata*, the two with *L. amplexans* forming a "species colectiva." He states that in *L. ciliata* the outer bracts are cordate but not clasping, while in *L. involucrata* they are deeply cordate-clasping. There does not appear to be any essential difference between the two forms.

3. BONPLANDIA Cav. Anal. Hist. Nat. 2: 131. 1800.

Plants suffrutescent, viscid-pubescent; lower leaves alternate, the upper opposite; flowers geminate, pedicellate; calyx green; corolla bilabiate, the lobes equaling or shorter than the tube; stamens exerted; capsule 1 to 3-seeded.

Only two species are known.

Leaves linear or pinnate-lobate, with linear lobes-----1. *B. linearis*.
Leaves and their lobes lanceolate or broader-----2. *B. geminiflora*.

1. Bonplandia linearis Robinson, Proc. Amer. Acad. 43: 24. 1907.

Type from Coru, Michoacán, altitude 1,800 meters; perhaps also in Durango.

Plants glandular-pilose; upper leaves linear, the lower pinnatifid into linear lobes; corolla purplish, about 2 cm. long.

2. Bonplandia geminiflora Cav. Anal. Hist. Nat. 2: 131. 1800.

Caldasia heterophylla Willd. Hort. Berol. pl. 71. 1807.

Sinaloa to San Luis Potosí, Morelos, and Michoacán. Guatemala.

Plants a meter high or less, suffrutescent, ill-scented; lower leaves ovate or lanceolate, lyrate-pinnatifid, serrate, acuminate, petiolate; corolla purplish, 2 to 2.5 cm. long, glabrous.

144. HYDROPHYLLACEAE. Waterleaf Family.

REFERENCE: Brand in Engl. Pflanzenreich IV. 251, 1913.

Shrubs or small trees, or usually herbs; leaves alternate or opposite, simple (in the genera here listed); flowers perfect, regular, terminal and axillary, often in scorpioid cymes; calyx 5-parted, inferior, often accrescent in fruit; corolla gamopetalous, 5-lobate; stamens 5, inserted on the corolla; styles 1 or 2, the stigmas 2, capitate; fruit a capsule, bivalvate, 1-celled, with 2 parietal placentae.

Several genera are represented in Mexico only by herbaceous species.

Stamens equal in length; leaves mostly 10 cm. wide or more; plants usually with stinging hairs-----1. **WIGANDIA**.

Stamens unequal; leaves much smaller; plants without stinging hairs.

Capsule crustaceous; leaves often dentate and glutinous---2. **ERIODICTYON**.

Capsule membranaceous; leaves entire, not glutinous----3. **CONANTHUS**.

1. WIGANDIA H. B. K. Nov. Gen. & Sp. 3: 127. 1819.

Shrubs, trees, or large herbs; leaves very large, simple; flowers in scorpioid cymes; calyx 5-parted to base; corolla funnelform-campanulate; stamens slightly exerted; styles 2, elongate; ovules very numerous; seeds more or less winged.

Style only slightly longer than the calyx-----1. *W. caracasana*.
Style twice as long as the calyx.

Stems usually hispid with stinging hairs; calyx hispid-----2. *W. kunthii*.

Stems tomentose; calyx not hispid-----3. *W. scorpioides*.

1. Wigandia caracasana H. B. K. Nov. Gen. & Sp. 3: 100. 1819.

Wigandia macrophylla Schlecht. & Cham. Linnaea 6: 382. 1831.

San Luis Potosí, Veracruz, Mexico, and Oaxaca. Guatemala to Colombia and Venezuela; type from Caracas, Venezuela.

Plants 3 meters high or less, densely pubescent and usually hispid; leaves ovate to oval, 40 cm. long or less, obtuse, subcordate at base, coarsely crenate, tomentose beneath; sepals 10 to 15 mm. long; corolla purplish, longer than the

sepals. "Hoja de San Pablo," "palo de San Pablo," "San Pablo" (Oaxaca); "tabaco cimarrón" (*Seler*); "chocón" (Guatemala); "tabaquillo" (El Salvador); "pringamoza" (Colombia).

2. *Wigandia kunthii* Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 116. 1833. Sinaloa and Durango to Chiapas. Central America.

Shrub or tree, 5 meters high or less; leaves oval or rounded, 40 cm. long or less, rounded or obtuse at apex, cordate at base, coarsely crenate, tomentose beneath; sepals 6 to 10 mm. long; corolla about 1.5 cm. long, bluish or white; capsule hispid. "Quemadora" (Jalisco, Sinaloa); "ortiga" (Jalisco, Michoacán, Guerrero, Oaxaca, Mexico, Costa Rica); "tabaco cimarrón" (Mexico, Puebla); "ortiga grande" (Guanajuato, Oaxaca); "sosa" (*Ramírez*); "ortiga prieta," "chichicastle" (*Brand*); "tabacón" (El Salvador).

The long hairs sting the skin painfully like those of a nettle. The plant has been employed in Mexico as a remedy for syphilitic affections, and a decoction of the leaves in Costa Rica for rheumatism.

3. *Wigandia scorpioides* Choisy in DC. Prodr. 10: 184. 1846. Veracruz and Oaxaca.

Small tree, the young branches densely white-tomentose; leaves ovate-oval or rounded-oval, 30 cm. long or less, rounded at apex, cordate at base, crenate or crenate-lobate, very densely whitish-tomentose beneath; sepals about 1 cm. long, the corolla about twice as long. "Consuelda mayor" (*Urbina*).

2. *ERIODICTYON* Benth. Bot. Voy. Sulph. 35. 1844.

REFERENCE: Abrams & Smiley, Taxonomy and distribution of *Eriodictyon*, Bot. Gaz. 60: 115-133. 1915.

Shrubs; leaves alternate, entire or dentate, reticulate-veined; flowers in scorpioid racemes; calyx 5-parted to base; corolla funnelform or subcampanulate, pubescent; stamens included, barbate at base; styles 2; ovules 6 to 7 on each placenta.

The species are known in California as "hierba santa." The dried leaves are official in the U. S. Pharmacopoeia, and are used in the treatment of asthma, chronic bronchitis, and inflammation of the genito-urinary tract. They contain two aromatic resins and tannic acid. The plants have long been employed in California as a bitter tonic and a stimulant balsamic expectorant, and sometimes as a remedy for rheumatism. The Coahuilla Indians of southern California applied the leaves as poultices to sores upon men and beasts, and bathed sore parts or fatigued limbs with a decoction of the plant.

Leaves sessile, usually hirsute on the upper surface-----1. *E. sessilifolium*.
Leaves petiolate, not hirsute.

Branches tomentose, tardily if ever glabrate-----2. *E. lanatum*.
Branches glabrous except sometimes in the inflorescence.

Leaves linear-lanceolate, not revolute; calyx densely pubescent.

3. *E. trichocalyx*.

Leaves narrowly linear, revolute; calyx sparsely pubescent.

4. *E. angustifolium*.

1. *Eriodictyon sessilifolium* Greene, Bull. Calif. Acad. 1: 201. 1885.

Northern Baja California; type from Bahía de Todos Santos.

Shrub, 1 to 2.5 meters high, the branches hirsute; leaves oblong or lance-oblong, 6 to 12 cm. long, obtuse or acute, truncate or cordate at base, coarsely dentate, white-tomentose beneath; corolla lilac-purple, 12 mm. long.

2. *Eriodictyon lanatum* (Brand) Abrams, Bot. Gaz. 60: 126. 1915.
Eriodictyon californicum subsp. *australe* var. *lanatum* Brand in Engl.
 Pflanzenreich IV. 251: 142. 1913.
 Northern Baja California. Southern California; type collected between
 Campo and Jacumba.

Shrub, 2 meters high or less; leaves linear-lanceolate, 4 to 8 cm. long, acute
 at each end, subrevolute, entire or dentate, white-tomentose beneath; corolla
 pale purplish blue or nearly white, 7 to 8 mm. long.

3. *Eriodictyon trichocalyx* Heller, Muhlenbergia 1: 108. 1904.
 Northern Baja California. Southern California; type from San Bernardino
 Mountains.

Glutinous shrub, 0.5 to 1.5 meters high; leaves 5 to 10 cm. long, acute at
 base and apex, coarsely dentate or sometimes entire, tomentulose beneath;
 corolla white, 5 to 6 mm. long.

4. *Eriodictyon angustifolium* Nutt. Journ. Acad. Phila. II. 2: 181. 1848.
 Mountains of Baja California. Arizona, Utah, and Nevada; type from
 Arizona.

Glutinous shrub, 2 meters high or less; leaves 5 to 10 cm. long, glabrous
 above, white-tomentose beneath, entire; corolla about 5 mm. long.

3. *CONANTHUS* S. Wats. in King, Geol. Expl. 40th Par. 5: 256. 1871.

Plants usually herbaceous but sometimes suffruticose; leaves alternate,
 entire; flowers solitary or in scorpioid cymes; calyx 5-parted; corolla cylindric,
 campanulate, or funnelform; styles 2, free or connate; ovules numerous.

Numerous herbaceous species occur in Mexico.

Styles connate. Leaves linear-----1. *C. stenophyllus*.

Styles distinct.

Leaves elliptic or lanceolate-----2. *C. sericeus*.

Leaves linear.

Corolla cylindric, 9 mm. long-----3. *C. flavescens*.

Corolla salverform, 12 mm. long-----4. *C. purpusii*.

1. *Conanthus stenophyllus* (A. Gray) Standl.

Nama stenophyllum A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 361. 1882.
 Coahuila, Zacatecas, and San Luis Potosí; type from San Lorenzo de la
 Laguna, Coahuila.

Plants 30 cm. high or less, with thick woody branches below, pubescent;
 leaves 10 to 17 mm. long; flowers sessile or short-pedicellate, in terminal
 leafy cymes; corolla 9 mm. long.

2. *Conanthus sericeus* (Willd.) Standl.

Nama sericeum Willd.; Roem. & Schult. Syst. Veg. 6: 189. 1820.

Nama longiflorum Choisy, Mém. Soc. Phys. Hist. Nat. Genève 6: 114. 1833.
 San Luis Potosí and Hidalgo.

Plants tall and slender, erect, the stems whitish-hirsutulous; leaves 2.5 to
 4.5 cm. long, acute, whitish-sericeous especially beneath; corolla 2 to 2.8 cm.
 long.

3. *Conanthus flavescens* (T. S. Brandeg.) Standl.

Nama flavescens T. S. Brandeg. Zoe 5: 254. 1908.

Coahuila; type from Parras.

Plants suffrutescent, 30 cm. high or more, hirsute and glandular-viscid
 above; leaves 1.5 to 2 cm. long; sepals linear, 5 to 6 mm. long.

4. *Conanthus purpusii* (T. S. Brandeg.) Standl.*Nama purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 186. 1911.

Type from Movano, Coahuila.

Plants suffrutescent, white-hirsute; leaves sessile, 2.5 cm. long or less, obtuse; sepals linear, 6 to 7 mm. long; corolla bluish purple.

145. BORAGINACEAE. Borage Family.

Trees, shrubs, or herbs; leaves estipulate, entire or toothed, alternate or rarely opposite; flowers perfect, regular, usually in cymes, the branches commonly scorpioid; calyx inferior, usually persistent, tubular or campanulate; corolla gamopetalous, subrotate to funnelform or salverform, the limb commonly 5-lobate; stamens as many as the corolla lobes and alternate with them, inserted on the corolla; ovary normally of 2 2-ovulate carpels, sometimes 4-celled; style entire or once or twice bifid; fruit drupaceous or of 4 nutlets.

Several genera are represented in Mexico only by herbaceous species.

Style twice bifid-----1. **CORDIA.**

Style entire or once bifid.

Flowers in cymes, these usually paniculate.

Calyx closed in bud, in anthesis valvate, 2 to 5-lobate---2. **BOURRERIA.**Calyx not closed in bud, 5-parted-----3. **EHRETIA.**

Flowers in scorpioid spikes or racemes, these often cymose, or the flowers in terminal heads or solitary or clustered in the axils.

Flowers in terminal heads or solitary or clustered in the axils.

4. **COLDENIA.**

Flowers in scorpioid spikes or racemes.

Fruit drupaceous-----5. **TOURNEFORTIA.**Fruit dry, separating into 2 or 4 nutlets-----6. **HELIOTROPIMUM.**1. **CORDIA** L. Sp. Pl. 190. 1753.

Trees or shrubs; leaves mostly alternate, entire or dentate; flowers in cymes, heads, or spikes, small or large; calyx tubular or campanulate, often striate, 3 to 5-dentate; corolla funnelform, salverform, or campanulate, usually 4 to 6-lobate, sometimes with as many as 18 lobes; style twice bifid; fruit drupaceous.

The following vernacular names have been reported for plants of the genus whose specific identity is uncertain: "Palo negro" (*Ramírez*); "cuéramo" (Michoacán); "candelero" (Tabasco); "rosadillo" (Oaxaca); "rasca-viejo" (Michoacán).

Calyx conspicuously 10-striate or sulcate.

Calyx 3 to 4 mm. long, campanulate.

Corolla tube exserted-----1. **C. alba.**Corolla tube not exserted-----2. **C. diversifolia.**

Calyx 5 mm. long or more, usually cylindric.

Leaves finely stellate-pubescent beneath-----3. **C. alliodora.**

Leaves not stellate-pubescent.

Leaves 1 to 3 cm. long.

Leaves entire-----4. **C. seleriana.**Leaves coarsely dentate-----5. **C. greggii.**

Leaves mostly 5 cm. long or much larger.

Leaves densely pilose, tomentose, or sericeous beneath, even in age.

Leaves densely whitish-sericeous beneath-----6. *C. elaeagnoides*.

Leaves tomentose or pilose beneath with loose spreading hairs.

Flowers 2 cm. long-----7. *C. guerkeana*.

Flowers 2.5 to 4.5 cm. long.

Leaves densely tomentose beneath-----8. *C. boissieri*.

Leaves hispidulous beneath with short, very stiff hairs.

9. *C. morelosana*.

Leaves glabrous beneath in age except along the costa, or with small inconspicuous hairs along the veins.

Calyx lobes subulate or narrowly deltoid, acute.

10. *C. gerascanthus*.

Calyx lobes broadly ovate or deltoid, obtuse.

Calyx 6 to 7 mm. long, minutely puberulent----11. *C. igualensis*.

Calyx 9 to 14 mm. long, densely pubescent.

Slender portion of the corolla tube much exerted from the calyx-----12. *C. tinifolia*.

Slender portion of the corolla tube not or scarcely exerted.

13. *C. sonorae*.

Calyx neither striate nor sulcate.

Flowers in cymes.

Corolla 12 to 16-lobate-----14. *C. dodecandra*.

Corolla 5 to 8-lobate.

Flowers 6 mm. long or less-----15. *C. chiapensis*.

Flowers more than 1 cm. long.

Calyx 5 to 6 mm. long; leaves tomentose beneath, at least when young-----16. *C. microsebestena*.

Calyx 8 to 14 mm. long; leaves not tomentose beneath.

Leaves setulose-hirtellous beneath; flowers mostly 3.5 to 4.5 cm. long-----17. *C. sebestena*.

Leaves minutely scaberulous or glabrate beneath; flowers less than 3 cm. long-----4. *C. seleriana*.

Flowers in spikes or globose heads.

Flowers in dense globose heads.

Leaves stellate-pubescent on the upper surface.

Calyx lobes filiform-----18. *C. pringlei*.

Calyx lobes short, obtuse-----19. *C. stellata*.

Leaves without stellate pubescence.

Flower heads paniculate-----20. *C. corymbosa*.

Flower heads solitary.

Calyx lobes subulate or filiform.

Stems and peduncles hispid with spreading hairs.

21. *C. urticacea*.

Stems and peduncles puberulent or tomentulose, often also appressed-setulose.

Corolla 1.5 cm. long or less.

Leaves sparsely strigose or strigillose-----22. *C. limicola*.

Leaves setose-scabrous-----23. *C. globosa*.

Corolla 2 cm. long or more.

Leaves acute or attenuate at base-----24. *C. perlonga*.

Leaves mostly obtuse or rounded at base.

25. *C. appendiculata*.

Calyx lobes ovate or deltoid, acute or acuminate.

Corolla 12 to 20 mm. long-----26. *C. podocephala*.

Corolla 7 mm. long or less.

Calyx lobes mucronate-acuminate-----27. *C. ambigua*.

Calyx lobes obtuse or merely acute-----28. *C. cana*.

Flowers in dense or interrupted spikes.

Leaves ovate to broadly ovate or elliptic-----29. *C. ferruginea*.

Leaves linear to oblong-----30. *C. cylindrostachya*.

1. *Cordia alba* (Jacq.) Roem. & Schult. Syst. Veg. 4: 466. 1819.

Varronia alba Jacq. Enum. Pl. Carib. 14. 1760.

Michoacán to Tamaulipas, Veracruz, and Chiapas. West Indies; Guatemala to Colombia and Venezuela.

Shrub or small tree, usually 4 to 8 meters high, with thick, brownish or grayish, fissured bark, the branchlets sparsely or densely setulose; leaves very variable in size and shape, mostly ovate to rounded and 5 to 12 cm. long, rounded to acuminate at apex, scabrous or smooth above, glabrate beneath in age; flowers in large open cymes; corolla white or yellow, about 1 cm. long; fruit white, about 1 cm. long. "Zazamil" (Oaxaca, Guerrero); "gulabere" (Oaxaca); "vavos" (*Seler*); "uvita mocosa" (Colombia); "varía blanca," "ateje blanco," "atejo amarillo," "uva gomosa," "capá blanca" (Cuba); "tigüillote," "tigüillote negro," "cebito" (El Salvador); "caujaro" (Colombia); "uvillo," "uvero," "goma" (Panama).

The wood is said to be hard and strong, yellow, with a specific gravity of about 0.78, and to be used in carpentry. The leaves and flowers are reported to have emollient properties and to be used for treating affections of the chest. A decoction of the flowers is sometimes employed for inducing perspiration. In El Salvador a French physician formerly prepared from the charcoal a preparation which was much used for treating affections of the stomach. The fruit is employed in Oaxaca for coagulating indigo. It is white, transparent, mucilaginous, and extremely sweet, and is often eaten. The viscid juice is used in El Salvador for fastening the wrappers of cigars.

2. *Cordia diversifolia* Pavón; DC. Prodr. 9: 474. 1845.

Sinaloa to Colima.

Large shrub or small tree, the branchlets scabrous and sometimes hirsute; leaves obovate to rounded-obovate, 6 to 10 cm. long, rounded to acute at apex, broadly cuneate or obtuse at base, remotely mucronate-serrate above the base, scabrous above, setulose-scabrous beneath; flowers in small cymes, sessile, secund upon the branches; calyx tubular-campanulate, striate, 3 mm. long, scabrous, obtusely 5-dentate; corolla yellow, the lobes obtuse, reflexed, equaling or shorter than the calyx, the throat hirsute.

3. *Cordia alliodora* (Ruiz & Pav.) Cham. Linnaea 8: 121. 1833.

Cordia gerascanthus Jacq. Stirp. Amer. 43. 1763. Not *C. gerascanthus* L. 1759.

Cerdana alliodora Ruiz & Pav. Fl. Peruv. Chil. 2: 47. pl. 184. 1799.

Sinaloa to Oaxaca and Tabasco. West Indies; Central and South America.

Tree, 7 to 20 meters high, the trunk 50 cm. or more in diameter, the bark grayish, fissured; leaves mostly elliptic-oblong, 10 to 20 cm. long, acute or acuminate, finely stellate-pubescent, entire; flowers white, fragrant, in large panicles; calyx about 5 mm. long, the corolla twice as long; wood close-grained, the sapwood thick, light brown, the heartwood slightly darker, the specific gravity reported as ranging from 0.574 to 0.700. "Bojón," "bojón blanco," "bojón prieto" (Tabasco); "tambor" (Michoacán); "hormiguero"

(Michoacán, Guerrero, Oaxaca); "amapa prieta" (Sinaloa); "palo de rosa" (Oaxaca, Cuba, Porto Rico) "palo María" (Guerrero, *Ramírez*); "laurel" (Panama, Costa Rica, El Salvador, Guatemala, Honduras); "solera" (Colombia); "laurel macho" (Nicaragua); "capá prieta" (Porto Rico, Cuba); "varía," "capá roja" (Cuba); "canjaro," "pardillo" (Venezuela); "suchicahue" (*Reko*); "árbol del ajo" (Peru); "laurel blanco" (El Salvador); "canalete" (Colombia).

The wood is highly valued for carpenter and cabinet work, and is used for beams, flooring, ceiling, and finer work. The smaller branches are sometimes employed for making barrel hoops. The forks of the young twigs are almost always enlarged by hollow swellings, which afford shelter for fierce ants, hence the name "hormiguero." The fruit is edible. A decoction of the leaves is employed as a tonic and stimulant, especially in the case of catarrh and affections of the lungs, and an ointment made with the pulverized seeds has been used in the West Indies as a remedy for cutaneous diseases. The fresh bark is reported to have an odor suggestive of garlic.

4. *Cordia seleriana* Fernald, Proc. Amer. Acad. 36: 498. 1901.

Michoacán to Oaxaca; type from Huilotepec, Oaxaca.

Shrub or small tree; leaves ovate to suborbicular, scabrous or hispidulous; cymes few-flowered; calyx tubular-campanulate, 1 cm. long or less; corolla white, 1.5 to 3 cm. long.

5. *Cordia greggii* Torr. U. S. & Mex. Bound. Bot. 135. 1859.

Cordia greggii palmeri S. Wats. Proc. Amer. Acad. 24: 61. 1889.

Cordia watsoni Rose, Contr. U. S. Nat. Herb. 1: 89. 1890.

Baja California to Sinaloa, Durango, Zacatecas, and Coahuila; type from Bolsón de Mapimí, Durango.

Shrub, 1 to 3 meters high; leaves mostly ovate or obovate, rounded or obtuse at apex, obtuse or acute at base, coarsely dentate, very scabrous; flowers white, in few-flowered headlike cymes; calyx about 7 mm. long, the lobes subulate; corolla 1.5 to 3 cm. long. "Vara prieta" (Sinaloa); "San Juanito" (Durango, Sinaloa).

A decoction of the leaves is said to be used as a stimulant medicine.

6. *Cordia elaeagnoides* DC. Prodr. 9: 474. 1845.

Michoacán to Chiapas; type from Chinitán, between Tehuantepec and Boca del Monte.

Tree, 6 to 10 meters high; leaves ovate to broadly elliptic, 8 to 17 cm. long, acuminate or long-acuminate, entire or nearly so, glabrous and smooth above; flowers creamy white, in large cymes; calyx 6 mm. long, whitish-sericeous, the teeth obtuse; corolla 2 cm. broad or larger. "Grisiño" (Chiapas); "bocote," "gueramo" (Michoacán, Guerrero); "ocotillo meco" (Oaxaca).

The wood is said to be valuable for cabinet work.

7. *Cordia guerkeana* Loesener, Verh. Bot. Ver. Brandenb. 55: 186. 1913.

Oaxaca; type from Totolapam.

Leaves oblong to broadly obovate or oval-oblong, 4.5 to 9 cm. long, obtuse or rounded at apex, entire or nearly so, glabrate above; flowers fragrant; calyx 10 to 12 mm. long, fulvous-tomentose, the teeth short, obtuse; corolla white, the tube more than twice as long as the calyx. "Laa-zaa-yi-xē" (*Seler*).

8. *Cordia boissieri* DC. Prodr. 9: 478. 1845.

Coahuila to Tamaulipas and San Luis Potosí. Western Texas.

Shrub or small tree, 8 meters high or less, the trunk up to 20 cm. in diameter; bark thick, gray, ridged; leaves ovate to oblong, 8 to 12 cm. long,

obtuse, rounded or cordate at base, scabrous above, entire or nearly so; flowers in small dense cymes; calyx 1 cm. long, the teeth acute; corolla 3 to 4 cm. long, white, with yellow throat, the lobes crispate; fruit ovoid, 2.5 to 3 cm. long, reddish brown, shining, the flesh sweet; wood soft, close-grained, brown, its specific gravity about 0.68. "Anacahuite," "anacahuitl," "anacahuita" (Tamaulipas, Guanajuato, Nuevo León, Texas; from the Nahuatl *amacuahuitl*, "paper-tree"); "siricote" (Tamaulipas); "nacagüita" (Nuevo León); "trompillo" (Tamaulipas, Nuevo León); "nacahuite" (San Luis Potosí); "nacahuitl" (Nuevo León).

The tree is often planted for ornament and is very handsome when covered with flowers. The fruit is eaten by people but if eaten raw it said to cause dizziness, as if one were intoxicated. Domestic animals are fond of the fruit and hogs eat the seeds. The wood is of little value, but yokes and other articles are made from it. All parts of the plant are aromatic. Jelly made from the fruit is much used as a remedy for coughs and colds. A decoction of the leaves is a popular domestic remedy for rheumatism and is generally employed in the treatment of bronchial affections. About 1860 the wood attracted some attention in Germany as a possible remedy for tuberculosis and quantities of it were exported from Tampico. Analysis, however, showed that it did not possess important medicinal properties, and experience proved that no good results followed its use, consequently it was not long employed.

9. *Cordia morelosana* Standl., sp. nov.

Morelos; type from Cuernavaca (*Pringle* 8205; U. S. Nat. Herb. no. 354555).

Small tree; leaves petiolate, broadly elliptic or rounded, 3.5 to 6 cm. long, 2 to 4 cm. wide, rounded or apiculate at apex, obtuse or rounded at base, coriaceous, scabrous above, setose-hispidulous beneath, the venation very prominent and reticulate beneath; flowers in large dense cymes; calyx 13 mm. long, tubular, striate, densely pilose, the teeth short, obtuse; corolla about 3 cm. long, 5 or 6-lobate, the lobes rounded.

10. *Cordia gerascanthus* L. Syst. Nat. ed. 10. 936. 1759.

Cordia gerascanthoides H. B. K. Nov. Gen. & Sp. 3: 69. 1819.

Yucatán; reported from Tabasco. Greater Antilles.

Tree, 4 to 30 meters high; leaves lanceolate to elliptic-oblong, 5 to 12 cm. long, acute or acuminate, acute at base, entire, glabrous or nearly so; flowers white, fragrant, in dense cymes; calyx 7 to 10 mm. long, pilose or tomentulose; corolla about twice as long as the calyx. "Baría" (Tabasco, Quintana Roo, *Cienfuegos*); "bohom," "habeem" (Yucatán, Maya).

The wood is said to be strong and elastic and to be valuable for purposes of construction.

11. *Cordia igualensis* Bartlett, Proc. Amer. Acad. 44: 632. 1909.

Type from Iguala Canyon, Guerrero, altitude 760 meters.

Leaves elliptic, 12 to 18 cm. long, abruptly short-acuminate, acute at base, entire, glabrous above; flowers white, in large cymes; corolla 2.5 cm. long.

12. *Cordia tinifolia* Willd.; Roem. & Schult. Syst. Veg. 4: 800. 1819.

Tepic to Guerrero; type from Acapulco.

Tree, 4 to 15 meters high; leaves narrowly oblong to elliptic-oblong, 7 to 15 cm. long, acute or acuminate, acute to rounded at base, glabrous above; flowers white, in large or small cymes, sessile; corolla about 3 cm. long.

13. *Cordia sonorae* Rose, Contr. U. S. Nat. Herb. 1: 106. pl. 9. 1891.

Sonora to Guerrero; type from Alamos, Sonora.

Shrub or tree, 2 to 15 meters high; leaves oblong to elliptic, 5 to 11 cm. long, obtuse, coriaceous, scaberulous or glabrate above; flowers white, in small dense cymes; corolla 3 cm. long or less. "Asta," "palo de asta" (Sonora, Sinaloa).

Cordia langlassei Loesener,¹ the type of which came from the Río Coyaquilla, Michoacán or Guerrero, was described from leafless flowering branches. It is closely related to *C. sonorae* and probably a synonym.

14. *Cordia dodecandra* DC. Prodr. 9: 478. 1845.

Cordia heccaidecandra Loesener, Bot. Jahrb. Engler 36: Beibl. 80: 25. 105. Yucatán and Chiapas. Guatemala.

Tree, 30 meters high or less; leaves oblong to oval or rounded, 6 to 13 cm. long, obtuse or rounded at base and apex, entire or nearly so, scabrous; flowers reddish yellow, in small cymes; calyx 1 to 1.5 cm. long; corolla about 5 cm. long; fruit 5 cm. long, greenish or yellowish, slightly acid. "Copté," "siricote" (Yucatán).

The tree is sometimes cultivated for its edible fruit. The wood is said to be hard and heavy, to take a fine polish, and to be used for making furniture. A decoction of the wood or bark is a domestic remedy for colds. The leaves are used for cleaning dishes and as a substitute for sandpaper.

15. *Cordia chiapensis* Fernald, Proc. Amer. Acad. 40: 52. 1904.

Type from Ocuilapa, Chiapas, altitude 1,020 to 1,140 meters.

Shrub with brown bark; leaves short-petiolate, oblong-lanceolate or ovate-lanceolate, 3 to 8 cm. long, acute or acuminate, acute at base, serrate, scabrous; cymes scorpioid, long-pedunculate, the flowers sessile; calyx 4 mm. long or less; fruit 6 mm. long.

16. *Cordia microsebestena* Loesener, Verh. Bot. Ver. Brandenb. 55: 187. 1913.

Oaxaca; type from La Mistequilla, Tehuantepec.

Leaves ovate to rounded, 2 to 6 cm. long, obtuse to acuminate, scaberulous above; cymes few-flowered; calyx 5 mm. long, 5 or 6-dentate; corolla white.

17. *Cordia sebestena* L. Sp. Pl. 190. 1753.

? *Cordia crispiflora* DC. Prodr. 9: 476. 1845.

Yucatán. Florida and West Indies.

Tree, 10 meters high or less, the trunk up to 15 cm. in diameter; bark thick, dark brown, blackish, irregularly ridged; leaves ovate to rounded, 8 to 20 cm. long, acute to rounded at apex, entire or repand-dentate, scabrous above; flowers in large or small cymes, orange; calyx 1 to 1.5 cm. long; fruit ovoid, 2.5 to 4 cm. long, white; wood hard, close-grained, dark brown, its specific gravity about 0.71. "Siricote blanco," "siricote," "copté," "zac-copté," "anacahuite," "anachuita" (Yucatán); "San Bartolomé" (Porto Rico); "vomitel colorado" (Cuba, Porto Rico).

The tree is often planted for ornament. The fruit is edible and is said to have emollient properties and to be used in the treatment of fevers. The plant has been employed also as a remedy for intestinal and stomach complaints and for bronchial affections.

18. *Cordia pringlei* Robinson, Proc. Amer. Acad. 26: 169. 1891.

Cordia pringlei altatensis T. S. Brandeg. Zoe 5: 219. 1905.

Sinaloa to San Luis Potosí and Veracruz; type from Las Palmas, San Luis Potosí. Nicaragua and Costa Rica.

¹ Repert. Sp. Nov. Fedde 12: 240. 1913.

Shrub, 3 to 4.5 meters high; leaves ovate-oblong to broadly ovate, 4 to 10 cm. long, obtuse, coarsely crenate; heads 2.5 to 3 cm. in diameter, long-pedunculate; corolla white, 1 cm. long or less. "Huazimilla" (San Luis Potosí, *Seler*).

Some of the specimens have been determined as *C. macrocephala* H. B. K.

19. *Cordia stellata* Greenm. Proc. Amer. Acad. 39: 86. 1903.

Puebla and Oaxaca; type from Oaxaca.

Shrub; leaves ovate to rounded-ovate, 2 to 10 cm. long, obtuse, coarsely crenate, densely stellate-pubescent; heads long-pedunculate, about 2 cm. in diameter; corolla white, 1 cm. broad or less.

20. *Cordia corymbosa* (L.) Don, Hist. Dichl. Pl. 4: 383. 1838.

Lantana corymbosa L. Sp. Pl. 628. 1753.

Cordia ulmifolia Juss. in Dum. Cours. Bot. Cult. 2: 148. 1802.

Veracruz. West Indies; Central and South America.

Shrub, 2 to 5 meters high, sometimes subscandent; leaves ovate, lance-oblong, or elliptic, 3 to 11 cm. long, acute or acuminate, serrate or subentire, scabrous above, pubescent beneath; heads numerous, about 7 mm. thick; corolla white, 4 to 5 mm. long; fruit red. "Basora prieta," "palo de perico," "saraguaso" (Porto Rico); "varilla negra" (Costa Rica).

21. *Cordia urticacea* Standl., sp. nov.

Type from Real de Guadalupe, Michoacán or Guerrero, altitude 1,200 meters (*Langlassé* 355; U. S. Nat. Herb. no. 385888).

Shrub, 2 meters high, the branchlets densely hispid; leaves slender-petiolate, elliptic or broadly elliptic, 11 to 15 cm. long, 6 to 8 cm. wide, acute, abruptly decurrent at base, coarsely serrate, hispid-hirsute; peduncles 12 cm. long, hispid, the heads 1.5 cm. in diameter; calyx sparsely hispid, the lobes filiform, 2 to 4 mm. long; corolla white, 3 cm. long, the limb 3 cm. broad.

22. *Cordia limicola* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 502. 1919.

Veracruz; type from Zacuapan.

Shrub; leaves ovate or elliptic, 5 to 8 cm. long, acute, decurrent at base, coarsely crenate-dentate; peduncles equaling or longer than the leaves, the heads about 1 cm. in diameter; calyx 8 mm. long.

23. *Cordia globosa* (Jacq.) H. B. K. Nov. Gen. & Sp. 3: 76. 1819.

Varronia globosa Jacq. Enum. Pl. Carib. 14. 1760.

Cordia dasycephala H. B. K. Nov. Gen. & Sp. 3: 76. 1819.

Sinaloa and Durango to Oaxaca, Veracruz, and Yucatán. West Indies; Central and South America.

Shrub, 2 to 4.5 meters high; leaves narrowly lanceolate to ovate, 2 to 8 cm. long, obtuse to acuminate, coarsely serrate, very scabrous; heads mostly short-pedunculate, 1 cm. in diameter or slightly larger; corolla white; fruit red. "Ateje" (Cuba); "copillo," "saraguaso prieto" (Porto Rico); "cuajatlanta," "zompopo" (El Salvador).

24. *Cordia perlonga* Fernald, Proc. Amer. Acad. 33: 90. 1897.

Type from Acapulco, Guerrero.

Shrub with dark brown bark; leaves narrowly lanceolate to ovate-lanceolate, 6 to 9 cm. long, acuminate, coarsely serrate, very scabrous; peduncles longer than the leaves, the heads globose or oblong, in fruit 2 to 3 cm. long; corolla white.

25. *Cordia appendiculata* Greenm. Field Mus. Bot. 2: 338. 1912.

Oaxaca.

Shrub or small tree, 3 to 4.5 meters high; leaves ovate or oblong-ovate, 3 to 7 cm. long, acute, serrate, appressed-hispid above, setulose-pilose beneath; heads long-pedunculate, globose, 2 to 3 cm. in diameter; corolla white.

Doubtfully distinct from *C. perlonga*. The description of *C. oaxacana* DC.¹, the type of which came from Tololafa, is strongly suggestive of this species, and that may be the oldest name for it.

26. *Cordia podocephala* Torr. U. S. & Mex. Bound. Bot. 135. 1859.

Nuevo León and Tamaulipas. Western Texas; type from San Antonio.

Plants suffrutescent, 30 to 60 cm. high; leaves ovate-oblong to narrowly lanceolate, 2 to 5 cm. long, obtuse or acute, coarsely serrate, scabrous; peduncles longer than the leaves, the heads 6 to 8 mm. thick; corolla white.

27. *Cordia ambigua* Schlecht. & Cham. Linnaea 5: 115. 1830.

Veracruz; type from Jalapa.

Slender shrub or tree, 3 to 6 meters high; leaves broadly ovate or elliptic, 3 to 8 cm. long, acute, coarsely serrate, scabrous above, hirtellous beneath; heads 7 to 10 mm. in diameter, slender-pedunculate.

28. *Cordia cana* Mart. & Gal. Bull. Acad. Brux. 11²: 331. 1844.

Cordia insularis Greenm. Proc. Amer. Acad. 33: 482. 1898.

Sinaloa to Oaxaca; type from Oaxaca. Central America.

Shrub, 1.5 to 4.5 meters high; leaves lanceolate to oblong, ovate, or elliptic, 1.5 to 7.5 cm. long, acuminate to obtuse, serrate or subentire, scabrous above, usually strigose beneath; heads mostly 5 mm. (in fruit often 1 cm. thick) in diameter, slender-pedunculate; corolla greenish white. "Cuajatinta" (Guatemala, El Salvador); "varilla negra," "escobillo negro" (El Salvador).

29. *Cordia ferruginea* Roem. & Schult. Syst. Veg. 4: 468. 1819.

Cordia laxiflora H. B. K. Nov. Gen. & Sp. 3: 72. 1819.

Cordia crenulata A. DC. in DC. Prodr. 9: 492. 1845.

Tepic to Chiapas and Veracruz. Guatemala to Colombia.

Shrub, 2 to 4.5 meters high, sometimes subscandent; leaves 4 to 15 cm. long, acute or acuminate, usually rounded and abruptly decurrent at base, serrate or subentire, scabrous or glabrate above, ferruginous-pubescent beneath; flowers in short or elongate, dense or interrupted spikes; corolla greenish white, about 4 mm. long. "Bejuco negro" (Guatemala, Honduras); "bubo," "gon-guipo" (Veracruz, Villada).

30. *Cordia cylindrostachya* (Ruiz & Pav.) Roem. & Schult. Syst. Veg. 4: 459. 1819.

Varronia cylindrostachya Ruiz & Pav. Fl. Peruv. Chil. 2: 23. 1799.

?*Cordia obliqua* H. B. K. Nov. Gen. & Sp. 3: 74. 1819.

Cordia linearis A. DC. in DC. Prodr. 9: 493. 1845.

Cordia brevispicata Mart. & Gal. Bull. Acad. Brux. 11²: 331. 1844.

Cordia palmeri S. Wats. Proc. Amer. Acad. 24: 62. 1889.

Cordia socorrensis T. S. Brandeg. Erythea 7: 5. 1899.

Cordia imparilis Macbride, Contr. Gray Herb. n. ser. 49: 16. 1917.

Baja California and Sonora to Chiapas, Morelos, and Yucatán. West Indies; Central and South America; type from Peru.

Aromatic shrub, 1 to 3 meters high; leaves 2 to 10 cm. long, mostly linear, lanceolate, or oblong, usually serrate, commonly scabrous above and pubescent

¹ Prodr. 9: 497. 1845.

beneath, sometimes merely granular; spikes on long or short peduncles, short or elongate, usually dense; corolla white, about 4 mm. long; fruit red. "Tacotillo," "vara prieta" (Sinaloa); "hierba del pasmo" (Sonora); "azota caballos" (Tabasco, *Roviroso*); "chovarobo," "sangre de toro" (Oaxaca, Chiapas, *Seler*); "oreja de ratón" (*Conzatti*); "xcopché" (Yucatán, Maya); "basora prieta," "saraguaso" (Porto Rico); "cuajatinta" (El Salvador).

The specimens exhibit notable variation in pubescence and leaf form, but they do not afford constant characters for specific segregation. In El Salvador the plant is said to be used for coagulating rubber and indigo.

DOUBTFUL SPECIES.

CORDIA COLLOCocca L. Sp. Pl. ed. 2. 274. 1762. Reported from Oaxaca by Hemsley, but the report is probably based upon an incorrect identification.

CORDIA FOLIOSA Mart. & Gal. Bull. Acad. Brux. 11²: 330. 1844. Type from Zacuapan, Veracruz.

CORDIA HARTWISSIANA Regel, Ind. Sem. Hort. Petrop. 39. 1858. Type from southern Mexico.

CORDIA ROTATA Moc.; DC. Prodr. 9: 483. 1845. Based upon one of Sessé and Mociño's plates.¹

CORDIA SERRATIFOLIA H. B. K. Nov. Gen. & Sp. 3: 76. 1819. Type from Campeche.

2. *BOURRERIA* P. Br.; Jacq. Enum. Pl. Carib. 2, 14. 1760.

Shrubs or trees; leaves alternate, petiolate, entire; flowers rather large, white, in terminal corymb-like cymes; calyx campanulate, 2 to 5-lobate, the lobes valvate; corolla salverform, the limb usually 5-lobate; styles 2-cleft, the stigmas flattened; fruit a drupe, containing 4 bony nutlets.

Calyx glabrous outside or nearly so.

Filaments glabrous.....1. *B. pulchra*.

Filaments pubescent,

Corolla 2 cm. long or more; leaves obtuse or acute at base.

2. *B. formosa*.

Corolla about 13 mm. long; leaves mostly subcordate at base.

3. *B. purpusii*.

Calyx tomentose or sericeous outside.

Leaves abruptly short-acuminate; corolla tube much exceeding the calyx.

4. *B. rekoï*.

Leaves obtuse or rounded at apex; corolla tube about equaling the calyx.

Leaves glabrous beneath.

Leaves glabrous on the upper surface.....5. *B. revoluta*.

Leaves scaberulous on the upper surface.....6. *B. obovata*.

Leaves strigose or tomentose beneath.

Leaves tomentose or velutinous beneath with loose spreading hairs.

Corolla lobes oblong, acutish.....7. *B. sonorae*.

Corolla lobes rounded.....8. *B. andrieuxii*.

Leaves strigose or appressed-pilose beneath.

Leaves 3 times as long as broad or longer, the lateral nerves nearly obsolete.....9. *B. spathulata*.

Leaves mostly twice as long as broad or less, the lateral nerves conspicuous.....10. *B. strigosa*.

¹ DC. Calq. Dess. Fl. Mex. pl. 880.

1. *Bourreria pulchra* Millsp. Field Mus. Bot. 2: 338. 1912.*Cordia pulchra* Millsp. Bot. Jahrb. Engler 36: Beibl. 80: 24. 1905.

Yucatán.

Leaves oblanceolate-oblong to elliptic-oval, 5 to 8 cm. long, obtuse, cuneate to rounded at base, minutely tomentulose beneath; cymes large, many-flowered; calyx 6 mm. long; corolla about 18 mm. long.

2. *Bourreria formosa* (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 369. pl. 59. 1882.*Ehretia formosa* DC. Prodr. 9: 510. 1845.*Ehretia formosa oaxacana* DC. Prodr. 9: 510. 1845.

Oaxaca; type from Tehuantepec. Guatemala and El Salvador.

Tree, glabrous throughout or nearly so; leaves slender-petiolate, oval to elliptic-oblong, 7 to 11 cm. long, obtuse to acuminate; cymes large, many-flowered; calyx 6 to 8 mm. long. "Quisjoche" (Costa Rica, cultivated); "esquin-suche," "listón" (El Salvador).

In El Salvador the dried flowers are added to the fermented beverage known as "agua dulce," which is prepared from crude sugar.

3. *Bourreria purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 191. 1915.

Type from San Gerónimo, Oaxaca.

Shrub; leaves broadly ovate or rounded-ovate, 8 to 12 cm. long, acute, thinly pilose beneath, at least when young; cymes large, many-flowered; calyx 4 mm. long.

4. *Bourreria rekoii* Standl., sp. nov.

Type from Cafetal Alianza, Oaxaca, altitude 700 meters (*Reko* 3766; U. S. Nat. Herb. no. 887814).

Young branches sparsely hirtellous; leaves slender-petiolate, obovate or obovate-oblong, 8 to 16 cm. long, 4 to 8 cm. wide, abruptly short-acuminate, cuneate at base, glabrate above, sparsely and minutely hirtellous beneath or glabrate; cymes rather few-flowered, pedunculate; calyx 10 to 11 mm. long, the 5 or 6 lobes shorter than the tube, acuminate, densely hirtellous outside, tomentose within; corolla granular outside, the tube about 17 mm. long, the lobes 1 cm. long; filaments pubescent below.

5. *Bourreria revoluta* H. B. K. Nov. Gen. & Sp. 3: 67. 1819.

Type from Regla, Hidalgo.

Leaves obovate, 3.5 to 5 cm. long, obtuse, acute at base, coriaceous, reticulate-veined; cymes pedunculate; calyx tubular-campanulate, 5-dentate, pubescent; fruit subglobose, red.

6. *Bourreria obovata* Eastw. Proc. Amer. Acad. 44: 606. 1909.

Oaxaca; type from Jayacatlán, altitude 1,300 meters.

Leaves obovate, rounded or retuse at apex, attenuate to base; calyx 5-dentate, the teeth acute; corolla lobes 5 mm. long.

7. *Bourreria sonorae* S. Wats. Proc. Amer. Acad. 24: 62. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Shrub or small tree, 3 to 6 meters high; leaves oblanceolate-oblong to rounded-obovate, 2 to 5 cm. long, rounded at apex, obtuse to attenuate at base, very scabrous above, with prominent reticulate venation; cymes few-flowered or reduced to a single flower; corolla about 1 cm. long; fruit black, 1 cm. or less in diameter.

The fruit is said to be edible and to have a flavor suggesting that of hawthorn (*Crataegus*) fruit.

8. *Bourreria andrieuxii* (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 369. 1882.
Ehretia andrieuxii DC. Prodr. 9: 510. 1845.

Type from Puebla.

Leaves ovate, 2.5 to 4 cm. long, 1.2 to 2 cm. wide, rounded at base, canescent-pubescent; cymes short, few-flowered; calyx 4 mm. long; corolla tube 4 mm. long, the lobes 8 mm. long.

9. *Bourreria spathulata* (Miers) Hemsl. Biol. Centr. Amer. Bot. 2: 370. 1882.
Crematomia spathulata Miers, Ann. Mag. Nat. Hist. IV. 3: 310. 1869.

Type from Mexico.

Leaves elongate spatulate-oblong, 2.5 to 4 cm. long, 6 to 14 mm. wide, obtuse, scabrid above, strigose beneath, the margins revolute; cymes shorter than the leaves, 4 to 6-flowered; calyx 6 mm. long; corolla tube 1 cm. long.

10. *Bourreria strigosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 390. 1909.
 Puebla; type from Barranca de Tlacualosto.

Shrub, 1.8 to 3 meters high; leaves nearly sessile, obovate or obovate-oblong, 1.5 to 2.5 cm. long, rounded at apex, cuneate at base; cymes short, 6 to 12-flowered; calyx 5 to 6 mm. long; corolla about 8 mm. long.

DOUBTFUL SPECIES.

- BOURRERIA HUANITA* (Llave & Lex.) Hemsl. Biol. Centr. Amer. Bot. 2: 370. 1882.
Morelosia huanita Llave & Lex. Nov. Veg. Descr. 1: 1. 1824.

Crematomia huanita Miers, Ann. Mag. Nat. Hist. IV. 3: 313. 1869.

Type from Morelia, Michoacán.

Tree; leaves ovate, 7.5 to 10 cm. long, long-petiolate, lustrous; cymes many-flowered; calyx ventricose-tubular, 5-lobate; corolla tube not exceeding the calyx, the lobes rounded; filaments tomentose at base.

The writer has seen no specimens of the genus from Michoacán. It is probable that the plant is the same as *B. formosa*, and if so the name *B. huanita* should replace that one. *Bourreria huanita* is mentioned in various Mexican publications and the following vernacular names are reported: "Huanita" (Michoacán); "izquixochitl," "esquisúchil"; "jazmín de Tehuantepec" (Oaxaca); "yaga guilexoba" (Oaxaca, Zapotec).

3. *EHRETIA* L. Syst. Nat. ed. 10. 936. 1759.

Shrubs or trees; leaves alternate, entire or serrate; flowers small, white, the cymes arranged in chiefly terminal panicles; calyx 5-parted; corolla tube short, the limb with 5 obtuse spreading lobes; style bifid; fruit a small drupe.

Leaves entire.

Leaves smooth on the upper surface-----1. *E. tinifolia*.

Leaves very scabrous on the upper surface-----2. *E. elliptica*.

Leaves serrate, at least near the apex.

Leaves glabrous and smooth beneath-----3. *E. luxiana*.

Leaves scabrous or pubescent beneath, at least along the costa.

Leaves mostly rounded or obtuse at apex; corolla puberulent or scaberulous.

2. *E. elliptica*.

Leaves acute or acuminate; corolla glabrous.

Corolla about 10 mm. long-----4. *E. tehuacana*.

Corolla 7 mm. long or less.

Inflorescence glandular-puberulent-----5. *E. viscosa*.

Inflorescence without glandular pubescence.

Leaves cordate at base-----6. *E. cordifolia*.

Leaves rounded to acute at base-----7. *E. latifolia*.

1. *Ehretia tinifolia* L. Syst. Nat. ed. 10. 936. 1759.

Tamaulipas, Veracruz, Oaxaca, and Yucatán. West Indies.

Shrub or tree, glabrous throughout or nearly so, sometimes 27 meters high, with dense crown, the bark rather smooth; leaves petiolate, oblong to ovate, 5 to 12 cm. long, rounded to acutish at apex, obtuse or rounded at base, lustrous; panicles longer than the leaves, dense or open; corolla white, about 4 mm. long; fruit 5 to 6 mm. in diameter, red or purple. "Nandimbo" (Oaxaca); "manzana" (Tamaulipas, Veracruz); "manzanita" (Tamaulipas); "roble," "beec," "bec," "saúco" (Yucatán); "capulín cimarrón" (Oaxaca); "roble prieto" (Cuba).

The fruit is edible. The tree is often planted for shade.

The description of *E. longifolia* Miers,¹ which was based partly upon specimens from Jamaica and partly upon a specimen collected between Tehuacán and Oaxaca, suggests this species, and Miers's name is probably to be reduced to synonymy.

2. *Ehretia elliptica* DC. Prodr. 9: 503. 1845.

Ehretia ciliata Miers, Ann. Mag. Nat. Hist. IV. 3: 111. 1869.

Ehretia exasperata Miers, Ann. Mag. Nat. Hist. IV. 3: 112. 1869.

Coahuila to Guanajuato, Veracruz, and Tamaulipas. Western Texas.

Shrub or tree, sometimes 15 meters high; bark thick, furrowed, separating into thin, gray or reddish scales; leaves oblong to rounded, 3 to 7 cm. long, usually rounded or obtuse at base and apex, thick, very scabrous or sometimes glabrate beneath; panicles small, dense or open; flowers sweet-scented; corolla 6 to 7 mm. long; fruit 5 to 8 mm. in diameter, yellow; wood hard, weak, brown, close-grained, its specific gravity about 0.64. "Manzanita," "manzanillo" (Tamaulipas); "anacua" (Nuevo León, Tamaulipas, Texas); "anagua" (Nuevo León); "anacahuite" (Guanajuato).

In Texas the tree is known as "sugarberry," "nockaway," and "knack-away," the last two names being corruptions of the Mexican "anacua," which is itself an abbreviation of "anacahuite." The tree is often planted because of its dense foliage and handsome flowers. The wood is used for wheel spokes, axles, tool handles, and yokes. The fruit is sweet and edible.

3. *Ehretia luxiana* Donn. Smith, Bot. Gaz. 18: 5. 1893.

Oaxaca. Guatemala and El Salvador; type from San Miguel Uspantán, Guatemala.

Small tree; leaves lance-oblong to oblong-oval, 7 to 12 cm. long, acute to long-acuminate, rounded to acute at base, serrate toward the apex, scaberulous or smooth above; panicles small, dense; corolla 5 to 6 mm. long; fruit about 8 mm. in diameter. "Manzanita" (El Salvador).

4. *Ehretia tehuacana* Greenm. Field Mus. Bot. 2: 339. 1912.

Puebla; type from Tehuacán.

Leaves ovate-oblong, 4 to 8.5 cm. long, obtuse or rounded at base, dentate toward the apex, scabrous above, hirtellous beneath; fruit 6 to 8 mm. long.

5. *Ehretia viscosa* Fernald, Trees & Shrubs 1: 25. pl. 13. 1902.

Known only from the type locality, Chapultepec Springs near Cuernavaca, Morelos, altitude 1,500 meters.

Large tree with dense spreading crown; leaves oblong-ovate to broadly ovate, 5.5 to 12 cm. long, acute, rounded or subcordate at base, scabrous above, densely velutinous-hirtellous beneath; panicles small and dense; fruit nearly 1 cm. long.

¹ Ann. Mag. Nat. Hist. IV. 3: 110. 1869.

6. *Ehretia cordifolia* Robinson, Proc. Amer. Acad. 29: 319. 1894.

Type from Zapotlán, Jalisco.

Large tree; leaves ovate, 5 to 7 cm. long, acute, coriaceous, very scabrous; panicles small; fruit 8 mm. long.

7. *Ehretia latifolia* DC. Prodr. 9: 503. 1845.

Ehretia mexicana S. Wats. Proc. Amer. Acad. 26: 144. 1891.

Jalisco to Puebla and Oaxaca.

Leaves lance-oblong to broadly ovate or elliptic, 4 to 9 cm. long, acuminate, scabrous or scaberulous; panicles usually as long as the leaves, dense or open; fruit about 6 mm. long.

4. *COLDENIA* L. Sp. Pl. 125. 1753.

Herbs or low shrubs; leaves alternate, entire, small; flowers small, axillary or in terminal heads; calyx 4 or 5-parted, the segments narrow; corolla subrotate; styles 2, filiform; fruit drupaceous, globose, containing 4 hard nutlets.

A few other species, which are wholly herbaceous, occur in Mexico.

Plants erect; flowers in terminal heads-----1. *C. greggii*.

Plants prostrate or nearly so; flowers axillary.

Leaves linear, rigid. Fruit deeply 4-lobate-----2. *C. hispidissima*.

Leaves mostly ovate or elliptic.

Leaves hispidulous, green, without tomentum-----3. *C. purpusii*.

Leaves tomentose, whitish or grayish, often also hispidulous.

Leaves canescent-tomentose, the pubescence all appressed.

4. *C. canescens*.

Leaves hispid with spreading hairs and also tomentose.

Nutlets about 1 mm. long; petioles nearly as long as the blades.

5. *C. mexicana*.

Nutlets 1.5 mm. long; petioles very short-----6. *C. tomentosa*.

1. *Coldenia greggii* (Torr.) A. Gray, Syn. Fl. 2¹: 182. 1878.

Ptilocalyx greggii Torr. U. S. Rep. Expl. Miss. Pacif. 2: 110. pl. 8. 1855.

Chihuahua, Coahuila, Durango, and Zacatecas; type from Buena Vista, Coahuila. Western Texas and southern New Mexico.

Shrub, 60 cm. high or less, much branched; leaves ovate or oval, 5 to 8 mm. long, canescent-tomentose, short-petiolate; calyx lobes filiform, plumose with long hairs; corolla 5 mm. long; fruit 4-sulcate. "Cenizo," "hierba del cenizo" (Durango).

2. *Coldenia hispidissima* (Torr.) A. Gray, Proc. Amer. Acad. 5: 340. 1862.

Eddya hispidissima Torr. U. S. Rep. Expl. Miss. Pacif. 2: 170. pl. 9. 1855.

Chihuahua and Coahuila. Western Texas to Arizona and Utah; type collected near El Paso, Texas.

Plants suffrutescent, much branched; leaves mostly sessile, 4 to 8 mm. long, hispid and puberulent, revolute, the costa thick and conspicuous; calyx lobes linear.

3. *Coldenia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 186. 1911.

San Luis Potosí; type from Minas de San Rafael.

Plants suffrutescent, hispid; leaves ovate or elliptic, 5 to 8 mm. long, acute, petiolate; calyx lobes linear; corolla purplish.

4. *Coldenia canescens* DC. Prodr. 9: 559. 1845.

Stegnocarpus canescens Torr. U. S. Rep. Expl. Miss. Pacif. 2: 169. 1855.

Chihuahua to Zacatecas, Hidalgo, and Tamaulipas; type collected between Santander and Victoria, Tamaulipas. Western Texas to Arizona.

Plants frutescent, canescent-sericeous or tomentose; leaves petiolate, mostly ovate or elliptic, 5 to 12 mm. long; calyx lobes linear-lanceolate; corolla purplish, 6 to 7 mm. broad. "Hierba de la virgen" (Coahuila, San Luis Potosí).

The plant is employed locally as a remedy for dysentery.

5. *Coldenia mexicana* A. Gray, Proc. Amer. Acad. 18: 119. 1883.

Coahuila; type from Saltillo.

Plants prostrate, fruticose, setose-hispid and canescent-tomentose; leaves ovate to broadly elliptic; flowers sessile; calyx lobes narrowly linear; corolla pink, 6 mm. long.

6. *Coldenia tomentosa* A. Gray, Proc. Amer. Acad. 18: 120. 1883.

Coahuila and Nuevo León; type from the Sierra Madre south of Saltillo, Coahuila.

Plants fruticose, setose-hispid and canescent-hispid; leaves lance-ovate, revolute; corolla purple.

5. *TOURNEFORTIA* L. Sp. Pl. 140. 1753.

Shrubs or small trees, often scandent; leaves entire; flowers small, in scorpioid cymose spikes or racemes; calyx 5-parted; corolla salverform, usually white, the throat naked; stamens included; fruit drupaceous, small, containing 4 nutlets.

Corolla lobes linear to triangular, acute or acuminate.

Leaves glabrous beneath or sparsely scabrous or scaberulous.

Calyx equaling the corolla tube.....1. *T. umbellata*.

Calyx much shorter than the corolla tube.

Lobes of the corolla as long as the tube; fruit sericeous...4. *T. potosina*.

Lobes much shorter than the tube; fruit glabrous or glabrate.

Fruit globose-ovoid, entire.....2. *T. glabra*.

Fruit globose, 4-lobate.....3. *T. peruviana*.

Leaves densely sericeous or pubescent beneath.

Corolla lobes almost filiform, equaling the tube.....4. *T. potosina*.

Corolla lobes linear or broader, shorter than the tube.

Corolla tube 2.5 to 3 mm. long.....5. *T. volubilis*.

Corolla tube 5 to 8 mm. long.

Tube about 5 mm. long.....6. *T. nelsoni*.

Tube 8 mm. long.....7. *T. caeciliana*.

Corolla lobes broad, obtuse.

Leaves linear or oblong-linear, very obtuse.....8. *T. gnaphalodes*.

Leaves lanceolate to broadly ovate, usually acute or acuminate.

Calyx lobes equaling the corolla, obtuse.....9. *T. calycina*.

Calyx lobes shorter than the corolla.

Cymes dense, composed of 2 to 4 short spikes; leaves densely pubescent beneath, at least when young, often sessile.

Leaves mostly obtuse, crispate, the pubescence soft to the touch.

10. *T. mollis*.

Leaves acute or acuminate, not crispate, the pubescence harsh.

11. *T. hartwegiana*.

Cymes usually lax, composed of numerous spikes, these often elongate; leaves often glabrate, petiolate.

Leaves usually densely sericeous or pubescent beneath; calyx commonly half as long as the corolla tube or shorter.

12. *T. hirsutissima*.

Leaves glabrate or thinly scabrous beneath, or hirtellous along the nerves; calyx often more than half as long as the corolla tube. Calyx lobes more than half as long as the corolla tube.

13. *T. densiflora*.

Calyx lobes less than half as long as the corolla tube.

Calyx lobes obtuse or acute; leaves usually glabrous.

14. *T. bicolor*.

Calyx lobes acuminate; leaves hirtellous beneath upon the nerves.

15. *T. petiolaris*.

1. *Tournefortia umbellata* H. B. K. Nov. Gen. & Sp. 3: 79. *pl.* 202. 1819.

Yucatán and Campeche; type collected near Campeche.

Low shrub, nearly glabrous; leaves short-petiolate, lanceolate or lance-oblong, 6 to 10 cm. long, acuminate, attenuate at base, glabrous; spikes several, elongate; corolla 3 to 4 mm. long, glabrous or scaberulous.

2. *Tournefortia glabra* L. Sp. Pl. 141. 1753.

Tournefortia cymosa L. Sp. Pl. ed. 2. 202. 1762.

Tepic to Oaxaca and Veracruz. West Indies and Central America.

Large shrub or small tree; leaves petiolate, lanceolate to elliptic, 6 to 16 cm. long, acuminate at base and apex, glabrous or sparsely sericeous when young; spikes usually numerous, slender, elongate; corolla whitish, the tube about 4 mm. long; fruit white, 5 mm. or less in diameter. "Limoncillo" (Veracruz).

In Oaxaca the leaves are applied as poultices to the feet as a remedy for influenza. A decoction of the plant is said to be employed in Veracruz, externally, as a remedy for rheumatism.

3. *Tournefortia peruviana* Poir. in Lam. Encycl. Suppl. 4: 425. 1816.

San Luis Potosí and Veracruz. West Indies and South America.

Shrub, nearly glabrous; leaves ovate or ovate-oblong, 6 to 11 cm. long, acuminate, rounded or obtuse at base, smooth; spikes usually numerous, slender, lax; corolla tube 5 to 6 mm. long; fruit yellowish, 6 mm. or less in diameter.

Some of the Mexican specimens have been determined incorrectly as *T. laurifolia* Vent.

4. *Tournefortia potosina* Standl., sp. nov.

San Luis Potosí; type from Tamasopo Canyon, altitude 750 meters (*Pringle* 3518; U. S. Nat. Herb. no. 316801).

Shrub, 2 to 3 meters high, the young branches strigose; leaves petiolate, lanceolate to oblong-ovate, 4 to 13 cm. long, acute to long-acuminate, obtuse or rounded at base, strigose-scabrous or glabrate above, densely strigose-scabrous beneath when young; cymes usually much branched, the spikes slender and lax, the flowers pedicellate; calyx lobes strigose, subulate, about half as long as the corolla tube; corolla strigose, the tube 2 to 3 mm. long, the lobes filiform-subulate, fully as long; fruit ovoid-globose, densely sericeous, terete.

Purpus 5377 and 5378 from Minas de San Rafael represent the same species.

5. *Tournefortia volubilis* L. Sp. Pl. 140. 1753.

Tournefortia velutina H. B. K. Nov. Gen. & Sp. 3: 79. *pl.* 201. 1819.

Tournefortia floribunda H. B. K. Nov. Gen. & Sp. 3: 79. 1819.

Messerschmidia candida Mart. & Gal. Bull. Acad. Brux. 11²: 334. 1844.

Tournefortia candida Walp. Repert. Bot. 6: 556. 1846-47.

Baja California and Sinaloa to Tamaulipas, Veracruz, Yucatán, and Oaxaca. Southern Florida; West Indies; Central and South America.

Shrub, suberect with pendent branches or scandent; leaves lanceolate to oblong-ovate, 4 to 10 cm. long, acuminate, rounded or obtuse at base, usually grayish-sericeous, densely so beneath; spikes few or numerous, lax, long and slender; corolla tube about 3 mm. long, the lobes short; fruit 5 mm. or less in diameter. "Xulkin" (Yucatán, Maya); "comida de culebra" (Nicaragua); "pringamoza" (Porto Rico).

6. *Tournefortia nelsoni* Donn. Smith, Bot. Gaz. 23: 10. 1897.

Veracruz and Puebla. Guatemala; type collected between San Martín and Todos Santos.

Scandent shrub; leaves petiolate, elliptic or ovate, 10 to 30 cm. long, acuminate, rounded or obtuse and decurrent at base, densely brownish-pubescent beneath; cymes large, the spikes numerous, elongate.

7. *Tournefortia caeciliana* Loesener, Verh. Bot. Ver. Brandenb. 55: 190. 1913.

Type collected near Ococingo, Chiapas.

Leaves petiolate, oblong, 18 to 27 cm. long, caudate-acuminate, cuneate at base, densely velutinous beneath; spikes numerous, elongate; fruit 7 to 8 mm. long.

8. *Tournefortia gnaphalodes* (L.) R. Br. Prodr. Fl. Nov. Holl. 496. 1810.

Heliotropium gnaphalodes L. Syst. Nat. ed. 10. 1913. 1759.

Mallotonia gnaphalodes Britton, Ann. Mo. Bot. Gard. 2: 47. 1915.

Yucatán, on seashores. Florida; West Indies.

Shrub, 1 meter high or less, densely silvery-sericeous throughout; leaves 4 to 10 cm. long; cymes headlike, with 2 to 4 short branches; calyx lobes obtuse, nearly as long as the corolla; fruit ovoid, black, 5 mm. long. "Té del mar," "temporana" (Porto Rico).

9. *Tournefortia calycina* Benth. Bot. Voy. Sulph. 139. 1844.

Michoacán to Oaxaca; type from Acapulco.

Low shrub; leaves short-petiolate, lanceolate to broadly ovate, 6 to 12 cm. long, acuminate, attenuate or abruptly decurrent at base, scabrous; cymes composed of usually 4 dense spikes; corolla white, the tube 6 to 7 mm. long.

10. *Tournefortia mollis* (Torr.) A. Gray, Proc. Amer. Acad. 10: 50. 1875.

Heliophytum molle Torr. U. S. & Mex. Bound. Bot. 138. 1859.

Tournefortia monclovana A. Gray, Proc. Amer. Acad. 18: 120. 1883.

Chihuahua and Coahuila. Western Texas, the type collected opposite Presidio del Norte.

Plants about 30 cm. high or less, erect, chiefly herbaceous, soft-pubescent throughout; leaves lance-oblong to deltoid-ovate, 3 to 10 cm. long, rounded or truncate at base and often short-decurrent; corolla tube 4 mm. long.

11. *Tournefortia hartwegiana* Steud. Nom. Bot. ed. 2. 2: 693. 1841.

Tournefortia capitata Mart. & Gal. Bull. Acad. Brux. 11²: 332. 1844.

Baja California and Sonora to Tamaulipas, San Luis Potosí, and Oaxaca; type from Bolaños, Jalisco.

Erect shrub, 1 to 4 meters high; leaves lanceolate, oblanceolate, or elliptic-oblong, 5 to 13 cm. long, acuminate, attenuate at base, scabrous above, scaberulous or pubescent beneath; flowers sweet-scented; corolla white, the tube about 6 mm. long; fruit white. "Hierba del zapo," "hierba del burro," "confite coyote" (Sinaloa).

12. *Tournefortia hirsutissima* L. Sp. Pl. 140. 1753.

?*Tournefortia asperrima* Mart. & Gal. Bull. Acad. Brux. 11²: 333. 1844.

Messerschmidia chrysantha Mart. & Gal. Bull. Acad. Brux. 11²: 334. 1844.

Tournefortia chrysantha Walp. Repert. Bot. 6: 556. 1846-47.

Sinaloa to Tamaulipas, Veracruz, Puebla, and Guerrero. West Indies; Central and South America.

Scandent shrub, the stems usually hirsute or hispid; leaves lance-oblong to elliptic or ovate-oval, 8 to 15 cm. long, acuminate, rounded to acute at base, scabrous above; cymes usually large and broad; corolla white, the tube 4 to 5 mm. long. "Amapa hasta," "perlas" (Sinaloa); "tlachichinoa" (Puebla, Morelos, Oaxaca); "tlepatli" (Jalisco, *Urbina*); "ortiguilla" (*Herrera*); "nigua" (Cuba, Porto Rico); "mata de nigua," "nigua peluda," "bejuco de nigua" (Porto Rico); "lágrimas de San Pedro" (Colombia); "tiricia," "frutilla" (Nicaragua).

The hairs of the stems penetrate the skin readily and cause irritation. The crushed leaves have been applied in the West Indies to the skin for the purpose of removing chiggers ("niguas"), and are said to be effective. The decoction of the plant is sometimes used as a wash to cure cutaneous diseases and ulcers of the mouth. The roots are reported to have diuretic properties.

13. *Tournefortia densiflora* Mart. & Gal. Bull. Acad. Brux. 11²: 333. 1844.

Tournefortia trichocalycina DC. Prodr. 9: 517. 1845.

Sinaloa to Tamaulipas, Veracruz, and Oaxaca; type from Tampico, Tamaulipas. Guatemala.

Shrub, 1 to 4.5 meters high; leaves petiolate, lanceolate to ovate, 5 to 16 cm. long, acuminate, usually attenuate at base, scabrous; spikes few or numerous; corolla white, the tube about 7 mm. long; calyx lobes linear-attenuate. "Hierba del negro" (Oaxaca, *Reko*); "hierba rasposa" (Morelos); "topoya" (Oaxaca).

A decoction of the plant is said to be administered as a remedy for intestinal affections. In Oaxaca the plant is employed as a remedy for wounds and pimples.

14. *Tournefortia bicolor* Swartz, Prodr. Veg. Ind. Occ. 40. 1788.

Stenostomum dichotomum DC. Prodr. 4: 461. 1830.

Michoacán to Oaxaca, Tabasco, and Veracruz. West Indies; Central and South America.

Shrub, 3 to 5 meters high, erect or subscandent, glabrous or nearly so; leaves oblong to broadly elliptic, 6 to 16 cm. long, obtuse to acuminate, acute to rounded at base, lustrous; cymes usually large and composed of numerous spikes; corolla white, the tube 4 to 5 cm. long; fruit white. "Bejuco de nigua" (Porto Rico).

15. *Tournefortia petiolaris* DC. Prodr. 9: 520. 1845.

Morelos; type from somewhere in Mexico.

Shrub, 1 to 2 meters high; leaves ovate or elliptic, 9 to 21 cm. long, acuminate at base and apex, thin, scaberulous above; spikes elongate, lax; corolla white, the tube about 7 mm. long.

DOUBTFUL SPECIES.

TOURNEFORTIA ELLIPTICA Mart. & Gal. Bull. Acad. Brux. 11²: 332. 1844. Type from the city of Veracruz.

TOURNEFORTIA HERNANDESI Dunal; DC. Prodr. 9: 529. 1845. Type from somewhere in Mexico.

TOURNEFORTIA SCHIEDEANA Don, Hist. Dichl. Pl. 4: 368. 1839. Type from Jalapa, Veracruz.

6. *HELIOTROPIUM* L. Sp. Pl. 130. 1753.

Shrubs or herbs; leaves alternate or opposite, entire; flowers small, in secund spikes or in bifid cymes, sometimes axillary; calyx 5-parted or 5-lobate, the lobes usually narrow; corolla salverform, the lobes broad or narrow; style short or elongate, the stigma conic or elongate; fruit dry, 2 or 4-lobate, separating into 2 or 4 nutlets.

Numerous herbaceous species occur in Mexico.

Flowers subtended by bracts or leaves, never in forked spikes.

Flowers few, crowded at the ends of the branches----1. *H. confertifolium*.

Flowers numerous, mostly in secund spikes.

Leaves narrowly linear, 1.5 mm. wide or less-----2. *H. angustifolium*.

Leaves linear or broader, 2.5 to 10 mm. wide.

Fruit glabrous-----3. *H. rugosum*.

Fruit strigose.

Pubescence of the stems chiefly of reflexed hairs---4. *H. mexicanum*.

Pubescence of the stems of erect hairs-----5. *H. fruticosum*.

Flowers in ebracteate spikes, these usually forked and forming cymes.

Fruit at maturity separating into 2 2-celled nutlets-----6. *H. parviflorum*.

Fruit separating into 4 1-celled nutlets.

Stems hirsute with spreading hairs, the pubescence fulvous.

7. *H. jaliscense*.

Stems strigose or pilose with ascending hairs, the pubescence white or gray.

Hairs on the lower surface of the leaves loose, not closely appressed.

8. *H. coriaceum*.

Hairs on the lower surface of the leaves very closely appressed.

Leaves linear, strongly revolute-----9. *H. pueblense*.

Leaves lanceolate or linear-lanceolate, not revolute--10. *H. calcicola*.

1. *Heliotropium confertifolium* Torr.; A. Gray, Syn. Fl. 2¹: 184. 1874.

Heliotropium limbatum confertifolium Torr. U. S. & Mex. Bound. Bot. 138. 1859.

Coahuila, Nuevo León, and San Luis Potosí. Western Texas; type from Leon Springs.

Plants suffrutescent, 30 cm. high or less, much branched, densely whitish-sericeous; leaves linear or narrowly oblong, 4 to 8 mm. long, crowded and imbricate; corolla pale purple, the tube about equaling the calyx.

2. *Heliotropium angustifolium* Torr. U. S. & Mex. Bound. Bot. 137. 1859.

Coahuila to Tamaulipas and San Luis Potosí. Western Texas.

Plants fruticose or suffrutescent, slender, 30 cm. high or less, canescent-strigose; leaves 8 to 20 mm. long, spreading, sessile; corolla scarcely exceeding the calyx, the lobes acute.

3. *Heliotropium rugosum* Mart. & Gal. Bull. Acad. Brux. 11²: 336. 1844.

Type from plains of Ejutla, Oaxaca.

Plants fruticose, pilose; leaves lanceolate, petiolate, 3.5 cm. long attenuate at each end, rugose above; corolla scarcely exceeding the calyx.

4. *Heliotropium mexicanum* Greenm. Proc. Amer. Acad. 33: 484. 1898.

Chihuahua and Durango to Oaxaca and San Luis Potosí; type from Guanajuato.

Plants suffrutescent, 60 cm. high or less; leaves oblong-linear to linear-lanceolate, 1 to 5 cm. long, subsessile, strigose and hirtellous; corolla white, 5 to 6 mm. long.

5. *Heliotropium fruticosum* L. Syst. Nat. ed. 10. 913. 1759.

Sonora to Veracruz, Yucatán, and Oaxaca. West Indies; Central and South America.

Plants fruticose or suffrutescent, usually 60 cm. high or less, canescent-strigose; leaves linear to narrowly lanceolate, 1.5 to 5 cm. long; corolla white, about 5 mm. long. "Hierba de la mula" (Sinaloa); "hierba del loro" (El Salvador).

A decoction of the plant is employed in Sinaloa as a remedy for fevers.

6. *Heliotropium parviflorum* L. Mant. Pl. 2: 201. 1771.

Baja California and Sinaloa to Coahuila, Tamaulipas, Veracruz, Yucatán, and Puebla. Florida; West Indies; Central and South America.

Plants chiefly herbaceous but often suffrutescent below, 1 meter high or less, green, sparsely hirsute or hirtellous; leaves lanceolate to ovate, 3 to 10 cm. long, obtuse or acute, petiolate; spikes usually much elongate; corolla white, 2 mm. long or less. "Rabo de mico," "nemax" (Yucatán); "borraja" (El Salvador); "flor de alacrán" (Guatemala).

In Yucatán the plant is used as a remedy for nosebleed, diseases of the gums, and dysentery.

7. *Heliotropium jaliscense* Macbride, Proc. Amer. Acad. 51: 542. 1916.

Jalisco to Oaxaca; type from San Sebastián, Jalisco.

Plants fruticose or suffrutescent, green; leaves petiolate, lanceolate or lance-oblong, 5 to 10 cm. long, hispidulous; corolla 3.5 to 4 mm. long; fruit glabrous.

8. *Heliotropium coriaceum* Lehm. Act. Nov. Nat. Cur. 142: 810. 1829.

Chiapas.

Plants erect, fruticose; leaves short-petiolate or sessile, lance-oblong, 1.5 to 4.5 cm. long, acute, hispidulous above; corolla white, about 5 mm. long.

9. *Heliotropium pueblense* Standl., sp. nov.

Puebla; type from Tehuacán (*Rose, Painter & Rose* 9979; U. S. Nat. Herb. no. 453474).

Erect shrub; leaves linear or oblong-linear, subsessile, 6 to 20 mm. long, acute or obtuse, densely cinereous-strigose, the margins strongly revolute; peduncles 12 mm. long or less, bifid, the spikes few-flowered, less than 1 cm. long, the flowers sessile; calyx lobes lance-oblong, 1.5 mm. long, acute; corolla 2 to 2.5 mm. long, densely strigose outside.

Purpus 6502 from Tehuacán belongs to this species.

10. *Heliotropium calcicola* Fernald, Proc. Amer. Acad. 43: 62. 1907.

Heliotropium petraeum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 384. 1913.

Guerrero to Tamaulipas and Veracruz; type from Iguala Canyon, Guerrero, altitude 750 meters.

Shrub, 0.5 to 1.2 meters high; leaves subsessile, 2 to 6 cm. long, obtuse or acute, silvery-sericeous or strigose, more densely so beneath; branches of the cyme short or elongate; corolla white, 2 to 2.5 mm. long.

DOUBTFUL GENERA.

Rhabdia lycioides Mart. (= *Rotula aquatica* Lour.) is reported from Oaxaca by Hemsley. No North American specimens have been seen by the writer.

146. VERBENACEAE. Vervain Family.

Shrubs or trees, sometimes herbs; leaves usually opposite or verticillate, simple or digitately compound, estipulate; flowers perfect, usually irregular; calyx inferior, persistent, campanulate or tubular, 4 or 5-lobate or dentate;

corolla gamopetalous, the tube cylindric or ampliate above, often curved, the limb 4 or 5-lobate, often bilabiate; perfect stamens 4 or 2, attached to the corolla and alternate with the lobes; style simple, entire or shortly bilobate; fruit drupaceous or subcapsular, 2 or 4-celled.

Several genera are represented in Mexico only by herbaceous species.

Leaves digitately compound-----1. **VITEX**.

Leaves simple.

Flowers in heads, spikes, or racemes, rarely solitary in the leaf axils.

Fruit with 4 stout spines at apex-----2. **GHINIA**.

Fruit without spines.

Flowers racemose.

Calyx deeply lobate, strongly accrescent, blue; fruit dry--3. **PETREA**.

Calyx shallowly dentate, not blue; fruit fleshy.

Stigma bilobate; drupe containing 2 2-seeded nutlets.

4. **CITHAREXYLUM**.

Stigma 4-lobate; drupe containing 4 2-seeded nutlets.

5. **DURANTA**.

Flowers spicate or capitate.

Stamens 2; spikes terminal-----6. **VALERIANOIDES**.

Stamens 4; spikes or heads axillary and terminal.

Fruit dry-----7. **LIPPIA**.

Fruit fleshy-----8. **LANTANA**.

Flowers in cymes or panicles.

Fruit capsular; cymes very dense, headlike-----9. **AVICENNIA**.

Fruit drupaceous; cymes loose and open.

Nutlets of the fruit united.

Nutlets united to form a single stone-----10. **CORNUTIA**.

Nutlets cohering in pairs-----11. **CLERODENDRUM**.

Nutlets distinct.

Nutlet 1-----12. **PETITIA**.

Nutlets 4.

Branches of the style short, obtuse-----13. **CALLICARPA**.

Branches of the style subulate-----14. **AEGIPHILA**.

1. **VITEX** L. Sp. Pl. 638. 1753.

Shrubs or trees; leaves opposite, digitately compound, the leaflets entire; cymes axillary or in terminal panicles; calyx campanulate, 5-dentate; corolla tube short, the limb oblique, somewhat bilabiate, 5-lobate; stamens 4; fruit drupaceous.

Leaflets usually 3; corolla densely sericeous-pilose outside-----1. **V. mollis**.

Leaflets mostly 5; corolla sparsely puberulent or glabrate.

Leaflets densely tomentulose beneath.

Corolla about 12 mm. long, the throat villous-----2. **V. pyramidata**.

Corolla about 8 mm. long, the throat not villous-----3. **V. gaumeri**.

Leaflets glabrous beneath or nearly so-----4. **V. hemsleyi**.

1. **Vitex mollis** H. B. K. Nov. Gen. & Sp. 2: 245. 1817.

Vitex lasiophylla Benth. Bot. Voy. Sulph. 155. 1844.

Baja California to Chihuahua, Morelos, and Oaxaca; type from Chilpancingo, Guerrero.

Large or medium-sized tree, 18 meters high or less, the bark grayish or brown, shredded; leaves long-petiolate, the leaflets normally 3, rarely 5, oblong to oval-oblong, 12 cm. long or less, obtuse or rounded at apex, densely velu-

tinuous-pilose beneath; cymes few-flowered, axillary, long-pedunculate, densely pilose; corolla 1 cm. long; fruit globose, 1 to 2 cm. in diameter, bluish black. "Torete," "negro coyote," "tescalama" (Sinaloa); "ahuilote" (Jalisco, Colima); "agüilote" (Jalisco); "atuto" (Michoacán); "coyotomate" (Guerero, Colima); "uvalama" (Baja California, Durango, Sinaloa); "uvalano" (Jalisco); "obalamo" (Sinaloa); "ualama," "valama" (Durango); "agua-malarlo" (Tepic).

The fruit is edible and is often sold in the markets. A decoction of the fruit and leaves is employed as a remedy for diarrhoea.

2. *Vitex pyramidata* Robinson, Proc. Amer. Acad. 29: 321. 1894.

Sonora to Durango and Jalisco; type from Tequila, Jalisco.

Shrub or sometimes a large tree, usually 15 meters high or less; leaves long-petiolate, the leaflets elliptic to lance-oblong, 18 cm. long or less, rounded to acuminate at apex, obtuse or rounded at base, glabrate above, beneath densely and minutely grayish-tomentulose; flowers in paniced cymes, the panicles axillary, pyramidal, many-flowered, about as long as the leaves; fruit about 1 cm. in diameter. "Tescalama," "negrito coyote" (Sinaloa).

The fruit is edible.

3. *Vitex gaumeri* Greenm. Field Mus. Bot. 2: 260. 1907.

Yucatán; type from Izamal.

Tree, 10 to 15 meters high; leaflets 5 or 7, ovate to elliptic-oblong, 5 to 11 cm. long, usually short-acuminate, obtuse to subcordate at base, pale and tomentulose beneath; cymes in axillary panicles, many-flowered; flowers bright purple; fruit about 1.5 cm. in diameter. "Yaxnic" (Maya).

4. *Vitex hemsleyi* Briq. Bull. Herb. Boiss. 4: 347. 1896.

Oaxaca; type collected between Juquila and Tutapeque.

Leaflets 5, ovate-elliptic or elliptic-obovate, 8 to 12 cm. long, acuminate, obtuse or acute at base, glabrous, at least in age; cymes many-flowered; corolla 7 to 8 mm. long, villous in the throat.

2. *GHINIA* Schreb. Gen. Pl. 19. 1789.

Small shrubs or sometimes herbs; leaves opposite, petiolate, coarsely toothed; flowers in long, terminal and axillary racemes; calyx tubular, 5-costate; corolla with slender tube, the limb spreading, 5-lobate; stamens 4; fruit dry, hard, with 4 short stout spines at apex.

Corolla 6 to 7 mm. long; leaves scaberulous on the upper surface.

1. *G. curassavica*.

Corolla about 15 mm. long; leaves glabrous on the upper surface.

2. *G. euphrasiifolia*.

1. *Ghinia curassavica* (L.) Millsp. Field Mus. Bot. 2: 174. 1906.

Verbena curassavica L. Sp. Pl. 19. 1753.

Tamonea curassavica Pers. Syn. Pl. 2: 139. 1806.

Tamonea scabra Schlecht. & Cham. Linnaea 5: 99. 1830.

San Luis Potosí, Veracruz, and Yucatán. West Indies.

Low shrub, or sometimes herbaceous, 60 cm. high or less; leaves ovate or rhombic-ovate, 1 to 4 cm. long, obtuse or acute, coarsely crenate-serrate, sparsely scaberulous; calyx 4 mm. long.

2. *Ghinia euphrasiifolia* (Robinson) Standl.

Tamonea euphrasiifolia Robinson, Proc. Amer. Acad. 44: 613. 1909.

Type from Alta Mira, Tamaulipas.

Low much-branched shrub, the branchlets puberulent; leaves deltoid-ovate, 4 to 6 mm. long, puberulent beneath; calyx 6 mm. long.

3. *PETREA* L. Sp. Pl. 626. 1753.1. *Petrea arborea* H. B. K. Nov. Gen. & Sp. 2: 282. 1817.*Petrea mexicana* Schiede, Linnaea 6: 373. 1831.*Petrea ovata* Mart. & Gal. Bull. Acad. Brux. 11²: 329. 1844.

Guerrero to Tamaulipas, Veracruz, Yucatán, Tabasco, and Chiapas. Central and South America.

Large woody vine; leaves opposite, short-petiolate, elliptic-oblong to elliptic-oval or obovate-oblong, 4.5 to 14 cm. long, obtuse or acute, often subcordate at base, entire, coriaceous, scaberulous; flowers blue, in long pendent racemes; calyx tube very short, the lobes oblong or linear-oblong, in fruit 1.5 to 2 cm. long, blue, obtuse or acute; corolla funnelform, about 1 cm. long; fruit a small coriaceous indehiscent capsule. "Opp tzimin" (Yucatán, Maya); "toto-postillo," "soltero" (Oaxaca); "bejuco de caballo" (Yucatán, Veracruz); "raspa-sombrero," "jazmín," "coamecate azul" (Veracruz); "choreque" (Costa Rica); "buirá" (Panama); "hoja chigüe" (Nicaragua); "flor de Santa María" (Tabasco); "jazmín azul," "chaparrito" (Colombia); "adelfa," "flor de Jesús," "lengua de vaca," "Adolfina" (El Salvador).

The vine is an extremely showy one when in flower, and it (or *P. volubilis* L.) is sometimes cultivated as an ornamental plant under the name of "purple wreath." The tough stems are employed as a substitute for rope.

Petrea volubilis L. has been reported from Mexico but probably incorrectly.

4. *CITHAREXYLUM* L. Sp. Pl. 625. 1753.

Shrubs or trees; leaves opposite or ternate, entire or toothed; flowers small, in axillary or terminal racemes, rarely solitary in the leaf axils; calyx tubular-campanulate, truncate or 4 or 5-dentate, persistent in fruit; corolla tube cylindric, the limb 5-lobate, the lobes subequal; stamens 4; fruit drupaceous.

The fruits of some species are edible. The plants are used in domestic medicine, emmenagogue and pectoral properties being ascribed to them. Some species furnish hard strong wood, which is useful for various purposes. The following vernacular names are reported for plants of the genus whose specific identity is uncertain: "Chachalaca" (Michoacán); "naranjillo," "tepesi," "roble," "roble amarillo" (Veracruz); "comida de cuervo" (Durango).

Flowers solitary in the leaf axils or in 2 to 4-flowered racemes.

Leaves less than 1 cm. long-----1. *C. brachyanthum*.

Leaves 2 to 6 cm. long or more, glabrous or pubescent.

Leaves glabrous beneath or very minutely and obscurely puberulent.

2. *C. tetramerum*.

Leaves hirtellous or tomentose beneath.

Calyx in fruit 4 to 4.5 mm. long; leaves mostly rounded at base.

3. *C. altamiranum*.

Calyx in fruit 2 to 2.5 mm. long; leaves decurrent at base---4. *C. rosei*.

Flowers in elongate many-flowered racemes.

Leaves copiously hirtellous or pilose beneath with spreading hairs.

Leaves flabelliform, 13 mm. long or less, crenate-lobate.

5. *C. flabellifolium*.

Leaves never flabelliform, much larger, entire or serrate.

Leaves stellate-tomentose beneath-----6. *C. rugendasii*.

Leaves pubescent with simple hairs.

Flowers 9 to 15 mm. long.

Leaves densely hirtellous beneath; calyx 6 to 7 mm. long.

7. *C. kerberi*.

Leaves glabrous beneath except in the axils of the lateral nerves;

calyx 4 mm. long-----8. *C. trinerve*.

Flowers 8 mm. long or less.

Calyx lobes spreading, elongate, acuminate-----9. *C. incanum*.

Calyx lobes erect, short, obtuse, or the calyx truncate.

Leaves coriaceous when mature, prominently reticulate-veined;
racemes chiefly straight, not nodding-----10. *C. berlandieri*.

Leaves thin, not prominently reticulate; racemes usually curved
and nodding.

Calyx 5 mm. long; corolla tube not or scarcely exceeding the
calyx -----11. *C. bourgeaui*anum.

Calyx 3 mm. long; corolla tube conspicuously exceeding the
calyx-----12. *C. ovatifolium*.

Leaves glabrous beneath or very minutely and obscurely puberulent.

Corolla lobes finely puberulent outside.

Leaves very obtuse, rounded, or emarginate at apex, coriaceous, with
very prominent reticulate venation-----13. *C. ellipticum*.

Leaves mostly acute or acuminate, thin or coriaceous, the venation not
very prominent and reticulate.

Calyx 1.5 to 2 mm. long-----14. *C. glabrum*.

Calyx 3.5 to 4.5 mm. long.

Leaves very lustrous on the upper surface; branches subterete.

15. *C. lucidum*.

Leaves dull; branches sharply 4 or 6-angulate--16. *C. hexangulare*.

Corolla lobes glabrous outside, often ciliate.

Petioles 5 mm. long or less. Corolla lobes strongly ciliate.

17. *C. pringlei*.

Petioles mostly 1 to 4 cm. long.

Corolla 6 to 7 mm. long, the lobes eciliate or nearly so--18. *C. affine*.

Corolla 3.5 to 4 mm. long, the lobes strongly ciliate----19. *C. schottii*.

1. *Citharexylum brachyanthum* A. Gray, Syn. Fl. ed. 2. 2¹: 458. 1886.

Lycium brachyanthum A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 426. 1882.

Coahuila, Nuevo León, Zacatecas, and Hidalgo; type from Coahuila. Western Texas.

Shrub, 1 to 1.5 meters high, with stiff subspinescent branchlets; leaves linear-spatulate to obovate, subsessile, entire, puberulent or pubescent; flowers solitary or fasciculate; calyx about 2.5 mm. long, 5-dentate; corolla white, 4 mm. long; fruit 6 mm. in diameter.

2. *Citharexylum tetramerum* T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 390. 1909.

San Luis Potosí and Puebla; type from Cerro de Matzize, near San Luis Tlaxiutlanapa, Puebla.

Shrub, 2 to 4 meters high; leaves oblanceolate or oblong-oblanceolate, 2.5 to 6 cm. long, short-petiolate, obtuse or subacute, glabrous beneath or obscurely puberulent, glandular-punctate; flowers solitary or in 2 or 3-flowered racemes, 4-parted; calyx 2.5 mm. long; corolla white, 4 to 5 mm. long.

It is probable that the oldest name for this plant is *C. lycioides* D. Don.¹ That species was described from Mexico, no definite locality being given.

3. *Citharexylum altamiranum* Greenm. Field Mus. Bot. 2: 259. 1907.

Querétaro; type from Hacienda del Ciervo.

Leaves elliptic to suborbicular, 2 to 4 cm. long, obtuse or rounded at apex, usually entire, hirsute-pubescent; calyx 5-dentate; fruit 7 to 8 mm. long.

¹ Edinburgh New Phil. Journ. 11: 237. 1831.

4. *Citharexylum rosei* Greenm. Field Mus. Bot. 2: 260. 1907.

Type from San Pablo, Querétaro.

Leaves ovate or rhombic-ovate, 1 to 3 cm. long, obtuse, cinereous-tomentose beneath, entire; fruit 7 to 8 mm. long.

5. *Citharexylum flabellifolium* S. Wats. Proc. Amer. Acad. 24: 67. 1889.

Baja California and Sonora; type from Guaymas, Sonora.

Shrub, the branches terete; leaves rounded or truncate at apex, petiolate, hirtellous; calyx 6 mm. long, inclosing the fruit, the teeth subulate; corolla dark violet, 12 mm. long, the tube not exserted; fruit black, 4 to 6 mm. in diameter.

6. *Citharexylum rugendasii* Cham. Linnaea 7: 120. 1832.

?*Citharexylum rugendasii endlichii* Loesener, Repert. Sp. Nov. Fedde 9: 367. 1911.

Veracruz; type from Jalapa.

Medium-sized tree, the branches tetragonous; leaves ovate-oblong, 10 to 20 cm. long, 5 to 9 cm. wide, short-acuminate, rounded at base and decurrent, glabrous above, lustrous; racemes paniculate, erect; calyx 3 mm. long, hirtellous; corolla white, the tube longer than the calyx.

Schauer¹ states that *C. mocini* Don,² which was described from Mexico, differs only in its nodding racemes.

7. *Citharexylum kerberi* Greenm. Field Mus. Bot. 2: 188. 1907.

Type from Mexico, probably from Veracruz.

Branches terete or subtetragonous; leaves short-petiolate, elliptic, obovate, or oblong-oblong, 5 to 15 cm. long, acute or short-acuminate, scaberrulous above, densely hirtellous beneath; racemes terminal, 13 to 18 cm. long; calyx 6 to 7 mm. long, 5-dentate; corolla glabrous outside. "Aceitunillo."

8. *Citharexylum trinerve* Blake, Proc. Biol. Soc. Washington 34: 45. 1921.

Type from Xnocac, Yucatán.

Shrub 1.5 meters high; leaves oval or elliptic, 3 to 5.5 cm. long, obtuse or emarginate, short-cuneate at base, reticulate-veined, strongly 3-nerved; spikes 2.5 cm. long; corolla glabrous outside.

9. *Citharexylum incanum* Sessé & Moc.; Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Citharexylum scabrum Sessé & Moc.; Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Citharexylum cinaloanum Robinson, Bot. Gaz. 16: 342. 1891.

Sinaloa.

Leaves on long or short petioles, oval to oblong-ovate, 3 to 10 cm. long, rounded to acuminate at apex, rounded to acute at base and decurrent, entire or dentate, scabrous above, finely hirtellous beneath, with prominent reticulate venation; racemes terminal, solitary or paniculate, erect; calyx 2 mm. long; corolla puberulent outside.

The original descriptions of the two Sessé and Mocino species are incomplete, but both mention the recurved or spreading calyx teeth. The present plant is the only Mexican one seen by the writer which possesses this character.

10. *Citharexylum berlandieri* Robinson, Proc. Amer. Acad. 26: 174. 1891.

Sinaloa, Tamaulipas, San Luis Potosí, and Veracruz; type from Las Canoas, San Luis Potosí.

Shrub or tree, 2 to 9 meters high, the trunk sometimes 30 cm. in diameter, the branches pendent, tetragonous when young; leaves oblong to ovate or

¹ In DC. Prodr. 11: 614. 1847.

² Edinburgh New Phil. Journ. 11: 238. 1831.

rhombic, 3 to 8 cm. long, rounded to acuminate at apex, usually entire, rarely coarsely dentate, scabrous or pubescent above, usually velutinous-pubescent beneath; racemes mostly axillary and short; calyx 4 mm. long; fruit about 6 mm. long, at first yellow, black when mature. "Negrito," "orcajuela," "revienta-cabra" (Tamaulipas); "saúco hediondo" (Veracruz); "cacachila," "panochillo" (Sinaloa).

A decoction of the plant is administered as a remedy for colds. This species has been reported from Mexico as *C. villosum* Jacq.

11. *Citharexylum bourgeauianum* Greenm. Field Mus. Bot. 2: 185. 1907.

Veracruz; type from Orizaba.

Tree, the branchlets tetragonous; leaves oval-elliptic to oblong-lanceolate, 6 to 18 cm. long, acuminate, acute at base, entire, glabrous above or nearly so, finely hirtellous beneath; racemes terminal, solitary or paniculate, 20 cm. long or less; corolla white or pink.

12. *Citharexylum ovatifolium* Greenm. Proc. Amer. Acad. 32: 301. 1897.

Morelos, Hidalgo, and Oaxaca; type from Cuernavaca, Morelos.

Shrub or small tree, 2 to 6 meters high, the branchlets quadrangular; leaves ovate or elliptic, 4 to 12 cm. long, acute or acuminate, entire or more or less crenate-serrate, scabrid above, hirtellous beneath; racemes terminal or axillary, 10 cm. long or less.

One specimen which the writer has referred here with some doubt was determined originally as *C. sessei* Don.¹ The description of that species agrees fairly well with the specimens referred here, but it is too incomplete to permit a definite decision upon the subject.

13. *Citharexylum ellipticum* Sessé & Moc.; Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Veracruz; type from somewhere in Mexico.

Branchlets quadrangular; leaves short-petiolate, oblong to elliptic or broadly ovate, 3.5 to 9.5 cm. long, obtuse or acute at base; racemes elongate, erect; calyx 2 to 3 mm. long; fruit about 5 mm. in diameter.

14. *Citharexylum glabrum* (S. Wats.) Greenm. Proc. Amer. Acad. 32: 300. 1897.

Gonzalea glabra S. Wats. Proc. Amer. Acad. 25: 152. 1890.

Type from Lake Chapala, Jalisco.

Tree, 6 to 8 meters high, glabrous; leaves slender-petiolate, oblong or lance-oblong, 5 to 10 cm. long, narrowed to the obtuse or acute apex, obtuse or acute at base, entire; racemes 5 to 11 cm. long, nodding, dense; corolla 5 mm. long; flowers fragrant.

15. *Citharexylum lucidum* Schlecht. & Cham. Linnaea 5: 97. 1830.

Veracruz; type from Jalapa.

Glabrous throughout; leaves lanceolate to elliptic, 8 to 15 cm. long, acute at base, very lustrous above; racemes chiefly terminal, solitary or paniculate, erect; flowers white, fragrant.

By Schulz² *C. lucidum* is listed as a synonym of *C. caudatum* L., a West Indian species, but the Mexican plant appears to be specifically distinct.

¹ Edinburgh New Phil. Journ. 11: 238. 1831.

² In Urban, Symb. Antill. 6: 58. 1909.

16. *Citharexylum hexangulare* Greenm. Field Mus. Bot. 2: 187. 1907.

Veracruz. Guatemala; type from Cubilquitz, Alta Verapaz.

Glabrous shrub; leaves often ternate, lanceolate or oblong-lanceolate, 6 to 15 cm. long, usually acuminate, acute at base; racemes mostly terminal and paniculate, 10 to 20 cm. long.

17. *Citharexylum pringlei* Greenm. Proc. Amer. Acad. 41: 243. 1905.

Type from Trinidad Iron Works, Hidalgo, altitude 1,500 meters.

Shrub, 3 to 4.5 meters high, glabrous; leaves elliptic to lance-oblong, 3.5 to 7 cm. long, acute or obtuse-acuminate, entire, very lustrous above; racemes terminal, simple, nodding, 10 cm. long or less; corolla 5 cm. long.

18. *Citharexylum affine* Don, Edinburgh New Phil. Journ. 11: 238. 1831.

Citharexylum jurgenseni Briq. Bull. Herb. Boiss. 4: 342. 1896.

Citharexylum emrickianum Greenm. Field Mus. Bot. 2: 187. 1907.

Sinaloa to Oaxaca, Puebla, and Mexico; type from Chalco, Mexico (State).

Shrub or tree, 2 to 6 meters high, glabrous, the branchlets quadrangular and sometimes narrowly winged; leaves oblong to broadly rhombic-ovate, 5 to 20 cm. long, rounded to long-acuminate at apex, acute or obtuse at base, entire; racemes axillary or terminal, nodding, slender, often very long; flowers bluish or violet; fruit 6 to 10 mm. long. "Coral" (Guerrero); "chacalpezle" (Oaxaca); "cacachila" (Sinaloa).

19. *Citharexylum schottii* Greenm. Field Mus. Bot. 2: 190. 1907.

Yucatán; type from Mérida.

Glabrous shrub or tree; leaves lanceolate, 4 to 10 cm. long, obtuse-acuminate, acute at base; racemes numerous, slender, 12 cm. long or less; calyx 2.5 mm. long; fruits 5 to 7 mm. long.

This has been reported from Yucatán as *C. quadrangulare* Jacq.

DOUBTFUL SPECIES.

CITHAREXYLUM PAUCIFLORUM T. S. Brandeg. Zoe 5: 236. 1906.

5. *DURANTA* L. Sp. Pl. 637. 1753.

1. *Duranta repens* L. Sp. Pl. 637. 1753.

Duranta erecta L. Sp. Pl. 637. 1753.

Duranta plumieri Jacq. Stirp. Amer. 186. 1763.

Duranta xalapensis H. B. K. Nov. Gen. & Sp. 2: 255. 1817.

?*Duranta macrocarpa* H. B. K. Nov. Gen. & Sp. 2: 255. 1817.

Baja California and Sinaloa to Chiapas, Puebla, Veracruz, and Yucatán.

Widely distributed in tropical America.

Shrub or tree, 6 meters high or less, usually armed with spines, the branches slender, often drooping or trailing; leaves opposite or verticillate, short-petiolate, ovate-elliptic, oval, or obovate, 2 to 5 cm. long, obtuse, entire or serrate above the middle; finely pubescent or glabrate; flowers lilac or white, in long loose racemes; calyx tubular, 4 to 6 mm. long, minutely 5-dentate; corolla salverform, the limb 8 to 15 mm. broad; fruit globose, yellow, 7 to 11 mm. in diameter, inclosed in the accrescent calyx, this produced into a curved beak. "Espina blanca" (Veracruz); "xcambocoché" (Yucatán, Maya); "Adonis blanco," "Adonis morado," "garbancillo," "espino negro" (Colombia);

"celosa," "celosa cimarrona," "violetina" (Cuba); "espina de paloma" (Panama); "lluvia," "azota-caballo," "lila," "cuenta de oro" (Porto Rico); "pensamiento" (Nicaragua); "lora" (Panama); "heliotropio," "chulada" (El Salvador).

The fruit has been used as a febrifuge, and stimulant properties have been ascribed to the flowers.

6. VALERIANOIDES Medic. Phil. Bot. 1: 177. 1789.

Shrubs or herbs; leaves opposite or alternate, toothed; flowers spicate, sessile in the axils of bracts or imbedded in excavations in the thick rachis; calyx tubular, 5-lobate; corolla salverform or funnelform; stamens 2; fruit dry, included in the calyx, separating into 2 nutlets.

Spikes (excluding the corollas) 1 cm. or more in diameter, the flowers not closely appressed; style exserted.

Spikes about 20 cm. long-----1. *V. albiflorum*.

Spikes less than 12 cm. long.

Calyx very densely and minutely puberulent-----2. *V. luisanum*.

Calyx hirtellous or hirsute.

Bracts long-ciliate-----3. *V. acuminatum*.

Bracts not conspicuously ciliate-----4. *V. nelsonii*.

Spikes 7 mm. or less in diameter, the flowers closely appressed to the rachis; style usually not exserted.

Calyx usually glabrous; corolla blue-----5. *V. jamaicense*.

Calyx pubescent; corolla purplish or reddish-----6. *V. mutabile*.

1. *Valerianoides albiflorum* (DC.) Kuntze, Rev. Gen. Pl. 2: 510. 1891.

Stachytarpheta albiflora DC.; Schauer in DC. Prodr. 11: 567. 1847.

?*Stachytarpheta albiflora coerulea* Loesener, Repert. Sp. Nov. Fedde 9: 366. 1911.

Type from Oaxaca; reported from Hidalgo.

Shrub, the branches pubescent; leaves ovate or elliptic, large, contracted below and subsessile, acuminate, coarsely crenate, strigose above, canescent-tomentose beneath; calyx 10 to 14 mm. long; corolla white.

2. *Valerianoides luisanum* Standl., sp. nov.

Type from Barranca de Tlacuilosto, near San Luis Tlutiltanapa, Puebla (*Purpus* 2568; U. S. Nat. Herb. no. 840562).

Shrub, the branchlets densely puberulent; leaves alternate, short-petiolate, oblong-ovate or rhombic-ovate, 1.5 to 3 cm. long, obtuse or acute, abruptly decurrent at base, coarsely crenate-serrate, minutely scaberulous; spikes 4 to 7 cm. long, the rachis puberulent; bracts lanceolate, acuminate, shorter than the calyx, minutely canescent-scaberulous; calyx 1 cm. long, scaberulous, deeply cleft ventrally, bidentate at apex; corolla tube slender, glabrous, about equaling the calyx, the limb 12 mm. broad; style exserted.

3. *Valerianoides acuminatum* (DC.) Kuntze, Rev. Gen. Pl. 2: 510. 1891.

Stachytarpheta acuminata DC.; Schauer in DC. Prodr. 11: 570. 1847.

Oaxaca.

Plants suffrutescent; leaves oblong-ovate or elliptic-oblong, 4 to 7 cm. long, acute or obtuse, crenate-serrate, scaberulous or beneath hirtellous; calyx 8 mm. long; corolla violaceous.

4. *Valerianoides nelsonii* (Robins. & Greenm.) Standl.*Stachytarpheta nelsonii* Robins. & Greenm. Amer. Journ. Sci. 50: 162. 1895.

Type collected above Dominguillo, Oaxaca.

Shrub, the branchlets densely hirtellous; leaves ovate, 2.5 to 4 cm. long, acute, coarsely serrate-dentate, tomentose beneath; spikes 5 to 10 cm. long; calyx 8 mm. long; corolla purple.

Probably only a form of *V. acuminatum*.5. *Valerianoides jamaicense* (L.) Medic. Phil. Bot. 1: 178. 1789.*Verbena jamaicensis* L. Sp. Pl. 19. 1753.*Stachytarpheta jamaicensis* Vahl, Enum. Pl. 1: 206. 1804.

Guerrero to Veracruz and Yucatán. Widely distributed in the tropics of both hemispheres.

Plants essentially annual but sometimes suffrutescent, glabrous or nearly so; leaves petiolate, oblong to ovate, 2 to 8 cm. long, coarsely serrate-dentate; spikes 15 to 50 cm. long; corolla 8 to 11 mm. long. "Verbena azul" (Nicaragua).

The plant is a common tropical weed. It is said to have emetic, cathartic, anthelmintic, and emmenagogue properties, and is used in various localities as a remedy for intestinal worms, venereal diseases, ulcers, erysipelas, yellow fever, dropsy, and stomach affections. It has been reported to be poisonous to sheep. In Brazil the leaves have been employed for adulterating tea, and the dried leaves are said to have been exported to Europe under the name "Brazilian tea."

6. *Valerianoides mutabile* (Jacq.) Kuntze, Rev. Gen. Pl. 2: 510. 1891.*Verbena mutabilis* Jacq. Icon. Rar. pl. 207. 1786.*Stachytarpheta mutabilis* Vahl, Enum. Pl. 1: 209. 1805.*Stachytarpheta purpurea* Greenm. Field Mus. Bot. 2: 258. 1907.

Sinaloa to Guerrero, Veracruz, and Yucatán. Widely distributed in tropical regions.

Plants chiefly herbaceous but often suffrutescent; leaves broadly ovate to oblong-ovate or spatulate-ovate, 3 to 10 cm. long rounded to acuminate at apex, abruptly contracted below and decurrent, scaberulous, pubescent, or hirsute; spikes 10 to 30 cm. long or more, stout, pubescent; corolla 12 to 15 mm. long. "Verbena rosada" (Nicaragua); "rabo de zorro" (Colombia); "cola de alacrán," "verbena" (El Salvador).

Stachytarpheta purpurea is a hirsute form.7. *LIPPIA* L. Sp. Pl. 633. 1753.

Shrubs or small trees, sometimes herbs; leaves opposite or ternate, entire, toothed, or lobed; flowers capitate or spicate, small, bracteate; calyx small, ovoid, campanulate, or compressed, 2 or 4-dentate; corolla tube cylindric, the limb oblique, somewhat bilabiate, 4 or 5-lobate; stamens 4; fruit dry, 2-celled, included in the calyx.

Several herbaceous species occur in Mexico. The name "tehuacán" is said to be applied to some species of the genus in Tabasco and Yucatán.

Flowers in slender, elongate, more or less interrupted spikes.

Leaves entire-----1. *L. ligustrina*.Leaves crenate-----2. *L. wrightii*.Flowers 3 mm. long-----3. *L. macrostachya*.

Flowers 5 to 6 mm. long-----

Flowers capitate or in short, very dense spikes.

Bracts 4-ranked; heads somewhat elongate, at least in fruit.

Heads short-pedunculate, the peduncles mostly shorter than the petioles-----4. *L. palmeri*.

Heads long-pedunculate, the peduncles mostly longer than the petioles.

Leaves mostly 3.5 to 5 cm. long-----5. *L. graveolens*.

Leaves mostly 1.5 to 3.5 cm. long-----6. *L. berlandieri*.

Bracts irregularly imbricate in several ranks.

Bracts broad, accrescent in fruit, becoming membranaceous and prominently veined, the outer ones involucre-like.

Calyx hirsute with very long straight spreading hairs----7. *L. barbata*.

Calyx hirtellous with short hairs or puberulent or lanate.

Peduncles much shorter than the heads.

Heads in the axils of large leaves-----8. *L. chrysantha*.

Heads in interrupted, nearly naked spikes or racemes, the floral leaves reduced and bractlike-----9. *L. oaxacana*.

Peduncles longer than the heads, at least in anthesis.

Leaves 4.5 cm. long or less, usually obtuse.

Corolla limb about 8 mm. broad-----10. *L. formosa*.

Corolla limb about 2 mm. broad-----11. *L. nutans*.

Leaves mostly 6 to 15 cm. long, usually acute or acuminate.

Bracts purple-----12. *L. callicarpaefolia*.

Bracts not colored-----13. *L. umbellata*.

Bracts not or scarcely accrescent in fruit, not becoming membranaceous and prominently veined.

Heads commonly 4 or more at each node-----14. *L. myriocephala*.

Heads usually 1 or 2 at each node.

Leaves pinnatifid-----15. *L. appendiculata*.

Leaves crenate or serrate.

Leaves linear-oblong or oblong-lanceolate, 12 mm. wide or less.

Heads elongate in fruit; leaves 2.5 to 6 cm. long.

16. *L. stoechadifolia*.

Heads not elongate; leaves 1.5 cm. long or less--17. *L. fastigiata*.

Leaves oblong-ovate to broadly rhombic-ovate, usually more than 2 cm. wide.

Leaves thin, the pubescence all appressed; peduncles usually much longer than the petioles-----18. *L. dulcis*.

Leaves thick, the pubescence of the lower surface chiefly of spreading hairs; peduncles slightly if at all exceeding the petioles.

19. *L. geminata*.

1. *Lippia ligustrina* (Lag.) Britton, Trans. N. Y. Acad. Sci. 9: 181. 1890.

Verbena ligustrina Lag. Gen. & Sp. Nov. 18. 1816.

Lippia lycioides Steud. Nom. Bot. ed. 2. 2: 254. 1841.

Aloysia floribunda Mart. & Gal. Bull. Acad. Brux. 11: 320. 1844.

Sonora to Nuevo León, Puebla, and Zacatecas. Western Texas and southern Arizona.

Slender shrub, 1 to 4.5 meters high; leaves sessile, lance-oblong, 0.5 to 2.5 cm. long, acute or obtuse, scaberrulous, usually all entire but on young shoots sometimes serrate; spikes racemose; flowers sweet-scented, white or tinged with violet, 4 to 5 mm. long. "Vara dulce" (Nuevo León); "agrito" (Zacatecas); "jaboncillo" (Chihuahua); "jazmincillo" (Durango, Coahuila); "jasminillo," "vara dulce," "hierba dulce" (Durango); "huele de noche"

(Coahuila); "jaboncillo"¹ (Chihuahua, *Palmer*); "cabradora" (Texas); "vara blanca."

Employed in Coahuila as a remedy for diseases of the bladder.

A closely related species is *L. triphylla* (L'Hér.) Kuntze (*L. citriodora* H. B. K.), the lemon verbena, a native of South America but often cultivated in Mexican gardens. It is easily recognized by its much larger ternate leaves. In Mexico it is said to be known as "cedrón," "hierba Luisa," and "hierba de la princesa." The name "cedrón" is used also in South America, and in Peru the plant is known as "cedroncillo." In Mexico the plant is employed in domestic medicine as an antispasmodic and emmenagogue, and in other regions it is employed for various purposes. In southern Europe perfume has been manufactured from the leaves.

2. *Lippia wrightii* A. Gray, Amer. Journ. Sci. II. 16: 98. 1853.

Sonora to Coahuila, Zacatecas, and Durango. Western Texas to Arizona.

Shrub, 1 to 2 meters high; leaves petiolate, ovate to rounded-ovate, 6 to 15 mm. long, rounded at apex, rugose above and scabrous, canescent-tomentose beneath; flowers white. "Vara dulce," "altamisa" (Coahuila).

3. *Lippia macrostachya* S. Wats. Proc. Amer. Acad. 18: 134. 1883.

Coahuila to Tamaulipas and San Luis Potosí; type from mountains east of Saltillo, Coahuila.

Shrub, 1 to 2 meters high; leaves rounded-ovate to oblong-ovate, 1 to 4.5 cm. long, obtuse or rounded at apex, truncate or subcordate at base, canescent-tomentose beneath; spikes 18 cm. long or less; flowers pink.

4. *Lippia palmeri* S. Wats. Proc. Amer. Acad. 24: 67. 1889.

Baja California, Sonora, and Sinaloa; type from Guaymas, Sonora.

Shrub, 0.5 to 2 meters high, the pubescence of the branchlets appressed; leaves petiolate, ovate to rounded-ovate, 1 to 2.5 cm. long, obtuse or rounded at apex, usually decurrent at base, coarsely crenate, scaberulous; heads 13 mm. long or less; flowers white, turning to yellow or pink. "Orégano" (Sonora).

The leaves are used for flavoring meat. *L. palmeri spicata* Rose² described from La Paz, Baja California, is a form with spikes sometimes 2.5 cm. long.

5. *Lippia graveolens* H. B. K. Nov. Gen. & Sp. 2: 266. 1817.

Yucatán and Campeche; type from Campeche.

Shrub or small tree, sometimes 9 meters high; leaves petiolate, ovate-oblong or lance-oblong, obtuse or acute, rounded or subcordate at base, crenate, puberulent and glandular beneath; heads 4 to 6 at each node. "Orégano" (Yucatán).

6. *Lippia berlandieri* Schauer in DC. Prodr. 11: 575. 1847.

Coahuila to Tamaulipas, Veracruz, Oaxaca, and Sinaloa; type collected between Santander and Victoria, Tamaulipas.

Shrub, 1 to 2.5 meters high, the pubescence of the branchlets usually spreading; leaves petiolate, oblong to ovate or oval, obtuse or usually rounded at apex, rounded at base, crenate, densely pubescent beneath; heads 4 to 12 mm. long; flowers white. "Orégano" (Durango, Puebla, Guerrero, Coahuila); "salvia" (Puebla); "epazote," "epazotl" (Coahuila); "hierba dulce" (Hidalgo, Veracruz).

It is rather doubtful whether this differs in any important character from *L. graveolens*, but the Yucatán material available is insufficient to afford a

¹ Probably an error for "jazmincillo."

² Contr. U. S. Nat. Herb. 1: 75. 1890.

basis for definite conclusions. The leaves of *L. berlandieri* are employed for seasoning food. The plant is used in domestic medicine as a stimulant, emmenagogue, and demulcent.

7. *Lippia barbata* T. S. Brandeg. Proc. Calif. Acad. II. 2: 196. 1889.

Lippia montana T. S. Brandeg. Proc. Calif. Acad. II. 3: 163. 1891.

Baja California; type from La Giganta, near Comondú.

Shrub, 1 to 3.5 meters high; leaves petiolate, ovate or oblong-ovate, 2 to 5 cm. long, rounded to acute at apex and base, crenate, thick, rugose, very scabrous; heads rather lax, in fruit 2 to 3 cm. long, the bracts oblong; corolla 5 mm. long, yellow turning red.

8. *Lippia chysantha* Greenm. Proc. Amer. Acad. 39: 87. 1903.

Morelos and Chiapas; type from Yautepec, Morelos, altitude 1,350 meters.

Shrub, 1.5 to 2.5 meters high; leaves short-petiolate, lanceolate or lance-oblong, 4.5 to 8 cm. long, acute or obtuse, rounded or acute at base, finely crenate, hispidulous above, tomentose beneath; heads sessile or nearly so; bracts lanceolate or oblanceolate; corolla 5 to 6 mm. long, yellow.

9. *Lippia oaxacana* Robins. & Greenm. Amer. Journ. Sci. 50: 162. 1895.

Puebla, Guerrero, and Oaxaca; type from Las Joyas Canyon, Oaxaca, altitude 1,500 meters.

Shrub, 1 to 2.5 meters high; leaves short-petiolate, oblong-ovate to ovate-elliptic, 2 to 4.5 cm. long, acute to rounded at apex, obtuse or rounded at base, finely crenate, very rugose above, tomentose beneath; heads in terminal naked spikes; bracts rhombic-obovate, yellowish green; corolla 3 mm. long. "Canelilla" (Oaxaca).

10. *Lippia formosa* T. S. Brandeg. Proc. Calif. Acad. II. 3: 163. 1891.

Baja California; type from Bahía de Todos Santos.

Shrub, 2 to 4 meters high; leaves spatulate-ovate, obtuse, cuneate at base and nearly sessile, very coarsely crenate, scabrous; peduncles usually longer than the leaves, the heads 2 cm. broad, not elongate; corolla pink.

11. *Lippia nutans* Robins. & Greenm. Amer. Journ. Sci. 50: 162. 1895.

Puebla, Oaxaca, and Chiapas; type from Las Joyas Canyon, Oaxaca, altitude 1,350 meters.

Shrub, 1.5 to 2.5 meters high; leaves short-petiolate, ovate to elliptic or broadly ovate, 1.5 to 4.5 cm. long, acute or obtuse at base and apex, crenate, rugose and scabrous above, tomentose or hirtellous beneath; heads in fruit 3 cm. broad or less, not elongate, the bracts ovate, pale.

12. *Lippia callicarpaefolia* H. B. K. Nov. Gen. & Sp. 2: 268. 1817.

Lippia bicolor Kunth, Ind. Sem. Hort. Berol. 1845.

Lippia calocephala Zucc. Ind. Sem. Hort. Monac. 1846.

Lippia bracteosa Mart. & Gal. Bull. Acad. Brux. 11: 326. 1844.

Mexico, Morelos and Puebla; type collected near the City of Mexico.

Shrub, 1.5 to 4.5 meters high, the branches short-hirsute; leaves short-petiolate, ovate, 5 to 10.5 cm. long, acute, abruptly decurrent at base, crenate, rugose and scabrous above, canescent-tomentose beneath; peduncles very slender, numerous, the heads purple, about 2 cm. broad, the bracts broadly ovate, acute. "Salvia real" (Puebla, Ramírez); "rosa de Castilla" (Morelos).

13. *Lippia umbellata* Cav. Icon. Pl. 2: 75. pl. 194. 1793.

Lippia substrigosa Turcz. Bull. Soc. Nat. Moscou 1863²: 202. 1863.

Lippia pringlei Briq. Bull. Herb. Boiss. 4: 340. 1896.

Lippia chiapensis Loesener, Verh. Bot. Ver. Brandenb. 53: 78. 1911.

Lippia albicaulis Greenm. Field Mus. Bot. 2: 340. 1912.

Sinaloa and Durango to Chiapas, Mexico, Veracruz, and Yucatán. Central America.

Shrub or tree, 1.5 to 12 meters high; leaves short-petiolate, narrowly lanceolate to broadly ovate, 6 to 20 cm. long, obtuse to attenuate, acute to rounded at base, finely or coarsely crenate, scabrous or scaberulous above, usually tomentose beneath; heads very numerous, long-pedunculate, in fruit 1 to 2 cm. thick, the bracts commonly reniform or broadly ovate-cordate; flowers yellowish, turning red. "Nacare," "topozana" (Sinaloa); "tabaquillo" (Michoacán); "hierba de la mula" (Durango); "salvia," "rosa de Castilla"; "caragra" (Costa Rica); "seca-leche" (Guatemala, Honduras); "juanislama de monte" (Nicaragua); "oreganillo," "orégano montés" (El Salvador).

In Durango the plant is used as a remedy for colic. The numerous specimens at hand show considerable variation, especially in pubescence and size of heads, but there do not appear to be any well-marked characters by which it is possible to distinguish the proposed segregates.

14. *Lippia myriocephala* Schlecht & Cham. Linnaea 5: 98. 1830.

Lippia myriocephaloides Briq. Ann. Cons. Jard. Bot. Genève 4: 235. 1900.

Lippia hypoleia Briq. Ann. Cons. Jard. Bot. Genève 4: 236. 1900.

?*Lippia jurgenseni* Briq. Ann. Cons. Jard. Bot. Genève 4: 239. 1900.

?*Lippia yucatana* Loesener, Repert. Sp. Nov. Fedde 9: 364. 1911.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas; type material collected near Jalapa and Papantla, Veracruz. Guatemala and El Salvador.

Shrub or tree, 3 to 9 meters high; leaves short-petiolate, lanceolate or lance-oblong, 6 to 18 cm. long, usually long-acuminate, acute to attenuate at base, scaberulous or smooth above, sparsely puberulent or glabrate beneath or sometimes tomentose, entire or finely serrulate; heads numerous, on long slender peduncles, globose or somewhat elongate, 5 to 7 mm. thick; flowers lilac. "Palo de gusano" (Veracruz); "tatascamite" (Guatemala); "tatascame," "tamayagua," "oreganillo," "salvia" (El Salvador).

Lippia yucatana was described from Yucatán. The writer has seen no Yucatán specimens of *L. myriocephala*, and it may therefore be that *L. yucatana* is a distinct species, or possibly a synonym of *L. umbellata*.

15. *Lippia appendiculata* Robins. & Greenm. Proc. Amer. Acad. 29: 390. 1894.

Coahuila and Durango; type from Mapimi Desert, Durango.

Plants procumbent, suffrutescent, much branched; leaves lanceolate, 8 to 15 mm. long, grayish-strigose or scabrous; heads elongate in age, 2 cm. long or less; corolla purplish, 5 mm. long.

In general appearance the plant is like some of the species of *Verbena*.

16. *Lippia stoechadifolia* (L.) H. B. K. Nov. Gen. & Sp. 2: 265. 1817.

Verbena stoechadifolia L. Sp. Pl. 19. 1753.

San Luis Potosí, Veracruz, Oaxaca, and Yucatán. West Indies and northern South America.

Shrub, 0.5 to 2 meters high; leaves linear-oblong, coarsely dentate, stiff, strigose-scabrous; heads long-pedunculate, in fruit 1 to 2.5 cm. long, about 6 mm. thick; flowers pale lilac or whitish. "Té del país," "cabalyaxnic" (Yucatán); "poley" (Porto Rico).

17. *Lippia fastigiata* T. S. Brandeg. Proc. Calif. Acad. II. 2: 196. 1889.

Baja California; type from San Benito.

Densely branched shrub, 30 to 60 cm. high, cinereous-puberulent; leaves coarsely dentate, sessile, revolute; heads long-pedunculate, solitary; flowers pink or purple. "Damiana."

The leaves are much used as a substitute for Chinese tea.

18. *Lippia dulcis* Trevir. Nov. Act. Acad. Nat. Cur. 13¹: 187. 1826.

Tamaulipas, Veracruz, Morelos, Oaxaca, and Yucatán. Central America, West Indies, and Colombia.

Plants shrubby or suffrutescent, erect or procumbent, usually less than 60 cm. high; leaves long-petiolate, coarsely crenate, obtuse or acute, green; heads elongate in age, about 6 mm. in diameter; flowers white. "Hierba dulce" (Tamaulipas, Veracruz); "neuctixihuitl" (Nahuatl, *Ramírez*; "honey-herb"); "hierba buena" (Oaxaca, *Reko*); "orozuz" (Cuba, El Salvador, Costa Rica, Nicaragua); "orozul" (Nicaragua); "salvia santa," "corronchocho" (El Salvador).

Tea made from the plant is a common remedy for colic and colds.

19. *Lippia geminata* H. B. K. Nov. Gen. & Sp. 2: 2666. 1817.

Lantana lippioides Hook. & Arn. Bot. Beechey Voy. 305. 1839-40.

Sinaloa to Tamaulipas, Veracruz, and Oaxaca. West Indies; western Texas; Central and South America.

Shrub, usually a meter high or less; leaves short-petiolate, 3 to 6 cm. long, rounded to acute at apex, decurrent at base, scabrous above, crenate; heads somewhat elongate in fruit, 6 to 7 mm. thick; flowers pink or purple. "Hierba buena" (Jalisco, Veracruz, Oaxaca); "té del país" (Tabasco, *Roviroso*); "té de maceta," "té del pan" (Oaxaca, *Reko*); "mirto" (Tamaulipas); "hierba del negro" (Tamaulipas); "Juanilama," "juanislama" (Costa Rica, Guatemala, Nicaragua); "salvia" (Cuba); "sonora" (Sinaloa); "mas-tranto" (Panama).

The plant is reputed to have sudorific, antispasmodic, stomachic, and emmenagogue properties.

DOUBTFUL SPECIES.

LIPPIA AMERICANA L. Sp. Pl. 633. 1753. Type from Veracruz.

8. *LANTANA* L. Sp. Pl. 626. 1753.

Large or small shrubs; leaves opposite or ternate, toothed; flowers small, in dense axillary heads or spikes, bracteate; calyx small, truncate or sinuate-dentate; corolla tube cylindric, the limb 4 or 5-lobate; stamens 4; fruit a small drupe containing a 2-celled stone.

Outer bracts not involucre-like, linear or linear-lanceolate, not exceeding the inner ones, usually much shorter than the corolla tube; stems often prickly-----1. *L. camara*.

Outer bracts forming an involucre, ovate or lance-ovate or, if narrow, elongate and much exceeding the inner ones, usually almost or quite equaling the corolla tube; stems not prickly.

Heads not elongating during or after anthesis or scarcely so.

Leaves tomentose or pubescent beneath over nearly the whole surface, the pubescence chiefly spreading-----2. *L. involucrata*.

Leaves hispidulous-strigose beneath along the larger veins-----3. *L. hispida*.

Heads conspicuously elongate during and after anthesis.

Peduncles, at least most of them, equaling or much shorter than the leaves.

Leaves chiefly ternate, 7 to 15 cm. long; stems commonly hirsute.

4. *L. trifolia*.

Leaves chiefly opposite, 1.5 to 5 cm. long; stems strigose-----5. *L. canescens*.

Peduncles, all or most of them, twice as long as the leaves or longer.

Heads in anthesis 8 to 10 mm. thick-----6. *L. macropoda*.

Heads mostly 13 to 16 mm. thick-----7. *L. achyranthifolia*.

1. *Lantana camara* L. Sp. Pl. 627. 1753.*Lantana aculeata* L. Sp. Pl. 627. 1753.*Lantana horrida* H. B. K. Nov. Gen. & Sp. 2: 261. 1817.? *Lantana mollis* Graham, Edinburgh New Phil. Journ. 1829: 184. 1829.*Lantana hirsuta* Mart. & Gal. Bull. Acad. Brux. 11: 326. 1844.*Lantana polyacantha* Schauer in DC. Prodr. 11: 597. 1847.

Nearly throughout Mexico. Widely distributed in tropical America and naturalized in the Old World.

Shrub, 1 to 4 meters high, usually armed with stout recurved prickles; leaves rounded-ovate to oblong-ovate, 4 to 12 cm. long, acute or short-acuminate, sometimes obtuse, acute to subcordate at base, crenate, scabrous above, variously pubescent or occasionally glabrate beneath; heads not elongating; corolla yellow or orange, changing to red or purple, the tube about 1 cm. long; fruit black, 3 mm. long. "Hierba de Cristo" (Tamaulipas); "cinco negritos" (Veracruz, El Salvador, Guatemala, Nicaragua); "tres colores" (Michoacán, Guerrero); "zapotillo" (Oaxaca, *Seler*); "uña de gato" (Morelos); "palabra de mujer" (Sinaloa, Veracruz); "orozuz del país" (Veracruz); "alfombrilla hedionda" (Michoacán, *Ramírez*); "flor de San Cayetano" (Veracruz, Puebla, *Urbina*); "xo-hexnuc" (Yucatán, Maya); "siete colores" (Jalisco); "peonía negra" (Tamaulipas); "mora" (Colima; fruit); "matizadilla" (Oaxaca, Jalisco); "confituria" (Sonora, Sinaloa); "alantana," "lampana," "lantana" (Veracruz, etc.); "sonora roja," "sonora," "confite negro," "confite," "zarzamora" (Sinaloa); "corronchocho" (Guatemala); "sorrito" (Colombia); "cariaquillo," "poley cimarrón" (Porto Rico); "comida de paloma" (Guatemala, Honduras); "filigrana" (Cuba); "venturosa colorada" (Venezuela); "San Rafaelito" (Panama); "santo negrito," "cinco coloraditos" (El Salvador).

The lantana is a rather showy shrub when in flower and it is often planted for ornament and grown in hothouses. The plants bloom nearly all the year. This species has been introduced into most tropical countries, and in some of them, as in Hawaii, it has become a troublesome weed. The fruit is sweet and edible but not very palatable. A decoction of the leaves is sometimes employed as a remedy for rheumatism and as a tonic for the stomach. In Sinaloa the plant is a favorite remedy for snake bites, a strong decoction of the leaves being taken internally and a poultice of crushed leaves applied to the wound.

2. *Lantana involucrata* L. Cent. Pl. II. 22. 1756.*Lantana odorata* L. Syst. Nat. ed. 12. 418. 1767.*Lantana velutina* Mart. & Gal. Bull. Acad. Brux. 11: 325. 1844.

Nearly throughout Mexico. Florida, Texas, West Indies, and northern South America.

Shrub, 0.5 to 4 meters high; leaves ovate to oblong-ovate, elliptic, or rounded, 1 to 6 cm. long, rounded to acute at apex, finely or coarsely crenate, puberulent or tomentose beneath, usually scabrous above; peduncles longer or shorter than the leaves; corolla lilac or white, the tube 6 to 8 mm. long; fruit blue, 3 to 4 mm. long. "Orégano" (Tamaulipas); "tarepe" (Michoacán); "peonía colorada" (Tamaulipas); "confite" (Sinaloa); "cuasquito oloroso" (Nicaragua); "salvia santa," "orégano del monte" (Guatemala); "cariaquillo de Santa María," "Santa María" (Porto Rico); "hierba de la sangre," "filigrana cimarrona," "té de costa" (Cuba); "chiligüe," "cinco negritos" (El Salvador).

The flowers are fragrant and the whole plant, as in other species, has a strong aromatic odor. Palmer reports that in Tamaulipas pieces of the leaves or stems are put in the ears as a cure for deafness.

The only Mexican specimens which are exactly like the West Indian ones are those from Yucatán. In the West Indian plant the leaves are usually rounded at the apex and finely crenate, while in the common Mexican form (*L. velutina*) the leaves are more commonly acute or acutish, more coarsely crenate, and more copiously pubescent. There are, however, some intermediate forms, and it does not seem advisable to consider *L. velutina* a distinct species.

3. *Lantana hispida* H. B. K. Nov. Gen. & Sp. 2: 260. 1817.

?*Lantana hirta* Graham, Edinburgh New Phil. Journ. 2: 186. 1826.

Lantana teucrifolia Otto & Dietr. Allg. Gartenz. 9: 371. 1841.

Lantana geroldiana Otto & Dietr. Allg. Gartenz. 9: 372. 1841.

Veracruz, Puebla, Oaxaca, and Chiapas; type from Jalapa, Veracruz. Central America.

Shrub; leaves ovate-oblong to elliptic or ovate, 3 to 9 cm. long, acute or acuminate, acute or obtuse at base, crenate, scabrous above; peduncles equaling or shorter than the leaves; corolla lilac or white, the tube 5 to 6 mm. long. "Orozuz del país" (Veracruz); "toltolquelite" (Nicaragua).

Said to be used in Veracruz as a domestic remedy for tuberculosis.

4. *Lantana trifolia* L. Sp. Pl. 626. 1753.

Veracruz and Chiapas. West Indies; Central and South America.

Shrub; leaves lanceolate to ovate, acute to long-acuminate, decurrent at base, coarsely crenate, scabrous above, puberulent beneath; corolla lilac, the tube 5 to 6 mm. long; fruit purple, sweet, edible. "Filigrana de piña" (Cuba); "icaquito" (El Salvador).

5. *Lantana canescens* H. B. K. Nov. Gen. & Sp. 2: 259. 1817.

Coahuila to Tamaulipas, San Luis Potosí, Veracruz, and Yucatán. South America; type from Venezuela.

Shrub; leaves lanceolate to elliptic-ovate, acute or acuminate, finely crenate or subentire, densely strigose; heads 6 to 7 mm. thick; corolla white.

6. *Lantana macropoda* Torr. U. S. & Mex. Bound. Bot. 127. 1859.

Chihuahua, Coahuila, and Durango. Western Texas; type from the Rio San Pedro.

Shrub, 1 meter high or less; leaves oblong-ovate to broadly ovate, 1 to 4.5 cm. long, obtuse or acute, coarsely crenate-serrate, strigose; corolla white or purple.

7. *Lantana achyranthifolia* Desf. Cat. Pl. Paris. ed. 3. 392. 1829.

Lippia purpurea Jacq. Eclog. Amer. 1: 126. pl. 58. 1816. Not *Lantana purpurea* Hornem. 1815.

Lantana macropodioides Greenm. Field Mus. Bot. 2: 339. 1912.

Sonora and Chihuahua to Tamaulipas, Veracruz, and Chiapas. Central and South America.

Shrub, a meter high or less; leaves narrowly lanceolate to broadly ovate, mostly 4 to 8 cm. long, acuminate, coarsely and sharply serrate, densely strigose; corolla purple or whitish.

DOUBTFUL SPECIES.

LANTANA MULTICOLOR Lem. Fl. Serr. Jard. 3: Misc. 5. 1847. Described from cultivated plants grown from Mexican seeds. Perhaps a species of *Lippia*.

9. *AVICENNIA* L. Sp. Pl. 110. 1753.1. *Avicennia nitida* Jacq. Enum. Pl. Carib. 25. 1760.

In mangrove swamps along both coasts of Mexico, from Baja California and Tamaulipas southward. Widely distributed in tropical America.

Shrub or tree, sometimes 25 meters high, with a trunk 60 cm. in diameter; bark thin, dark brown, shallowly fissured; leaves opposite, short-petiolate, oblong or oblong-lanceolate, 5 to 10 cm. long, obtuse, acute at base, leathery, entire, green and glabrate above, beneath very minutely and densely white-puberulent; flowers in headlike axillary and terminal cymes; calyx campanulate, 5-lobate; corolla white, sericeous, the tube short, the limb 5-lobate, about 1 cm. broad; fruit an oblique 2-valvate capsule; wood hard, close-grained, dark brown, its specific gravity about 0.91. "Mangle blanco" (Veracruz, Oaxaca, Tabasco, Yucatán, Porto Rico, Cuba); "mangle prieto" (Cuba, Colombia); "mangle negro" (Cuba); "culumate" (Costa Rica); "chifle de vaca," "mangle bobo" (Porto Rico); "palo de sal" (Nicaragua, Costa Rica); "manglecito" (Colombia); "puyequé" (Sinaloa); "mangle," "mangle salado" (Panama); "árbol de sal," "istatén," "ishtatén" (El Salvador).

The wood is used for many purposes, and the bark is employed in tanning. The flowers are much sought by bees. The usual English name of the plant is "black mangrove."

10. *CORNUTIA* L. Sp. Pl. 628. 1753.

Shrubs or small trees; leaves opposite, entire or dentate; flowers small, violet, in cymes, these arranged in large terminal panicles; calyx small, campanulate, sinuate-dentate, not enlarged in fruit; corolla tube straight or curved, the limb 4-lobate; perfect stamens 2, 2 staminodia also present; fruit a small globose drupe.

Corolla minutely glandular-puberulent, the tube 2 mm. thick or less.

1. *C. pyramidata*.

Corolla villosulous, the tube about 3 mm. thick-----2. *C. grandifolia*.

1. *Cornutia pyramidata* L. Sp. Pl. 628. 1753.

Hosta latifolia H. B. K. Nov. Gen. & Sp. 2: 248. 1817.

Yucatán. West Indies and Central America.

Large shrub or small tree; leaves petiolate, ovate to rounded-ovate, 9 to 30 cm. long, acuminate, usually long-decurrent at base, densely and minutely pubescent; panicles thyrsiform, longer than the leaves; corolla tube slender, about 8 mm. long. "Palo cuadrado" (Panama); "hoja de zope," "hoja de jope" (Guatemala, Honduras); "pavilla" (Costa Rica); "cuatro caras" (Panama).

This species has been reported from elsewhere in Mexico, but the writer has seen only Yucatán specimens. Rovirosa reports it from Tabasco, where it may very likely occur, with the vernacular name "pangagé." The plant is said to yield a yellow dye.

2. *Cornutia grandifolia* (Schlecht. & Cham.) Schauer in DC. Prodr. 11: 682. 1847.

Hosta grandifolia Schlecht. & Cham. Linnaea 5: 97. 1830.

Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Small tree; leaves petiolate, ovate to broadly elliptic, 10 to 25 cm. long, acute or acuminate, decurrent at base, often dentate, usually densely pilose beneath; corolla tube stout, curved, 5 to 6 mm. long. "Pavilla" (Costa Rica).

DOUBTFUL SPECIES.

CORNUTIA LONGIFOLIA (H. B. K.) Spreng. Syst. Veg. 1: 39. 1825. *Hosta longifolia* H. B. K. Nov. Gen. & Sp. 2: 247. 1817. The type locality is given doubtfully as Mexico. The corolla is described as glabrous.

11. *CLERODENDRUM* L. Sp. Pl. 637. 1753.

Trees or shrubs, sometimes scandent; leaves opposite or ternate, entire or dentate; flowers large or small, in axillary or terminal cymes; calyx campanulate, truncate or 5-dentate; corolla tube straight or curved, the limb spreading, 4 or 5-lobate; stamens 4; fruit a globose or 4-lobate drupe, containing 4 nutlets.

Cymes axillary; leaves entire-----1. *C. ligustrinum*.
Cymes terminal; leaves sinuate-dentate-----2. *C. fragrans*.

1. *Clerodendrum ligustrinum* (Jacq.) R. Br.; Ait. Hort. Kew. ed. 2. 4: 64. 1812.

Volkameria ligustrina Jacq. Coll. Bot. Suppl. 118. pl. 5, f. 1. 1796.

Clerodendrum mexicanum T. S. Brandeg. Univ. Calif. Publ. Bot. 3: 391. 1909.

Aegiphila paludosa T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 191. 1915.

Tamaulipas, Veracruz, Yucatán, Campeche, Tabasco, Puebla, and Oaxaca.

Shrub, 1.5 to 3 meters high; petiole bases indurate and persistent; leaves ovate to elliptic-oblong, 4 to 10 cm. long, acute or acuminate, abruptly short-decurrent at base, glabrous or nearly so, punctate beneath; cymes pedunculate, few-flowered, sometimes longer than the leaves; calyx 6 to 8 mm. long; corolla white, the tube slender, about 1 cm. long, longer than the lobes; fruit about 1 cm. in diameter. "Muste" (Tabasco).

This has been reported from Yucatán as *C. aculeatum* (L.) Schlecht., but it is quite distinct from that West Indian species.

2. *Clerodendrum fragrans* Vent. Jard. Malm. 2: pl. 70. 1804.

Commonly cultivated in Mexico and sometimes naturalized; specimens seen from Nuevo León, Veracruz, and Yucatán. Native of southeastern Asia; cultivated and naturalized in tropical America.

Plants suffrutescent, 0.5 to 1.5 meters high; leaves long-petiolate, broadly deltoid-ovate or rounded-ovate, 10 to 30 cm. long, usually truncate at base; flowers in very dense terminal cymes, fragrant; corolla white, about 2.5 cm. long. "Bocamelia" (Oaxaca, El Salvador, Nicaragua); "metroceder" (Oaxaca, Reko); "jasmín de Amelia" (Guatemala); "camelia" (Panama); "viuda alegre" (El Salvador).

The form cultivated in tropical America has double flowers; it is *C. fragrans pleniflora* Schauer.¹

12. *PETITIA* Jacq. Enum. Pl. Carib. 1. 1760.

1. *Petitia oleina* (Benth.) Benth. & Hook; Hemsl. Biol. Centr. Amer. Bot. 2: 539. 1882.

Scleroon oleinum Benth. in Edwards, Bot. Reg. 29: Misc. 65. 1843.

Described from cultivated plants grown from Mexican seeds.

Shrub; leaves opposite, entire; flowers greenish white, in few-flowered axillary cymes; calyx campanulate, shortly 4-dentate; corolla funnelform, the limb 4-lobate; stamens 4; fruit a 4-celled drupe.

Known to the writer only from the original description.

¹In DC. Prodr. 11: 666. 1847.

13. *CALLICARPA* L. Sp. Pl. 111. 1753.

Shrubs or trees, the pubescence usually stellate; leaves opposite, serrate or entire; flowers small, in large axillary cymes; calyx short-campanulate, truncate or 4-dentate; corolla tube short, the limb spreading, 4-lobate, the lobes equal, imbricate; fruit drupaceous, globose or depressed, the endocarp separating into 4 or fewer nutlets.

Leaves obovate, very obtuse-----1. *C. parvifolia*.

Leaves lanceolate to ovate, acute or acuminate.

Leaves persistently but minutely stellate-pubescent on the upper surface.

2. *C. acuminata*.

Leaves glabrous on the upper surface except when very young.

Leaves densely stellate-tomentose beneath-----3. *C. pringlei*.

Leaves sparsely stellate-pubescent beneath-----4. *C. subpubescens*.

1. *Callicarpa parvifolia* Hook. & Arn. Bot. Beechey Voy. 305. 1839-40.

Type said to have come from Tepic.

Leaves coriaceous, 3.5 cm. long, short-petiolate, slightly crenate, glabrous above in age, densely grayish-tomentose beneath and reticulate-veined; peduncles equaling the petioles, the flowers capitate-cymose.

2. *Callicarpa acuminata* H. B. K. Nov. Gen. & Sp. 2: 252. 1817.

Tamaulipas, Veracruz, Yucatán, and Oaxaca. Guatemala to Colombia; type from Colombia.

Shrub or small tree, 1 to 6 meters high; leaves short-petiolate, ovate to oblong-serrate, lanceolate, 5 to 20 cm. long, entire or serrate, densely stellate-tomentulose beneath; cymes dense, many-flowered, usually less than half as long as the leaves; corolla white, about 3 mm. long; fruit black, 5 mm. in diameter. "Sac pukim" (Yucatán, Maya); "uvilla" (Tamaulipas); "vara del alcalde" (Honduras).

This is probably the plant reported as *C. americana* by Sessé and Mociño,¹ who state that its Totonac name is "patzahumacachil."

3. *Callicarpa pringlei* Briq. Bull. Herb. Boiss. 4: 345. 1896.

San Luis Potosí; type from Tamasopo Canyon.

Shrub, about 4.5 meters high, the young branches densely stellate-tomentose; leaves petiolate, lanceolate to ovate, 10 to 16 cm. long, serrate-dentate, thick, rugose above; cymes many-flowered, half as long as the leaves or shorter; corolla white, 3 to 4 mm. long; fruit about 4 mm. in diameter.

Rather doubtfully distinct from *C. acuminata*.

4. *Callicarpa subpubescens* Hook. & Arn. Bot. Beechey Voy. 305. 1839-40.

Type said to have come from Tepic.

Leaves petiolate, oblong-lanceolate, 5 cm. wide or less, attenuate at each end, serrate; peduncles equaling the petioles.

14. *AEGIPHILA* Jacq. Obs. Bot. 2: 3. 1764.1. *Aegiphila deppeana* Steud. Nom. Bot. ed. 2. 1: 29. 1840.

Aegiphila brachiata Schlecht. & Cham. Linnaea 6: 371. 1831. Not *A. brachiata* Vell. 1825.

Aegiphila pacifica Greenm. Proc. Amer. Acad. 33: 485. 1898.

Tepic and Veracruz; type from Estero (Tamaulipas?). Reported from Panama.

¹ Fl. Mex. 18. 1893.

Shrub or small tree, 2.5 to 7 meters high; leaves opposite, petiolate, ovate or oblong-ovate, 5 to 15 cm. long, acuminate, acute to rounded at base, entire, glabrate above, beneath tomentulose or glabrate; cymes in terminal panicles; calyx about 4 mm. long, obtusely 4-dentate; corolla white, glabrous, 10 to 12 mm. long, the tube ampliate above; fruit drupaceous, yellow, 6 to 8 mm. in diameter, the calyx persistent and cuplike at its base.

147. MENTHACEAE. Mint Family.

Shrubs or small trees or often herbs, usually aromatic; stems commonly quadrangular; leaves opposite or verticillate, simple; flowers perfect, irregular, small or large; calyx inferior, persistent, gamosepalous, 5-dentate or bilabiate; corolla gamopetalous, the limb 5-lobate or 4-lobate, usually bilabiate; stamens 4 or 2, attached to the corolla tube; style filiform, usually bifid at apex; fruit commonly of 4 small 1-seeded nutlets.

The family is often known by the name *Labiatae*. Several genera are represented in Mexico only by herbaceous species.

Fertile stamens 2.

Anther cells linear.

Upper lip of corolla spreading-----1. **RAMONA**.

Upper lip of corolla erect-----2. **SALVIA**.

Anther cells oblong.

Stamens distant, straight-----3. **CUNILA**.

Stamens ascending, converging, usually arcuate-----4. **POLIOMINTHA**.

Fertile stamens 4.

Calyx closed after anthesis.

Calyx gibbous, not inflated-----5. **SCUTELLARIA**.

Calyx not gibbous, inflated-----6. **SALAZARIA**.

Calyx open after anthesis.

Upper lip of the calyx decurrent upon the tube-----7. **OCIMUM**.

Upper lip of the calyx not decurrent.

Nutlets rugose-reticulate-----8. **TRICHOSTEMA**.

Nutlets smooth or granular.

Calyx bilabiate-----9. **CLINOPODIUM**.

Calyx not bilabiate, the 5 teeth equal or nearly so.

Stamens declined toward the lower lip of the corolla.

10. **HYPTIS**.

Stamens not declined.

Flowers in a terminal head-----11. **MONARDELLA**.

Flowers chiefly axillary, or in terminal racemes.

Leaves hastate; calyx campulate-----12. **SPHACELE**.

Leaves not hastate; calyx tubular-----13. **GARDOQUIA**.

1. **RAMONA** Greene, *Pittonia* 2: 235. 1892.

Low shrubs; leaves entire or crenate; flower clusters in interrupted spikes or sometimes paniculate; calyx bilabiate, the posterior lip entire or minutely 3-dentate, the anterior lip bifid; corolla tube equaling or longer than the calyx, the limb bilabiate; perfect stamens 2.

Bracts scarious-membranaceous, colored.

Leaves entire-----1. **R. pachystachya**.

Leaves crenulate-----2. **R. capitata**.

Bracts herbaceous.

Inflorescence thyrsoid-paniculate. Tube of the corolla shorter than the limb.
3. *R. polystachya*.

Inflorescence verticillate-spicate.

Corolla about 1 cm. long-----4. *R. stachyoides*.

Corolla nearly or fully 2 cm. long.

Outer bracts acute or short-mucronate-----5. *R. clevelandi*.

Outer bracts with long aristate tips-----6. *R. vaseyi*.

1. *Ramona pachystachya* (A. Gray) Heller, *Muhlenbergia* 1: 4. 1900.

Audibertia incana pachystachya A. Gray, *Syn. Fl.* ed. 2. 2¹: 461. 1886.

Audibertia pachystachya Parish, *Erythea* 6: 91. 1898.

Mountains of Baja California. California; type from San Bernardino Mountains.

Leaves spatulate, 2 to 4 cm. long, rounded at apex, attenuate at base to a slender petiole, minutely canescent-tomentulose or glabrate; inflorescence verticillate-spicate; bracts large, oval or rounded, purplish; corolla nearly 2 cm. long.

2. *Ramona capitata* (A. Gray) Briq. *Bull. Herb. Boiss.* 2: 440. 1894.

Audibertia capitata A. Gray, *Proc. Amer. Acad.* 7: 387. 1867.

Northwestern Sonora. Southern California; type from Providence Mountains.

Leaves oblong or ovate-oblong, 1 to 2 cm. long, obtuse, acute at base, slender-petiolate, very rugose, minutely tomentulose; flowers in terminal solitary heads, the bracts whitish; corolla nearly 2 cm. long.

3. *Ramona polystachya* (Benth.) Greene, *Pittonia* 2: 235. 1892.

Audibertia polystachya Benth. *Lab. Gen. & Sp.* 314. 1833.

Northern Baja California. California.

Shrub, about 1 meter high, densely white-tomentulose throughout; leaves lance-oblong, 5 to 8 cm. long, obtuse, acute at base; corolla white or nearly so, about 1 cm. long.

The white sage is a very common shrub in southern California and it is an important honey plant. The Indians of the region gather large quantities of the seeds, parch them, and grind them into meal in a mortar. The meal is stirred into water and salted, thus forming pinole, which is eaten or drunk.

4. *Ramona stachyoides* (Benth.) Briq. *Bull. Herb. Boiss.* 2: 440. 1894.

Audibertia stachyoides Benth. *Lab. Gen. & Sp.* 313. 1833.

Baja California. California.

Shrub, about 1 meter high; leaves oblong-lanceolate or oblanceolate, mostly 1.5 to 2.5 cm. long, obtuse, attenuate at base, glabrate and green above, tomentulose beneath; corolla white or lilac.

Known in California as "black sage"; like *R. polystachya*, an important honey plant.

5. *Ramona clevelandi* (A. Gray) Briq. *Bull. Herb. Boiss.* 2: 440. 1894.

Audibertia clevelandi A. Gray, *Proc. Amer. Acad.* 10: 76. 1874.

Northern Baja California. Southern California; type collected near San Diego.

Leaves oblong or lance-oblong, 2 to 7 cm. long, obtuse, acute at base, cinereous-tomentulose; bracts usually tinged with purple.

6. *Ramona vaseyi* (Porter) Briq. Bull. Herb. Boiss. 2: 440. 1894.

Audibertia vaseyi Porter, Bot. Gaz. 6: 207. 1881.

Northern Baja California. Southern California; type from San Diego County.

Leaves oblong or lance-oblong, 2 to 5 cm. long, obtuse, acute at base, cinereous-tomentulose beneath, often glabrate above.

2. *SALVIA* L. Sp. Pl. 23. 1753.

REFERENCE: Fernald, A synopsis of the Mexican and Central American species of *Salvia*, Proc. Amer. Acad. 35: 489-556. 1900.

Shrubs or herbs; leaves entire or toothed; flowers small or large, usually verticillate and racemose; calyx 2-lipped, the upper lip entire or 3-dentate, the lower bidentate; corolla conspicuously bilabiate; fertile stamens 2.

Many herbaceous species occur in Mexico, at least 100 or more. The best-known plant of the genus is *Salvia officinalis* L., the garden sage, a native of the Old World, whose aromatic leaves are used for flavoring food. Some of the herbaceous species are known in Mexico as "chia," and a favorite beverage, known by the same name, is prepared by soaking the mucilaginous seeds in water.

Calyx densely lanate with purplish wool.

Leaves linear-lanceolate; corolla white-----1. *S. leucantha*.

Leaves ovate, subcordate at base; corolla reddish.

Leaves very rugose, 2.5 to 4 cm. long; petioles 4 to 8 mm. long.

2. *S. lantanaefolia*.

Leaves scarcely rugose, 5 to 10 cm. long; petioles 1.5 to 2.5 cm. long.

3. *S. populifolia*.

Calyx not lanate or, if so, the wool not purplish.

A. Corolla commonly less than 2 cm. long, blue or white.

Bracts of the inflorescence large, persistent, firm, and leaflike.

Leaves 1.5 to 5 cm. long-----4. *S. nelsonii*.

Leaves mostly 7 to 15 cm. long.

Leaves tomentose beneath-----5. *S. shannoni*.

Leaves glabrous beneath except along the costa-----6. *S. collinsii*.

Bracts small, never leaflike, usually deciduous.

B. Leaves oblong or lanceolate or, if ovate, not cordate at base.

Calyx densely lanate.

Leaves crenulate-----7. *S. confinis*.

Leaves coarsely dentate-----8. *S. californica*.

Calyx canescent, pubescent, or tomentose, not lanate.

C. Leaves entire or essentially so.

Leaves sessile or subsessile, narrowly oblong or linear, strongly revolute.

Leaves linear, glabrous above; calyx glabrate--9. *S. fasciculata*.

Leaves narrowly oblong, tomentulose above; calyx glandular-pilose-----10. *S. coulteri*.

Leaves, except sometimes the uppermost, petiolate.

Leaves usually narrowly triangular-ovate, truncate at base.

11. *S. candicans*.

Leaves narrowly ovate or oblong, attenuate or rounded at base.

Calyx lobes obtuse.

Calyx glandular-pubescent-----12. *S. thymoides*.

Calyx without glandular pubescence---13. *S. chionophylla*.

Calyx lobes acuminate.

Leaves ovate or ovate-oblong, 3 to 7 mm. long, all slender-petiolate-----14. *S. serpyllifolia*.

Leaves oblong, 10 to 25 mm. long, the uppermost subsessile.

Leaves finely stellate-pubescent, at least when young.

15. *S. coahuilensis*.

Leaves glabrous-----16. *S. lycioides*.

CC. Leaves crenate or crenate-serrate.

Calyx lobes becoming much broadened in age, the calyx funnelform.

Leaves green above, usually rugose, regularly crenate.

Calyx finely and closely tomentose-----17. *S. ballotaeiflora*.

Calyx loosely and coarsely stellate-tomentose.

18. *S. ramosa*.

Leaves very pale on both surfaces, irregularly crenate.

19. *S. platycheila*.

Calyx lobes not broadened in age or scarcely so.

Mature leaves glabrous-----20. *S. similis*.

Mature leaves pubescent on one or both surfaces.

Pubescence of the leaves of stellate hairs.

Stems very densely and finely white-tomentulose; verticels

6 to 10-flowered-----21. *S. cedrosensis*.

Stems thinly stellate-tomentose; verticels 2 to 6-flowered.

22. *S. chamaedryoides*.

Pubescence of the leaves not stellate.

Leaves obtuse, densely viscid-pubescent on the upper surface.

23. *S. purpusii*.

Leaves acuminate, glabrous or nearly so on the upper surface.

Upper leaves sessile; flowers cymose-paniculate.

24. *S. dasycalyx*.

Upper leaves long-petiolate; inflorescence racemose.

25. *S. fallax*.

BB. Leaves ovate or broadly ovate, usually cordate at base.

Leaves glabrous beneath or sparsely puberulent along the nerves.

4. *S. nelsonii*.

Leaves, at least when young, densely pubescent or tomentose beneath.

D. Leaves stellate-pubescent beneath, at least when young.

Calyx densely white-lanate-----26. *S. rubropunctata*.

Calyx stellate-tomentose, not lanate except sometimes at base.

Leaves 1 to 1.5 cm. long-----27. *S. fruticulosa*.

Leaves 2 to 6 cm. long.

Branchlets and nerves of young leaves with sulphur-yellow tomentum-----28. *S. konzattii*.

Branchlets and lower surface of leaves with white tomentum.

Leaves broadly ovate, sharply crenate-dentate; calyx lobes obtuse-----29. *S. pruinosa*.

Leaves oblong-ovate, obtusely crenate; calyx lobes acute.

30. *S. goldmani*.

DD. Leaves white-tomentose beneath with simple hairs.

E. Leaves very rugose above, usually broadly ovate, obtuse.

Pedicels very short, 3 mm. long or less; racemes rather dense;

calyx in anthesis 4 to 5 mm. long.

Calyx glandular-villous-----31. *S. scordoniaefolia*.

- Calyx without glandular pubescence.
 Pubescence of the corolla glandular-----32. *S. dugesii*.
 Pubescence of the corolla chiefly eglandular.
 33. *S. lasiantha*.
 Pedicels 3 to 9 mm. long; racemes loosely flowered; calyx in
 anthesis 6 mm. long or more.
 Calyx purplish violet, glandular-villous, in anthesis nearly 10
 mm. long-----34. *S. semiatrata*.
 Calyx green or blue-tinged, glandular-puberulent and minutely
 hispidulous on the nerves, in anthesis about 6 mm. long.
 Leaves oblong or narrowly ovate-----35. *S. rupicola*.
 Leaves broadly ovate-----36. *S. gonzalezii*.
 EE. Leaves only slightly rugose, narrow-ovate, mostly acuminate.
 Flowers in small cymes, these arranged in a terminal thyrses.
 37. *S. thyrsiflora*.
 Flowers in simple or branched racemes.
 Branches pubescent with soft ascending hairs.
 38. *S. multiramea*.
 Branches short-pilose with recurved-spreading hairs.
 Calyx tubular, in fruit 5 mm. long, the tube 4 times as
 long as the lobes-----39. *S. alamosana*.
 Calyx campanulate, in fruit 6 to 7 mm. long, the tube twice
 as long as the lobes-----40. *S. chapalensis*.
 AA. Corolla 2 to 12 cm. long, variously colored, often scarlet or yellow.
 Corolla yellow.
 Flowers axillary, solitary-----41. *S. aspera*.
 Flowers racemose-----42. *S. chrysantha*.
 Corolla not yellow.
 Calyx inflated-campanulate. Corolla scarlet.
 Stems viscid-hirsute-----43. *S. adglutinans*.
 Stems not viscid-hirsute.
 Leaves chiefly ovate-lanceolate to oblong, cuneate or narrowed at
 base-----44. *S. sessei*.
 Leaves broadly ovate to orbicular.
 Leaves pubescent beneath on the nerves, 4 cm. long or less;
 branches glabrate-----45. *S. regla*.
 Leaves tomentose beneath, usually more than 4 cm. long;
 branches tomentose or puberulent.
 Branches tomentose-----46. *S. pubescens*.
 Branches puberulent-----47. *S. muralis*.
 Calyx tubular-campanulate, not inflated.
 F. Corolla ventricose, the tube straight.
 G. Leaves 1 to 4 cm. long.
 Flowers axillary-----48. *S. disjuncta*.
 Flowers in terminal racemes.
 Leaves narrowly oblong to linear-oblong-----49. *S. greggii*.
 Leaves ovate or broadly oblong.
 Pubescence of branches and leaves stellate---50. *S. oaxacana*.
 Pubescence of branches and leaves simple.
 Calyx glabrous, or barely puberulent at base---51. *S. oresbia*.
 Calyx hispidulous on the nerves.
 Leaves glabrous or glabrate beneath---52. *S. grahami*.

Leaves pubescent beneath.

Leaves mostly less than 2 cm. long—53. *S. microphylla*.

Leaves usually more than 2 cm. long.

Corolla 3.2 to 3.5 cm. long—54. *S. schaffneri*.

Corolla 2.5 to 2.7 cm. long.

Leaves thin, hardly rugose, subacuminate.

55. *S. lemmoni*.

Leaves rugose, usually rounded at apex.

56. *S. neurepia*.

GG. Leaves larger, all except the smallest more than 4 cm. long.

Leaves glabrous beneath or nearly so

Calyx herbaceous, the tube becoming corrugated, the lobes subequal—57. *S. pringlei*.

Calyx less herbaceous, the tube not corrugated, the lobes unequal.

Leaves cuneate or obtuse at base—58. *S. involucrata*.

Leaves mostly cordate at base—59. *S. pulchella*.

Leaves pubescent beneath.

Corolla 2.5 to 2.7 cm. long—60. *S. adenophora*.

Corolla 4 to 6 cm. long

Leaves densely white-tomentose beneath, finely crenate-serate; calyx glandular-puberulent—61. *S. fulgens*.

Leaves pilose beneath on the nerves, coarsely crenate; calyx not at all or very minutely glandular-puberulent.

62. *S. orizabensis*.

FF. Corolla not ventricose, the tube straight or curved.

Leaves cuneate or narrowed at base.

Leaves pubescent beneath; corolla rose-purple.

Corolla 1.5 to 1.8 cm. long.

Leaves ovate or oblong-ovate—63. *S. chiapensis*.

Leaves oblong-lanceolate—64. *S. antennifera*.

Corolla 2.5 to 4 cm. long—65. *S. curviflora*.

Leaves glabrous beneath; corolla red—66. *S. miniata*.

Leaves rounded or cordate at base.

Leaves cordate at base.

Corolla purple or pink—67. *S. aristulata*.

Corolla scarlet.

Calyx in anthesis 1 cm. long—68. *S. cyclophylla*.

Calyx 1.7 to 2 cm. long—69. *S. incana*.

Leaves rounded or rounded-truncate at base, not definitely cordate.

Leaves lanceolate, 10 to 15 cm. long—70. *S. perlonga*.

Leaves ovate or ovate-lanceolate, shorter.

G. Corolla purple or flesh-colored.

H. Leaves glabrous or minutely puberulent beneath.

Branches canescent-velutinous; flower clusters 2-flowered—71. *S. graciliflora*.

Branches slightly pilose, puberulent, or glabrous; flower clusters several or many-flowered.

Glands (2) usually present at base of petiole; corolla 2 to 2.7 cm. long—72. *S. purpurea*.

Glands absent; corolla 2.5 to 4 cm. long—73. *S. littae*.

HH. Leaves more or less pilose or tomentose beneath.

Pubescent stellate.

Calyx 12 to 13 mm. long-----74. *S. rosei*.

Calyx 5 mm. long-----75. *S. arbuscula*.

Pubescence not stellate.

Leaves merely pilose beneath.

Leaves broadly ovate; corolla deep purple-violet.

76. *S. iodantha*.

Leaves ovate-lanceolate; corolla flesh-colored.

77. *S. michoacana*.

Leaves velutinous or lanate beneath.

Leaves serrate; calyx lobes broad, mucronate.

78. *S. nervata*.

Leaves crenate; calyx lobes long-acuminate.

79. *S. karwinskii*.

GG. Corolla scarlet or vermillion.

Calyx lips unequal, the upper one produced into a subulate awn, the lower one short-----80. *S. cinnabarina*.

Calyx lips subequal.

Calyx lobes subulate-tipped-----81. *S. elegans*.

Calyx lobes not subulate-tipped.

Bracts 2 to 3 cm. long, persistent----82. *S. mollissima*.

Bracts smaller, deciduous-----83. *S. coccinea*.

1. *Salvia leucantha* Cav. Icon. Pl. 1: 16. *pl.* 24. 1791.

Salvia bicolor Sessé & Moc. Pl. Nov. Hisp. 8. 1887.

Zacatecas to Puebla and Morelos.

Plants chiefly herbaceous, sometimes suffrutescent below; leaves short-petiolate, 5 to 17 cm. long, attenuate, crenulate, green above, tomentose beneath; flowers in long racemes; calyx nearly 1 cm. long, covered with beautiful purple wool; corolla about 18 mm. long.

2. *Salvia lantanaefolia* Mart. & Gal. Bull. Acad. Brux. 11²: 69. 1844.

Puebla; type from Tehuacán.

Shrub; leaves obtuse, green above, tomentose beneath; flowers in dense racemes; calyx about 1 cm. long.

3. *Salvia populifolia* Fernald, Proc. Amer. Acad. 35: 530. 1900.

Type from Bolaños, Jalisco.

Shrub; leaves acute, crenulate, green and glabrate above, whitish-tomentose beneath; calyx in anthesis about 18 mm. long, the lobes acuminate; corolla 3.5 cm. long.

4. *Salvia nelsonii* Fernald, Proc. Amer. Acad. 35: 527. 1900.

Salvia albicans Fernald, Proc. Amer. Acad. 36: 501. 1901.

Guerrero, Puebla, and Morelos; type collected between Acatlán and Piaxtla, Puebla.

Shrub, 2.5 to 5 meters high, the branches cinereous-puberulent; leaves ovate, acute or acuminate, rounded at base, serrulate, finely canescent-puberulent; flowers in dense spikelike racemes; calyx 8 mm. long, densely white-tomentose, the lobes obtuse; corolla about 14 mm. long, blue and white.

5. *Salvia shannoni* Donn. Smith, Bot. Gaz. 19: 256. 1894.

Oaxaca and Chiapas. Guatemala; type from Volcán Chingo.

Shrub; leaves lanceolate to ovate, obtuse or cordate at base, acuminate, serrate or crenate-serrate, green above; racemes very thick and dense, the bracts purplish; calyx about 1 cm. long, the lobes acute.

6. *Salvia collinsii* Donn. Smith, Bot. Gaz. 61: 386. 1916.

Type from Pantepec, Chiapas.

Shrub, 1 to 1.5 meters high; leaves lance-oblong, long-acuminate, obtuse or acute at base, serrate, green and glabrous above, pale beneath; calyx 7 to 8 mm. long, green, the lobes acute; corolla white.

7. *Salvia confinis* Fernald, Proc. Amer. Acad. 35: 523. 1900.

Sonora. Type from Fort Huachuca, Arizona.

Branches stellate-canescant; leaves oblong, 1.5 to 4.5 cm. long, obtuse or acutish, canescant; racemes spikelike, 1 to 4 cm. long; corolla blue, scarcely 1 cm. long.

8. *Salvia californica* T. S. Brandeg. Proc. Calif. Acad. II. 2: 197. 1889.

Baja California; type from Calmalli.

Shrub, 1 meter high or less, densely stellate-tomentose; leaves sessile, ovate-elliptic, 18 mm. long or less, with few coarse spreading teeth; racemes interrupted, spikelike; corolla blue.

9. *Salvia fasciculata* Fernald, Proc. Amer. Acad. 45: 54. 1904.

Type from mountains near Oaxaca.

Shrub; leaves 1 to 2.5 cm. long, canescant beneath, strongly revolute; racemes 1 to 3 cm. long; calyx tubular-campanulate, in anthesis 4 mm. long, minutely stellate-pubescent; corolla purplish, 8 mm. long.

10. *Salvia coulteri* Fernald, Proc. Amer. Acad. 35: 519. 1900.

Type from somewhere in Mexico.

Leaves 1 to 1.5 cm. long, stellate-tomentulose, obtuse, revolute; racemes 2 to 3 cm. long; calyx 6 to 7 mm. long, the teeth lance-subulate; corolla 12 mm. long.

11. *Salvia candicans* Mart. & Gal. Bull. Acad. Brux. 11¹: 61. 1844.

Puebla; type from Tehuacán.

Shrub, 2 meters high or less; leaves 1 to 3 cm. long, obtuse, coriaceous, very densely stellate-tomentose, at least beneath; racemes short, dense; calyx 5 to 8 mm. long, densely stellate-tomentose; corolla 8 to 13 mm. long.

12. *Salvia thymoides* Benth. Lab. Gen. & Sp. 255. 1834.

Puebla and Oaxaca; type from Mitla, Oaxaca.

Slender shrub, usually about 30 cm. high; leaves mostly 4 to 7 mm. long, obtuse, stellate-tomentulose or glabrate; racemes slender, elongate, interrupted; calyx 5 to 6 mm. long; corolla about 13 mm. long.

13. *Salvia chionophylla* Fernald, Proc. Amer. Acad. 43: 64. 1907.

Type from Chojo Grande, 27 miles southeast of Saltillo, Coahuila.

Stems fruticose, decumbent, stellate-canescant; leaves 5 to 15 mm. long, rounded at apex, minutely stellate-tomentulose, whitish; racemes 5 to 10 mm. long, interrupted; calyx 6 to 9 mm. long; corolla 1.5 cm. long, blue and white.

14. *Salvia serpyllifolia* Fernald, Proc. Amer. Acad. 35: 521. 1900.

Type from San Luis Potosí.

Stems short-pubescent with white, spreading or recurved hairs; racemes 10 to 20 cm. long, interrupted; calyx short-hispidulous; corolla 12 mm. long.

15. *Salvia coahuilensis* Fernald, Proc. Amer. Acad. 35: 520. 1900.

Coahuila; type from Saltillo.

Plants 70 cm. high or less, woody below, the stems stellate-puberulent or glabrate; racemes 5 to 35 cm. long, interrupted; calyx puberulent, 6 to 8 mm. long; corolla 1.5 cm. long, blue.

16. *Salvia lycioides* A. Gray, Proc. Amer. Acad. 21: 408. 1886.

Santa Eulalia Mountains of Chihuahua.

Slender shrub, the branches sparsely puberulent or glabrate; leaves mostly obtuse; racemes slender, elongate, interrupted; calyx 6 to 8 mm. long; corolla nearly 2 cm. long.

17. *Salvia ballotaeflora* Benth. Lab. Gen. & Sp. 270. 1834.

Salvia laxa Benth. Lab. Gen. & Sp. 270. 1834.

Salvia ballotaeflora eulaliae Fernald, Proc. Amer. Acad. 35: 522. 1900.

Chihuahua to Zacatecas, Hidalgo, and Tamaulipas; type from Tolimán (Querétaro?). Western Texas.

Low shrub; leaves broadly deltoid-ovate, 1 to 3 cm. long, obtuse, densely stellate-tomentose beneath, usually truncate at base but rarely subcordate; racemes short, few-flowered; calyx 5 to 9 mm. long, the lobes very obtuse; corolla about 12 mm. long. "Engorda-cabra" (Zacatecas); "crespa" (San Luis Potosí); "mejorana" (Texas, Chihuahua); "mejorana del país" (Chihuahua).

S. ballotaeflora eulaliae is a form with large leaves (3 cm. long).

18. *Salvia ramosa* T. S. Brandeg. Zoe 5: 255. 1908.

Type from Tlacuilotepec, Puebla.

Shrub; leaves 1 cm. long or less, obtuse or rounded at apex, very rugose, finely stellate-puberulent, green above; racemes elongate, interrupted; calyx 4 to 5 mm. long; corolla about 7 mm. long.

19. *Salvia platycheila* A. Gray, Proc. Amer. Acad. 8: 292. 1870.

Carmen Island, Baja California.

Shrub; leaves slender-petiolate, 2 to 4.5 cm. long, very obtuse, very minutely and densely tomentulose; racemes short or elongate, interrupted; calyx 8 to 12 mm. long, minutely tomentulose; corolla nearly 2 cm. long.

20. *Salvia similis* T. S. Brandeg. Zoe 5: 108. 1901.

Baja California; type from mountains of the Cape Region.

Much-branched shrub, 1 to 3 meters high, the stems minutely canescent-tomentulose; leaves ovate, 2.5 to 7.5 cm. long, coarsely crenate-serrate, minutely stellate-tomentulose when young but soon glabrous; racemes short, dense; calyx 5 to 7 mm. long; corolla pale blue.

21. *Salvia cedrosensis* Greene, Bull. Calif. Acad. 1: 212. 1885.

Baja California; type from Cedros Island.

Low shrub; leaves slender-petiolate, ovate or broadly ovate, 2.5 cm. long or less, obtuse or acute, crenate, sparsely stellate-pubescent in age; racemes short or elongate, interrupted; calyx 5 to 7 mm. long, violet.

22. *Salvia chamaedryoides* Cav. Icon. Pl. 2: 77. pl. 197. 1793.

Salvia chamaedrifolia Andrews, Bot. Rep. 6: pl. 416. 1805 (?).

Salvia chamaedrys Willd. Hort. Berol. 1: 29. pl. 29. 1816.

Salvia chamaedryoides isochroma Fernald, Proc. Amer. Acad. 35: 522. 1900.
Zacatecas and San Luis Potosí to Mexico.

Low shrub, usually about 40 cm. high; leaves 1 to 3.5 cm. long, obtuse, finely crenate, canescent-tomentose, sometimes green above; racemes elongate, interrupted; calyx 7 to 12 mm. long, often tinged with violet; corolla about 12 mm. long.

23. *Salvia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 187. 1911.

Type from Cerro del Zapatero, Coahuila.

Low shrub, the branches glandular-pubescent; leaves 1.5 to 3 cm. long, obtuse, coarsely crenate, the lower ones (oblong) sometimes cordate at base,

densely glandular-pubescent; racemes 3 to 6 cm. long; calyx about 1 cm. long; corolla 18 mm. long, violaceous.

24. *Salvia dasycalyx* Fernald, Proc. Amer. Acad. 45: 421. 1910.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,800 meters.

Shrub, 1.5 meters high; leaves lance-oblong, 3.5 to 5 cm. long, villosulous beneath along the veins; panicles dense, many-flowered; calyx 3 mm. long, villous; corolla violet, 7 to 8 mm. long.

25. *Salvia fallax* Fernald, Proc. Amer. Acad. 45: 419. 1910.

Type from Tepic.

Shrub, the young branches villous; leaves ovate, 6 to 11 cm. long, sharply serrate, sparsely villous beneath; racemes 10 to 15 cm. long; calyx 5 to 6 mm. long, violaceous; corolla blue, 1 cm. long.

26. *Salvia rubropunctata* Robins. & Fern. Proc. Amer. Acad. 30: 121. 1894.

Type from Huehuerachi, Sonora.

Plants suffrutescent; leaves ovate or oblong-ovate, 4 cm. long or less, stellate-pubescent beneath or glabrate, red-punctate, finely crenate; racemes short and dense; calyx 5 mm. long; corolla blue, 12 mm. long.

27. *Salvia fruticulosa* Benth. Lab. Gen. & Sp. 721. 1834.

Type collected near the city of Oaxaca.

Low shrub, the stems white-tomentose; leaves ovate, obtuse, crenulate, white-tomentose beneath.

28. *Salvia konzattii* Fernald, Proc. Amer. Acad. 35: 526. 1900.

Type collected between El Parián and Etla, Oaxaca, altitude 370 meters.

Leaves 1.5 to 6 cm. long, rounded at apex, very rugose above, finely crenulate; racemes spikelike, 2 to 6 cm. long; calyx densely blue-tomentose; corolla blue, 12 mm. long.

29. *Salvia pruinosa* Fernald, Proc. Amer. Acad. 35: 526. 1900.

Type collected between Mesquitec and Monte Escobedo, Jalisco.

Shrub, the branchlets stellate-tomentulose; leaves 2.5 to 5 cm. long, obtuse, crenate-dentate, green and rugose above, white-tomentulose beneath; racemes dense, 10 cm. long or less; calyx 4 to 5 mm. long; corolla blue, 12 mm. long.

30. *Salvia goldmanii* Fernald, Proc. Amer. Acad. 35: 527. 1900.

Type from Batopilas, Chihuahua.

Stems thinly stellate-tomentulose; leaves 5 to 10 cm. long, acute, green above, pale beneath; racemes 5 to 15 cm. long; calyx 5 to 6 mm. long, bluish; corolla 1.5 cm. long.

31. *Salvia scorodoniaefolia* Poir. Encycl. Suppl. 5: 46. 1817.

Salvia melissodora Lag. Gen. & Sp. Nov. 2. 1817.

Salvia scorodonia Benth. Lab. Gen. & Sp. 264. 1834.

Salvia scorodoniaefolia crenaea Fernald, Proc. Amer. Acad. 35: 524. 1900.
Chihuahua to Oaxaca and Puebla.

Shrub, 1 to 1.5 meters high; leaves mostly deltoid-ovate, 2 to 9 cm. long, obtuse, crenate, whitish-tomentose beneath, usually green above; racemes short or elongate, mostly dense; calyx 5 to 7 mm. long; corolla blue.

32. *Salvia dugesii* Fernald, Proc. Amer. Acad. 36: 500. 1901.

Guanajuato, Querétaro, and Mexico; type from Guanajuato.

Shrub; leaves 1.5 to 4.5 cm. long, obtuse, very rugose, crenate, whitish-tomentose beneath, usually green above; racemes dense, elongate; calyx 7 mm. long, violaceous; corolla 1.5 cm. long. "Chía cimarrona" (Guanajuato).

33. *Salvia lasiantha* Benth. Lab. Gen. & Sp. 276. 1834.

?*Salvia keerlii* Benth. Lab. Gen. & Sp. 263. 1834.

Durango to San Luis Potosí and Oaxaca.

Shrub, 1 to 2.5 meters high; leaves mostly ovate-deltoid, 2 to 4.5 cm. long, obtuse, crenulate, whitish-tomentose beneath, usually green above; racemes dense, elongate; calyx 5 to 7 mm. long, bluish or purplish; corolla about 12 mm. long.

34. *Salvia semiatrata* Zucc. Abh. Akad. Wiss. München 1: 298. 1829-30.

Oaxaca.

Shrub, 1 to 2 meters high; leaves ovate-deltoid, 1.5 to 3.5 cm. long, obtuse, crenulate, whitish-tomentose beneath, green and very rugose above; racemes lax; corolla about 2 cm. long, the lower lip nearly black.

35. *Salvia rupicola* Fernald, Proc. Amer. Acad. 45: 420. 1910.

Type from Ixmiquilpan, Hidalgo.

Shrub; leaves 1 to 2 cm. long, obtuse, glandular-pilose beneath, green and rugose above, crenate; racemes 5 to 9 cm. long; corolla 1 cm. long.

36. *Salvia gonzalezii* Fernald, Proc. Amer. Acad. 35: 524. 1900.

Type collected between El Paríán and Etla, Oaxaca, altitude 370 meters.

Stems villous and glandular-puberulent; leaves broadly ovate, 1 to 2.5 cm. long, obtuse, crenulate, white-villous beneath; racemes 5 to 15 cm. long; corolla deep blue, 1.5 cm. long.

37. *Salvia thyrsiflora* Benth. Bot. Voy. Sulph. 151. 1844.

Tepic to Michoacán; type from Tepic.

Shrub, 1 to 2 meters high; leaves ovate-lanceolate, short-petiolate, 2 to 5 cm. long, crenate, tomentose beneath, green above; calyx 4 to 5 mm. long; corolla about 1.5 cm. long.

38. *Salvia multiramea* Fernald, Proc. Amer. Acad. 35: 525. 1900.

Guerrero to Chiapas; type collected near the city of Oaxaca.

Plants about 1 meter high, suffrutescent; leaves 2 to 7 cm. long, crenulate, tomentose beneath, short-petiolate; corolla blue or white, 10 to 12 mm. long.

39. *Salvia alamosana* Rose, Contr. U. S. Nat. Herb. 1: 110. 1890.

Type from Sierra de Alamos, Sonora.

Plants about a meter high, herbaceous or suffrutescent; leaves 5 to 7.5 cm. long, crenate, tomentose beneath; corolla blue, 1 cm. long.

40. *Salvia chapalensis* Briq. Ann. Cons. Jard. Genève 2: 145. 1898.

Type from Lake Chapala, Jalisco.

Leaves ovate, 4 to 5 cm. long, crenate, green above, white-tomentose beneath; corolla blue, about 1.5 cm. long.

41. *Salvia aspera* Mart. & Gal. Bull. Acad. Brux 11³: 71. 1844.

Puebla and Oaxaca; type from mountains of Oaxaca.

Shrub, 1.5 meters high or less; leaves deltoid or deltoid-ovate, 1.5 to 2.5 cm. long, obtuse, truncate or subcordate at base, crenate, green and rugose above, tomentose beneath; calyx 2 cm. long; corolla 4 cm. long.

42. *Salvia chrysantha* Mart. & Gal. Bull. Acad. Brux. 11³: 72. 1844.

Guerrero to Chiapas and Puebla; type from Cordillera of Oaxaca. Reported from Costa Rica.

Shrub, 1 to 3 meters high; leaves oblong-ovate to broadly ovate, 3 to 7 cm. long, obtuse or acute, rounded at base, crenulate, green above, densely tomentose beneath; racemes dense or interrupted, covered with beautiful yellow wool; calyx about 1 cm. long; corolla 2 to 3 cm. long, yellow, red within.

43. *Salvia adglutinans* Lag. Gen. & Sp. Nov. 2. 1816.

Described from "Nova Hispania," the type collected by Sessé and Mociffo.

Leaves ovate-lanceolate, cordate at base, acute, serrate, viscid-villous beneath when young; corolla scarlet, pubescent, 4 times as long as the calyx.

44. *Salvia sessei* Benth. Lab. Gen. & Sp. 288. 1834.

Rhodochlamys speciosa Schauer, Linnaea 30: 707. 1847.

Salvia roezli Scheidw. Fl. Serr. Jard. 14: 31. pl. 1407. 1861.

Salvia semperflorens Llave, Naturaleza 7: Apend. 81. 1885.

Salvia fastuosa Sessé & Moc. Pl. Nov. Hisp. 7. 1887.

Morelos and Guerrero.

Shrub, 2.5 to 4.5 meters high; leaves 5 to 13 cm. long, long-acuminate, crenate-serrate or subentire, yellow-glandular beneath; racemes lax, paniculate; calyx 2.5 cm. long, bright red; corolla scarlet, about 5 cm. long.

45. *Salvia regla* Cav. Icon. Pl. 5: 33. pl. 455. 1799.

Salvia deltoidea Pers. Syn. Pl. 1: 28. 1817.

Salvia crenata Mart. & Gal. Bull. Acad. Brux. 11²: 74. 1844.

Coahuila and Durango to Oaxaca and Hidalgo; type from Regla, Hidalgo.

Shrub, 1 to 2 meters high; leaves obtuse, coarsely crenate, green; flowers axillary or in short racemes; calyx 1.5 to 2 cm. long, bright red; corolla scarlet, 4 to 5 cm. long.

46. *Salvia pubescens* Benth. Lab. Gen. & Sp. 723. 1834.

Oaxaca; type from San Dionisio.

Shrub or small tree, 1 to 6 meters high; leaves 4.5 to 10 cm. long, acute or acuminate, crenate, green; flowers axillary or in short racemes; calyx red, 1.5 cm. long; corolla scarlet, 4 to 5 cm. long.

47. *Salvia muralis* Fernald, Proc. Amer. Acad. 43: 65. 1907.

Iguala Canyon, Guerrero, altitude about 800 meters.

Shrub, 1 to 3 meters high; leaves slender-petiolate, 6 to 10 cm. long, acuminate, coarsely crenate, green; racemes short, the flowers mostly geminate; calyx 1.5 to 2 cm. long, green or reddish; corolla scarlet, 4.5 to 6 cm. long.

48. *Salvia disjuncta* Fernald, Proc. Amer. Acad. 35: 533. 1900.

Chiapas.

Leaves deltoid-ovate, obtuse to acuminate, crenulate, green, somewhat tomentose beneath; calyx in anthesis 12 to 15 mm. long; corolla 3 to 4 cm. long.

49. *Salvia greggii* A. Gray, Proc. Amer. Acad. 8: 369. 1870.

Coahuila and Durango; type from Saltillo, Coahuila.

Low shrub; leaves mostly 1 to 1.5 cm. long, obtuse, usually entire and glabrous; calyx 10 to 12 mm. long, purplish; corolla red, 2.5 to 3 cm. long.

50. *Salvia oaxacana* Fernald, Proc. Amer. Acad. 35: 536. 1900.

Type from La Joya Canyon, Oaxaca, altitude 1,380 meters.

Shrub, much branched; leaves ovate, 1 cm. long or less, truncate or cordate at base, crenate, rugose above, white-tomentose beneath; calyx 8 to 10 mm. long, glandular-pilose.

51. *Salvia oresbia* Fernald, Proc. Amer. Acad. 35: 536. 1900.

San Luis Potosí; type from San Rafael.

Plants suffrutescent, about 30 cm. high, the branches glabrate; leaves ovate to rounded-ovate, 1 to 3 cm. long, obtuse or acute, appressed-serrate, glabrate; calyx purplish, 10 to 14 mm. long; corolla slightly over 2 cm. long.

52. *Salvia grahami* Benth. in Lindl. Bot. Reg. 16: pl. 1370. 1830.

Chihuahua and Coahuila to San Luis Potosí, Puebla, and Michoacán; type from Tlapujahua.

Low shrub; leaves petiolate, narrowly or broadly ovate, mostly 1 to 3 cm. long, obtuse or acute, crenate or subentire, green; racemes short or elongate, interrupted; calyx 7 to 12 mm. long, green or purplish; corolla red, 22 to 28 mm. long.

53. *Salvia microphylla* H. B. K. Nov. Gen. & Sp. 2: 295. 1817.

Salvia microphylla canescens A. Gray, Proc. Amer. Acad. 21: 407. 1886.

Salvia microphylla wislizeni A. Gray, Proc. Amer. Acad. 21: 408. 1886.

Chihuahua to San Luis Potosí, Puebla, and Mexico; type from Santa Rosa, Guanajuato.

Low shrub; leaves petiolate, obtuse or acute, crenate or subentire, densely or sparsely pubescent beneath; calyx 7 to 12 mm. long, green or bluish; corolla red, 2 to 2.5 cm. long. "Mirto" (Puebla, Jalisco); "pabellón mexicano"; "salvia del monte" (Ramírez); "toronjil" (Guerrero); "bandera mexicana" (Oaxaca, Reko).

54. *Salvia schaffneri* Fernald, Proc. Amer. Acad. 35: 535. 1900.

Type from mountains near Morales, San Luis Potosí.

Branches glandular-puberulent; leaves deltoid-ovate, acuminate, crenulate, puberulent, petiolate; racemes 15 cm. long or less; calyx 10 to 12 mm. long. "Mirto grande."

55. *Salvia lemmoni* A. Gray, Proc. Amer. Acad. 20: 309. 1885.

Chihuahua and Sonora. Arizona; type from Huachuca Mountains.

Plants suffrutescent, 30 to 60 cm. high, puberulent; leaves ovate or deltoid-ovate, crenulate, green, slender-petiolate; calyx 8 to 10 mm. long, glandular-puberulent.

56. *Salvia neurepia* Fernald, Proc. Amer. Acad. 35: 535. 1900.

San Luis Potosí and Mexico; type from Morales, San Luis Potosí.

Plants suffrutescent, the branches puberulent or villous; leaves ovate or rounded-ovate, rounded to subcordate at base, crenate, pubescent; racemes short or elongate; calyx 10 to 13 mm. long. "Mirto" (San Luis Potosí).

A decoction of the plant is a local remedy for fevers and headache.

57. *Salvia pringlei* Robins. & Greenm. Proc. Amer. Acad. 29: 391. 1894.

Type from Tequila, Jalisco.

Shrub, 1 to 2 meters high, the branches glabrate; leaves ovate, 4 to 9.5 cm. long, acuminate, obtuse or rounded at base, serrate, slender-petiolate; racemes dense; calyx 1.5 cm. long; corolla rose-purple, 3.5 to 4 cm. long, villous.

58. *Salvia involucrata* Cav. Icon. Pl. 2: 3. pl. 105. 1793.

Salvia laevigata H. B. K. Nov. Gen. & Sp. 2: 295. pl. 147. 1817.

Mexico, Hidalgo, and Puebla. Guatemala.

Plants suffrutescent; leaves ovate or oblong-ovate, 6 to 12 cm. long, acuminate, crenate-serrate, paler beneath; racemes dense, elongate; calyx about 1.5 cm. long, red or purplish.

59. *Salvia pulchella* DC. Cat. Hort. Monsp. 142. 1813.

Chiapas. Guatemala.

Plants large, herbaceous or suffrutescent; leaves broadly ovate, 8 cm. long or less, acuminate, crenate, paler beneath; racemes elongate; calyx green; corolla red, about 3 cm. long.

60. *Salvia adenophora* Fernald, Proc. Amer. Acad. 35: 538. 1900.

Oaxaca; type from Jayacatlán.

Shrub, the branches glandular-pilose; leaves cordate-ovate, 4 to 10 cm. long, obtuse or acute, crenate-serrate, tomentose beneath; racemes 30 cm. long or less; calyx 8 to 10 mm. long in anthesis; corolla red.

61. *Salvia fulgens* Cav. Icon. Pl. 1: 15. pl. 23. 1791.

Salvia cardinalis H. B. K. Nov. Gen. & Sp. 2: 300. pl. 152. 1817.

Salvia boucheana Kunth, Ind. Sem. Hort. Berol. 1845.

Salvia grandiflora Sessé & Moc. Pl. Nov. Hisp. 7. 1887.

Zacatecas to Michoacán and Puebla.

Plants 1 to 3 meters high, herbaceous or suffrutescent; leaves ovate, 5 to 12 cm. long, acuminate, cordate or rounded at base; racemes short or elongate; corolla red.

62. *Salvia orizabensis* Fernald, Proc. Amer. Acad. 35: 538. 1900.

Type from Mount Orizaba.

Stems short-pilose, glandular above; leaves ovate, 4 to 8 cm. long, subcordate at base; calyx 15 to 17 mm. long in anthesis.

63. *Salvia chiapensis* Fernald, Proc. Amer. Acad. 35: 544. 1900.

Chiapas.

Plants herbaceous or suffrutescent, the stems puberulent below, villosulous above; leaves ovate or oblong-ovate, 5 to 12 cm. long, acute, serrate, canescent-tomentose beneath; calyx 7 to 8 mm. long in anthesis.

64. *Salvia antennifer* Briq. Ann. Cons. Jard. Genève 2: 168. 1894.

Type from Chiapas.

Shrub, the stems villous; leaves 10 to 14 cm. long, acuminate, sparsely pilose, serrate; calyx about 8 mm. long, glandular-pilose.

65. *Salvia curviflora* Benth. Lab. Gen. & Sp. 284. 1834.

Michoacán and Hidalgo; type from Tlalpujahua, Michoacán.

Plants fruticose, the branches tomentose; leaves ovate-oblong, acute, crenate-serrate, tomentose beneath.

66. *Salvia miniata* Fernald, Proc. Amer. Acad. 35: 545. 1900.

Chiapas.

Glabrate shrub; leaves oblong-lanceolate, 15 to 20 cm. long, sharply serrate; corolla 3 to 3.2 cm. long, red.

67. *Salvia aristulata* Mart. & Gal. Bull. Acad. Brux. 11²: 67. 1844.

Salvia longistyla Benth. Lab. Gen. & Sp. 295. 1834.

Jalisco to Oaxaca and Veracruz; type from Capulalpan, Oaxaca.

Plants suffrutescent, 1 to 3 meters high; leaves long-petiolate, rounded-ovate, 7 to 18 cm. long, acute or acuminate, crenate, thin, green; racemes elongate, lax; calyx 2 to 2.5 cm. long; corolla 3.5 to 4.5 cm. long, curved.

68. *Salvia cyclophylla* Fernald, Proc. Amer. Acad. 35: 551. 1900.

Type collected between Tlapancingo, Oaxaca, and Tlalixtaquilla, Guerrero.

Shrub; leaves rounded-cordate, 6 to 7 cm. long, rounded at apex, crenate, thin, sparsely short-pilose; calyx glandular-pilose; corolla 25 to 27 mm. long.

69. *Salvia incana* Mart. & Gal. Bull. Acad. Brux. 11³: 68. 1844.

Type from Tehuacán, Puebla.

Plants suffrutescent, canescent-hirsute; leaves cordate-ovate, 2.5 cm. long, acutish, crenate, whitish-tomentose beneath; racemes short; corolla 3.5 cm. long.

70. *Salvia perlonga* Fernald, Proc. Amer. Acad. 35: 546. 1900.

Type from the Sierra Madre near Chilpancingo, Guerrero.

Shrub, the branches hispid-pilose; leaves acuminate, crenate, green and rugose above, whitish-tomentose beneath; racemes 10 to 20 cm. long; calyx purplish, 13 mm. long; corolla 3 cm. long, red.

71. *Salvia graciliflora* Mart. & Gal. Bull. Acad. Brux. 11²: 75. 1844.

Type from Zacuapan, Veracruz.

Stems suffrutescent; leaves ovate, 5 cm. long, acuminate, serrate; racemes short; calyx canescent-tomentose; corolla about 2.5 cm. long.

72. *Salvia purpurea* Cav. Icon. Pl. 2: 52. pl. 166. 1793.

Salvia affinis Schlecht. & Cham. Linnaea 5: 99. 1830.

Salvia purpurea pubens A. Gray, Proc. Amer. Acad. 22: 446. 1887.

Durango and Jalisco to Chiapas and Veracruz. Central America.

Plants herbaceous or suffrutescent, 1 to 3 meters high, the stems usually minutely puberulent or glabrate; leaves ovate or broadly ovate, 5 to 10 cm. long, acuminate, serrate; racemes dense, short or elongate; calyx usually purple-tomentose. "Chichinguaste" (Guatemala).

73. *Salvia littae* Vislana, Padov. Nuov. Sagg. 6: 87. 1847.

Oaxaca.

Stems chiefly herbaceous, 1 to 1.5 meters high; leaves ovate or rounded-ovate, 5 to 9 cm. long, acute, crenate-serrate; racemes dense; corolla purplish-villous.

74. *Salvia rosei* Fernald, Proc. Amer. Acad. 35: 548. 1900.

Type collected between Colotlán and Bolaños, Jalisco.

Shrub; leaves ovate, 3.5 to 6 cm. long, obtuse or acute, crenate-serrate; racemes 10 cm. long or less; calyx puberulent; corolla 2.5 to 3 cm. long.

75. *Salvia arbuscula* Fernald, Proc. Amer. Acad. 45: 421. 1910.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,500 meters.

Shrub, 2.5 meters high, the branches lanate; leaves ovate, about 10 cm. long, acuminate, subcordate at base, white-tomentose beneath; racemes elongate; corolla 2.5 to 3 cm. long.

76. *Salvia iodantha* Fernald, Proc. Amer. Acad. 35: 547. 1900.

Type from Cuernavaca, Morelos, altitude 2,340 meters.

Plants herbaceous or suffrutescent, 1 to 1.5 meters high, the stems puberulent; leaves 7 cm. long or less, short-acuminate, serrate; racemes 10 to 20 cm. long, subsecund; calyx in anthesis 5 mm. long; corolla slightly more than 2 cm. long.

77. *Salvia michoacana* Fernald, Proc. Amer. Acad. 35: 548. 1900.

Jalisco and Michoacán; type from Pátzcuaro, Michoacán.

Shrub, 1 to 3 meters high, the branches puberulent; leaves 5 to 12 cm. long, acuminate, crenate or serrate; racemes dense, 5 to 15 cm. long; calyx 4 to 5 mm. long; corolla 2 to 2.5 cm. long.

78. *Salvia nervata* Mart. & Gal. Bull. Acad. Brux. 11²: 77. 1844.

Type from Sierra de San Felipe, Oaxaca. Guatemala.

Plants herbaceous or suffrutescent, the stems puberulent; leaves ovate or ovate-lanceolate, 5 to 8 cm. long, acuminate; racemes secund, lax; calyx 10 to 14 mm. long; corolla about 3.5 cm. long.

79. *Salvia karwinskii* Benth. Lab. Gen. & Sp. 725. 1834.

Type from somewhere in Mexico.

Stems lanate; leaves ovate, acuminate, rounded at base, lanate beneath; calyx glandular-villous.

80. *Salvia cinnabarina* Mart. & Gal. Bull. Acad. Brux. 11²: 63. 1844.

Oaxaca and Chiapas; type from Cerro de San Felipe, Oaxaca. Guatemala.

Plants herbaceous or suffrutescent; leaves ovate, 3 to 12 cm. long, acute or acuminate, obtuse or rounded at base, serrulate, thinly tomentose or glabrate beneath; racemes elongate; corolla bright red, about 3 cm. long.

81. *Salvia elegans* Vahl, Enum. Pl. 1: 238. 1804.

Salvia incarnata Cav. Anal. Cienc. Nat. 2: 112. 1800. Not *S. incarnata* Etling. 1777.

Salvia punicea Mart. & Gal. Bull. Acad. Brux. 11²: 65. 1844.

Salvia microcalyx Scheele, Linnaea 22: 589. 1849.

Salvia longiflora Sessé & Moc. Pl. Nov. Hisp. 8. 1887.

Salvia elegans sonorensis Fernald, Proc. Amer. Acad. 35: 550. 1900.

Sonora and Chihuahua to Veracruz and Oaxaca.

Plants fruticose or herbaceous; leaves chiefly ovate, 3 to 10 cm. long, obtuse to acuminate, serrate or crenate, pubescent or glabrate beneath; racemes lax, elongate; corolla bright red, 3 to 3.5 cm. long.

82. *Salvia mollissima* Mart. & Gal. Bull. Acad. Brux. 11²: 71. 1844.

Type from Oaxaca.

Stems chiefly herbaceous, hirsute; leaves ovate-lanceolate, 7.5 cm. long, acuminate, crenate, white-tomentose beneath; calyx 8 to 10 mm. long; corolla 2.5 cm. long.

83. *Salvia coccinea* Juss.; Murr. Comm. Gött. 1: 86. pl. 1. 1778.

Salvia pseudococcinea Jacq. Coll. Bot. 2: 302. 1788.

Salvia ciliata Benth. Lab. Gen & Sp. 286. 1834.

Salvia galeottii Mart.; Mart. & Gal. Bull. Acad. Brux. 11²: 75. 1844.

Salvia coccinea pseudococcinea Kuntze, Rev. Gen. Pl. 2: 530. 1891.

Tamaulipas and Nuevo León to Tepic, Chiapas, and Yucatán. Widely distributed in tropical America.

Stems usually herbaceous but sometimes suffrutescent, commonly hirsute; leaves ovate or deltoid, 1.5 to 5 cm. long, obtuse or acute, crenate, tomentose or pubescent beneath; racemes short or elongate; calyx 6 to 9 mm. long; corolla about 2.5 cm. long, bright red. "Mirto" (Nuevo León).

This species is commonly cultivated as an ornamental plant under the names "salvia" and "scarlet sage." Several horticultural forms are known.

3. *CUNILA* L. Syst. Nat. ed. 10. 1359. 1759.

Low shrubs or herbs; leaves serrate or entire; flowers small, in dense or loose clusters, these axillary or in terminal spikes; calyx tubular, 10 to 13-nerved, barbate in the throat, the 5 teeth subequal; corolla bilabiate; stamens 2.

Bractlets equaling the calyx; flowers sessile or nearly so, in dense spikes.

1. *C. lythrifolia*.

Bractlets much shorter than the calyx; flowers pedicellate.

Corolla more than twice as long as the calyx, usually 3 times as long.

2. *C. longiflora*.

Corolla less than twice as long as the calyx.

Flower clusters arranged in rounded cymes-----3. *C. pycnantha*.

Flower clusters spicate.

Leaves densely tomentose beneath-----4. *C. tomentosa*.

Leaves thinly villous or glabrate beneath.

Stems villosulous-----5. *C. polyantha*.

Stems glabrous-----6. *C. leucantha*.

1. *Cunila lythrifolia* Benth. in Edwards, Bot. Reg. 15: pl. 1289. 1829.
? *Cunila stachyoides* Mart. & Gal. Bull. Acad. Brux. 11²: 190. 1844.
Hidalgo, Mexico, and Morelos.

Plants 0.6 to 2 meters high, herbaceous or suffrutescent, the stems densely pillose; leaves lance-oblong or oblong-ovate, 4 to 8 cm. long, acuminate, serrulate, tomentulose beneath; spikes very dense, villous; corolla purplish.

Cunila stachyoides was described from Orizaba.

2. *Cunila longiflora* A. Gray, Proc. Amer. Acad. 22: 444. 1887.
Jalisco; type from Río Blanco.

Plants slender, suffrutescent; leaves lanceolate to ovate, 3 to 6.5 cm. long, long-acuminate, serrulate or entire, thinly tomentulose beneath; flowers in lax pedunculate cymes; corolla 6 to 8 mm. long.

The writer has seen no specimens of *C. secunda* S. Wats.,¹ which was described from Guanajuato, where it is said to be known as "poleo de cerro." From the description it can not be distinguished from *C. longiflora*, and probably Watson's name should replace *C. longiflora*.

3. *Cunila pycnantha* Robins. & Greenm. Proc. Amer. Acad. 29: 391. 1894.

Jalisco, Michoacán, and Morelos; type from Nevado de Colima, altitude 2,100 meters.

Slender shrub, 1 to 2 meters high; leaves short-petiolate, oblong-lanceolate to ovate, 2.5 to 5.5 cm. long, long-acuminate, serrulate or entire, nearly glabrous; corolla white, 5 mm. long.

4. *Cunila tomentosa* Fernald, Proc. Amer. Acad. 35: 565. 1900.

Type collected between Plunia and San Miguel Suchistepec, Oaxaca, altitude 1,800 meters.

Stems sharply quadrangular; leaves lanceolate or ovate-lanceolate, 2 to 5 cm. long, acuminate, entire or serrulate; corolla 3 mm. long.

5. *Cunila polyantha* Benth. Lab. Gen. & Sp. 362. 1834.

Veracruz, Oaxaca, and Guerrero. Guatemala.

Leaves narrowly lanceolate to broadly ovate, 2 to 5 cm. long, acute to long-acuminate, entire or serrulate, thinly tomentose or glabrate beneath; corolla white, about 4 mm. long.

6. *Cunila leucantha* Benth. Lab. Gen. & Sp. 361. 1834.

Described from Mexico.

Leaves ovate-oblong, 12 to 16 mm. long, entire, glabrous; cymes lax, 16 to 20-flowered, the pedicels pubescent; corolla white.

The writer has seen no specimens agreeing with the original description.

4. **POLIOMINTHA** A. Gray, Proc. Amer. Acad. 8: 295. 1870.

Low shrubs; leaves entire; flowers pink or purple, clustered in the leaf axils; calyx tubular, 13 to 15-striate, barbate in the throat, the 5 teeth equal or nearly so; corolla bilabiate, the upper lip erect, emarginate, the lower 3-cleft, the tube equaling or longer than the calyx; stamens 2.

The following species are the only ones known.

Flowers 2 to 3.5 cm. long.

Leaves oval to broadly ovate-----1. *P. longiflora*.

Leaves linear-oblong-----2. *P. bicolor*.

¹ Proc. Amer. Acad. 18: 136. 1883.

Flowers less than 1.5 cm. long.

Leaves linear; calyx villous-hirsute-----3. *P. incana*.

Leaves oblong to suborbicular; calyx tomentulose.

Leaves glabrate, the pubescence simple-----4. *P. glabrescens*.

Leaves densely stellate-tomentose.

Leaves orbicular-ovate; corolla tube short-exserted-----5. *P. marifolia*.

Leaves oblong-ovate; corolla tube long-exserted-----6. *P. mollis*.

1. *Poliomintha longiflora* A. Gray, Proc. Amer. Acad. 8: 296. 1870.

Coahuila.

Shrub, about 30 cm. high; leaves 5 to 10 mm. long, rounded or obtuse at apex, canescent-tomentulose beneath with simple hairs, green above; corolla 2.5 to 3.5 cm. long, red. "Orégano."

The leaves are used for flavoring food and for making a beverage like tea.

2. *Poliomintha bicolor* S. Wats. Proc. Amer. Acad. 25: 160. 1890.

Hedeoma bicolor Briq. Ann. Cons. Jard. Bot. Genève 2: 185. 1898.

Type from Sierra de la Silla, Nuevo León, altitude 1,500 meters.

Densely branched shrub, 30 cm. high or less; leaves 4 to 8 mm. long, obtuse, densely white-tomentulose beneath with simple hairs, glabrous above; corolla about 3 cm. long.

3. *Poliomintha incana* (Torr.) A. Gray, Proc. Amer. Acad. 8: 296. 1870.

Hedeoma incana Torr. U. S. & Mex. Bound. Bot. 130. 1859.

Chihuahua and Sonora. Western Texas to Arizona and Utah.

Shrub, 1 meter high or less; leaves 1 to 3 cm. long, densely whitish-tomentulose with simple hairs; corolla 10 to 12 mm. long, pale purplish.

The Hopi Indians of Arizona boil and eat the leaves and use the flowers for seasoning food.

4. *Poliomintha glabrescens* A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 549. 1882.

Type from Soledad, southwest of Monclova, Coahuila. Western Texas.

Low glabrate shrub; leaves oblong, 7 to 18 mm. long, obtuse, conspicuously punctate; corolla about 12 mm. long.

5. *Poliomintha marifolia* (Schauer) A. Gray, Proc. Amer. Acad. 8: 365. 1870.

Keithia marifolia Schauer, Linnaea 20: 705. 1847.

San Luis Potosí and Hidalgo; type from Zimapán, Hidalgo.

Leaves petiolate, 5 to 15 mm. long, rounded or very obtuse at apex, white-tomentulose; corolla 12 to 14 mm. long.

6. *Poliomintha mollis* (Torr.) A. Gray, Proc. Amer. Acad. 8: 365. 1870.

Hedeoma mollis Torr. U. S. & Mex. Bound. Bot. 129. 1859.

Western Texas; type collected along the Rio Grande at Puerto de Paisano; doubtless extending into Mexico.

Leaves 1 to 2.5 cm. long, obtuse or acutish, petiolate; corolla 12 mm. long.

6. *SALAZARIA* Torr. U. S. & Mex. Bound. Bot. 133. 1859.

The genus was named for Don José Salazar, Mexican Commissioner of the United States and Mexican Boundary Survey. It consists of a single species.

1. *Salazaria mexicana* Torr. U. S. & Mex. Bound. Bot. 133. pl. 39. 1859.

Baja California, Chihuahua, and Coahuila; type collected in Chihuahua below Presidio del Norte. Utah to southern California.

Slender shrub, 1 meter high or less, the branches densely white-tomentose; leaves remote, short-petiolate, oblong to ovate, 2 cm. long or less, obtuse, entire or nearly so; flowers in few-flowered racemes; calyx subglobose, in fruit inflated and bladderlike, 1.5 cm. long, purplish, reticulate-veined; corolla about 2 cm. long, purplish; stamens 4.

7. *OCIMUM* L. Sp. Pl. 597. 1753.

Herbs or low shrubs; leaves petiolate, toothed; flowers in verticillate racemes; calyx deflexed in fruit, campanulate or ovoid, 5-lobate, the lobes unequal; corolla white or nearly so, the tube usually shorter than the calyx; stamens 4.

Calyx hirtellous or puberulent, the upper lobe decurrent nearly or quite to the base of the tube-----1. *O. micranthum*.

Calyx glabrous, the upper lobe decurrent to the middle of the tube or less.

2. *O. sellowii*.

1. *Ocimum micranthum* Willd. Enum. Pl. 630. 1809.

Sinaloa to Tamaulipas, Yucatán, and Colima. West Indies; Central and South America.

Plants essentially annual but sometimes suffrutescent, 60 cm. high or less; leaves oblong-ovate to broadly ovate, 2 to 9 cm. long, acute or obtuse, serrate or subentire, puberulent or glabrate; racemes 2 to 10 cm. long; calyx 6 to 7 mm. long in fruit; corolla 4 mm. long. "Albahaca cimarrona" (Porto Rico); "albahaca silvestre" (Guatemala); "albahaca," "albahaca montés" (El Salvador).

Ocimum campechianum Mill.,¹ described from Campeche, is probably not essentially different. It is said by Bentham to be more pubescent than *O. micranthum*. Specimens from the Yucatán Peninsula seen by the writer do not differ from the usual forms of *O. micranthum*.

In El Salvador bunches of the leaves of this plant are put in the ears as a remedy for earache.

2. *Ocimum sellowii* Benth. Lab. & Gen. Sp. 6. 1834.

San Luis Potosí and Veracruz. Brazil.

Plants herbaceous or suffrutescent, glabrous throughout or nearly so; leaves ovate or lance-ovate, 4 to 8 cm. long, acute or acuminate, acute at base, coarsely serrate; racemes 10 to 20 cm. long; calyx in fruit 8 mm. long; corolla 4 mm. long.

8. *TRICHOSTEMA* L. Sp. Pl. 598. 1753.

Herbs or low shrubs; leaves entire; flowers in axillary clusters or in thyrsiform panicles; calyx 5-dentate, 10-nerved, the limb equal or oblique; corolla tube slender, the limb subequally 5-lobate; stamens 4, the anterior ones longer.

Leaves linear; corolla tube short-exserted-----1. *T. parishii*.

Leaves ovate or broadly elliptic; corolla tube not exserted--2. *T. arizonicum*.

1. *Trichostema parishii* Vasey, Bot. Gaz. 6: 173. 1880.

Trichostema lanatum denudatum A. Gray, Syn. Fl. ed. 2. 2¹: 459. 1886.

Northern Baja California. Southern California; type from San Diego County.

Low shrub; leaves 1 to 4.5 cm. long, sessile, glabrate above, tomentulose beneath, the margins revolute; inflorescence thyrsiform, nearly naked, covered with purple wool; corolla about 1 cm. long; stamens long-exserted.

¹ Gard. Dict. ed. 8. *Ocimum* no. 5. 1768.

2. *Trichostema arizonicum* A. Gray, Proc. Amer. Acad. **8**: 371. 1872.

Northeastern Sonora. Arizona and New Mexico; type from Chiricahua Mountains, Arizona.

Plants 60 cm. high or less, woody below, puberulent; leaves petiolate, 1 to 2 cm. long, obtuse; flower clusters axillary, on long slender peduncles; corolla blue or whitish, 1 cm. long.

9. *CLINOPODIUM* L. Sp. Pl. 587. 1753.

Small shrubs or herbs; leaves entire or dentate; flowers axillary; calyx tubular, 13-nerved, bilabiate, the posterior lip 3-dentate, the anterior one 2-parted; corolla tube usually exserted, the limb bilabiate; stamens 4.

One herbaceous species occurs in Baja California.

Leaves 1 to 1.5 cm. long; petioles about as long as the blades.

1. *C. oaxacatum*.

Leaves mostly 3 to 7 cm. long; petioles much less than half as long as the blades.

Branches villous-hirsute-----**2. *C. macrostemum***

Branches finely puberulent or glabrous-----**3. *C. laevigatum*.**

1. *Clinopodium oaxacatum* (Fernald) Standl.

Calamintha oaxacana Fernald, Proc. Amer. Acad. **35**: 564. 1900.

Type collected between El Parián and Etla, Oaxaca, altitude 1,200 meters.

Shrub with slender glabrate branches; leaves elliptic-ovate, acute, sharply serrate; flowers solitary in the leaf axils; corolla red, about 3 cm. long.

2. *Clinopodium macrostemum* (Benth.) Kuntze, Rev. Gen. Pl. **2**: 515. 1891.

Calamintha macrostema Benth. in DC. Prodr. **12**: 229. 1848.

Mexico and Morelos, and perhaps in neighboring States.

Shrub, sometimes 2.5 meters high; leaves ovate or oblong-ovate, acuminate, serrate, sparsely villous-hirsute beneath; corolla about 3 cm. long. "Tabaquito," "té del monte" (Mexico).

A decoction of the plant is employed as a remedy for affections of the stomach and intestines. The leaves are employed as a substitute for Chinese tea.

3. *Clinopodium laevigatum* Standl., sp. nov.

Sinaloa to Oaxaca; type from Cerro San Felipe, Oaxaca (*Nelson* 1117; U. S. Nat. Herb. no 565856).

Shrub, 0.5 to 1.5 meters high, the branchlets minutely puberulent or glabrate, barbate at the nodes; leaves short-petiolate, lance-oblong to ovate-oblong, 2 to 8 cm. long, acute or acuminate, obtuse or acute at base, serrate or subentire, usually glabrous but sometimes sparsely scabrous above and hirtellous beneath along the costa; flowers in few-flowered axillary pedunculate cymes; calyx about 9 mm. long, glabrous; corolla about 2.5 cm. long. "Poleo" (Sinaloa); "nurite," "té nurite" (Michoacán); "guie-zaa" (Oaxaca, Zapotec, *Reko*); "hierba del borracho" (Oaxaca); "té del monte" (Oaxaca, Michoacán).

Tea made from the leaves, sweetened with sugar, is a popular beverage in some places along the western coast of Mexico. It is considered a remedy for kidney troubles and a good tonic after malarial and other fevers.

10. *HYPTIS* Jacq. Coll. Bot. **1**: 101. 1786.

Shrubs or herbs; leaves usually toothed; calyx tubular, ovoid, or campanulate, the 5 lobes equal; corolla bilabiate, the upper lip erect or spreading, the lower saccate; stamens 4.

Numerous herbaceous species of the genus occur in Mexico.

Flowers in loose panicles. Corolla 2 cm. long or larger.

Leaves clasping at base; calyx minutely glandular-puberulent. 1. *H. nelsonii*.

Leaves not clasping; calyx glandular-hispid. 2. *H. langlassei*.

Flowers in heads, umbels, or fascicles, these variously arranged.

Calyx lobes spreading in fruit.

Calyx lobes in fruit equaling or usually shorter than the tube.

3. *H. stellulata*.

Calyx lobes longer than the tube. 4. *H. mociniana*.

Calyx lobes erect in fruit.

Flowers sessile or nearly so.

Calyx in fruit 8 to 10 mm. long. 5. *H. rhytidea*.

Calyx about 2 mm. long. 6. *H. seemanni*.

Flowers all or mostly slender-pedicellate.

Flowers clusters all sessile or nearly so.

Leaves with a very dense, minute, close tomentum on the upper surface. 7. *H. tephrodes*.

Leaves with a coarse tomentum on the upper surface, or the tomentum fine but sparse.

Leaves lance-oblong to oblong-ovate, usually acute or acuminate.

8. *H. albida*.

Leaves mostly rounded-ovate and very obtuse. 12. *H. emoryi*.

Flower clusters all or mostly pedunculate.

Lobes of the calyx half as long as the tube or less. 9. *H. tomentosa*.

Lobes of the calyx more than half as long as the tube.

Leaves soon glabrate, green.

Calyx lobes linear-subulate; leaves broadly ovate, usually acute.

10. *H. laniflora*.

Calyx lobes lanceolate; leaves suborbicular, rounded at apex.

11. *H. insularis*.

Leaves densely whitish-tomentose on one or both surfaces.

12. *H. emoryi*.

1. *Hyptis nelsonii* Fernald, Proc. Amer. Acad. 35: 366. 1900.

Type collected between San Sebastián and summit of Monte Bufa de Mascota, Jalisco, altitude 1,850 meters.

Leaves linear-lanceolate, 15 to 20 cm. long, attenuate, serrulate or entire, glabrous; panicles 40 to 50 cm. long, lax; calyx in fruit 1 cm. long.

2. *Hyptis langlassei* Fernald, Proc. Amer. Acad. 45: 422. 1910.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,800 meters.

Shrub, 2 meters high; leaves lanceolate, 10 to 17 cm. long, acuminate, sub-cuneate at base, acutely dentate, glabrous; calyx in fruit 8 to 9 mm. long; corolla red.

3. *Hyptis stellulata* Benth. Lab. Gen. & Sp. 129. 1834.

Hyptis pubescens Benth. Lab. Gen. & Sp. 129. 1834.

Hyptis spinulosa Benth. Lab. Gen. & Sp. 129. 1834.

Hyptis punctata Mart. & Gal. Bull. Acad. Brux. 11²: 186. 1844.

Sonora to Oaxaca and Morelos.

Plants shrubby or suffrutescent, 1.5 to 3 meters high; leaves narrowly lanceolate to broadly ovate or ovate-oval, 2 to 8 cm. long, obtuse to long-attenuate, serrate, puberulent or tomentulose beneath; flowers sessile or nearly so in dense clusters, these spicate-paniculate; corolla white. "Salvia cimarrona" (Sinaloa).

4. *Hyptis mociniana* Benth. Lab. Gen. & Sp. 129. 1834.

Veracruz and Chiapas. Central America.

Plants shrubby or suffrutescent, 1 to 2.5 meters high; leaves ovate, 2 to 4 cm. long, acuminate, rounded or subcordate at base, serrate, tomentulose beneath; flowers sessile in dense clusters, these spicate-paniculate; corolla white. "Verbena montés," "chichinguastón" (El Salvador).

5. *Hyptis rhytidea* Benth. Pl. Hartw. 21. 1839.

Sinaloa and Durango to Jalisco and Aguascalientes; type from Aguascalientes.

Plants shrubby or suffrutescent, 1.5 to 2.5 meters high; leaves oblong or lance-oblong, 4 to 13 cm. long, acute or obtuse, serrate, coriaceous, scabrous above, tomentose or glabrate beneath; inflorescence spicate-paniculate. "Salvia prieta" (Sinaloa).

Used in Sinaloa as a remedy for fevers.

6. *Hyptis seemanni* A. Gray, Proc. Amer. Acad. 21: 407. 1886.

Hyptis seemanni stenophylla Robinson, Proc. Bost. Soc. Nat. Hist. 31: 267. 1904.

Chihuahua, Sonora, and Sinaloa.

Shrub; leaves linear-lanceolate to oblong-lanceolate, 4 to 7 cm. long, attenuate, crenate or serrate, tomentose beneath; flower heads small, sessile, spicate-paniculate; calyx densely villous in the throat and outside. "Salvia" (Sinaloa).

7. *Hyptis tephrodes* A. Gray, Proc. Amer. Acad. 5: 164. 1861.

Baja California; type from Cape San Lucas.

Shrub, 1.5 to 2.5 meters high; leaves lanceolate or lance-oblong, 3 to 7 cm. long, acute, crenate or serrate; flower clusters spicate-paniculate, the panicles nearly naked; calyx densely white-lanate.

Doubtfully distinct from *H. albida*.

8. *Hyptis albida* H. B. K. Nov. Gen. & Sp. 2: 319. 1817.

Sonora and Chihuahua to San Luis Potosí, Guanajuato, and Guerrero; type from Lake Cuitzeo, Guanajuato.

Shrub, 1.5 to 4.5 meters high, stellate-tomentose throughout; leaves 2 to 6 cm. long, crenate-serrate, prominently reticulate-veined; flower clusters spicate-paniculate, the panicles leafy or naked; calyx densely white-lanate; corolla blue. "Salvia" (Sinaloa, Jalisco, Aguascalientes); "orégano" (Sinaloa); "salvia real" (Guerrero).

The leaves are sometimes used for flavoring food. In Sinaloa they are employed as a remedy for ear-ache, and in Guerrero a decoction of the plant is used in fomentations to relieve rheumatic pains.

9. *Hyptis tomentosa* Poit. Ann. Mus. Paris 7: 469. 1806.

Puebla and Guerrero to Chiapas.

Shrub, 1.5 to 3 meters high, stellate-tomentose; leaves oblong to ovate or oval, 1 to 7 cm. long, obtuse, crenate; flower clusters chiefly axillary, the flowers long-pedicellate; calyx stellate-tomentose; corolla about 12 mm. long, violet.

10. *Hyptis laniflora* Benth. Bot. Voy. Sulph. 42. pl. 20. 1844.

Baja California; type from Cape San Lucas.

Shrub, 1.5 to 2.5 meters high; leaves 1 to 4.5 cm. long, coarsely dentate, coriaceous; flower clusters on long, slender, usually glabrous, purplish peduncles; calyx densely white-lanate. "Salvia."

A decoction of the plant is administered as a remedy for fevers.

11. *Hyptis insularis* (Standl. & Goldm.) Standl.

Mesosphaerum insulare Standl. & Goldm. Contr. U. S. Nat. Herb. 13: 375. 1911.

Type from Espíritu Santo Island, Baja California.

Shrub with spreading branches; leaves 1 to 2 cm. long, rounded or truncate at base, sinuate-dentate; peduncles slender, glabrous; calyx 6 mm. long, densely lanate.

Probably only a form of *H. laniflora*.

12. *Hyptis emoryi* Torr. in Ives, Rep. Colo. Riv. 20. 1861.

Sonora, Tepic, and Baja California. Southern Arizona and California.

Slender shrub, 1 to 2 meters high; leaves oblong-ovate to broadly ovate, 1 to 5 cm. long, crenate or coarsely dentate; flower clusters axillary or in nearly naked paniced racemes; calyx densely lanate; corolla violet, about 4 mm. long. "Salvia" (Sonora, Baja California).

Hyptis palmeri S. Wats.¹, described from Guaymas, Sonora, is probably not distinct.

11. **MONARDELLA** Benth. Lab. Gen. & Sp. 331. 1834.

At least two herbaceous species occur in Baja California.

1. *Monardella thymifolia* Greene, Bull. Calif. Acad. 1: 211. 1885.

Cedros Island, Baja California.

Low shrub, puberulent throughout; leaves ovate to broadly ovate, 5 to 10 mm. long, obtuse, entire or remotely serrulate, short-petiolate; flowers in dense terminal heads, the bracts large and conspicuous; calyx tubular, 7 mm. long, equally 5-dentate; stamens 4.

12. **SPHACELE** Benth. in Edwards, Bot. Reg. pl. 1289. 1829.

Plants woody or suffrutescent; leaves crenate; flowers solitary or in few-flowered clusters, axillary or in terminal racemes; calyx campanulate, about 10-nerved, reticulate-veined, 5-dentate, the teeth subequal; corolla tube amplicate above, the limb scarcely bilabiate, 4-lobate; stamens 4.

Flowers solitary in the leaf axils; leaves 1 to 2 cm. long-----1. *S. mexicana*.
Flowers in terminal racemiform panicles; leaves 10 to 25 cm. long.

2. *S. hastata*.

1. *Sphacele mexicana* Schauer, Linnaea 20: 707. 1847.

San Luis Potosí, Hidalgo, and Puebla; type from Zimapán, Hidalgo.

Shrub, 30 cm. high or less, densely stellate-tomentose throughout; leaves petiolate, triangular-hastate, obtuse, crenate, rugose, the margins revolute; flowers short-pedicellate, hidden among the leaves; calyx 6 mm. long.

2. *Sphacele hastata* A. Gray, Proc. Amer. Acad. 5: 341. 1862.

Baja California. Hawaii.

Plants tall and coarse, perhaps wholly herbaceous, thinly or densely stellate-tomentose; leaves narrowly triangular-hastate, acute or acuminate, petiolate; calyx 6 to 7 mm. long; corolla 2.5 cm. long or less.

13. **GARDOQUIA** Ruiz & Pav. Prodr. Fl. Peruv. Chil. 86. 1794.

Small shrubs; leaves entire or serrate; flowers solitary or clustered in the leaf axils; calyx tubular, 13-nerved, the 5 teeth subequal; corolla tube usually exserted, the limb bilabiate; stamens 4.

¹ Proc. Amer. Acad. 24: 68. 1889.

- Leaves linear-oblong, entire.....1. *G. micromerioides*.
 Leaves ovate or broadly ovate, serrate.
 Leaves 2 to 3 mm. long.....2. *G. helleri*.
 Leaves mostly 5 to 9 mm. long.....3. *G. mexicana*.

1. *Gardoquia micromerioides* Hemsl. Biol. Centr. Amer. Bot. 2: 550. 1882.

San Luis Potosí.

Plant suffrutescent, 40 cm. high or less, glabrate; leaves subsessile, 6 to 18 mm. long; flowers solitary, 12 to 18 mm. long; calyx 6 to 8 mm. long.

2. *Gardoquia helleri* Peyr. Linnaea 30: 34. 1859.

Type from Tepetitlán, Orizaba, Veracruz, altitude 2,400 to 2,700 meters.

Small much-branched shrub; leaves short-petiolate, acutish, 2 to 4-dentate, glabrous; flowers solitary; calyx 5 to 6 mm. long, corolla 18 to 25 mm. long.

Probably only a form of *G. mexicana*.

3. *Gardoquia mexicana* Benth. Pl. Hartw. 50. 1840.

Hidalgo to Guerrero, Oaxaca, and Veracruz; type from Regla, Hidalgo.

Low shrub, the branchlets minutely puberulent; leaves petiolate, obtuse or acute, serrulate, glabrous; calyx 6 mm. long; corolla 22 to 34 mm. long.

148. SOLANACEAE. Potato Family.

Shrubs or trees or often herbs, erect or scandent, often armed with prickles, the pubescence frequently of branched hairs; leaves mostly alternate, simple or compound; flowers perfect, usually in cymes, regular or nearly so; calyx inferior, usually 5-parted, gamosepalous; corolla gamopetalous, varying from tubular to rotate, the limb usually 5-lobate; stamens as many as the corolla lobes and alternate with them, attached to the corolla tube; style simple, the stigma discoid or bilamellate; fruit baccate or capsular, many-seeded.

Several genera besides those listed are represented in Mexico by herbaceous species.

Ovary 1-celled.....13. LITHOPHYTUM.

Ovary with 2 or more cells.

Fruit capsular.....1. NICOTIANA.

Fruit baccate.

Embryo straight or nearly so. Leaves entire.

Fruit many-seeded; corolla lobes imbricate.....2. JUANULLOA.

Fruit few-seeded; corolla lobes induplicate-valvate.....3. CESTRUM.

Embryo curved.

Ovary 4-celled.

Corolla lobes imbricate.....4. SWARTZIA.

Corolla lobes induplicate-valvate.....5. DATURA.

Ovary 2-celled.

Corolla lobes imbricate.....6. LYCIUM.

Corolla lobes valvate or induplicate-valvate.

Corolla funnelform.....7. ACNISTUS.

Corolla salverform or campanulate.

Anthers opening by terminal pores.....8. SOLANUM.

Anthers opening by longitudinal slits.

Calyx accrescent after anthesis.

Calyx longer than the fruit and contracted above it.

9. ATHENAEA.

Calyx equaling or shorter than the fruit, not contracted.

10. WITHANIA.

Calyx only slightly if at all accrescent.

Corolla broadly campanulate, 5-angulate or shallowly lobate.

11. **BRACHISTUS.**

Corolla subrotate, cleft to the middle or more deeply.

12. **BASSOVIA.**

1. **NICOTIANA** L. Sp. Pl. 180. 1753.

Several herbaceous species occur in Mexico. Best known among them, of course, is the tobacco ("tabaco") plant, *Nicotiana tabacum* L.

1. *Nicotiana glauca* Graham, Edinburgh Phil. Journ. 1828: 174. 1828.

Sonora to Tamaulipas and Oaxaca. Western Texas to southern California; native of Argentina and Uruguay, but thoroughly naturalized in some parts of North America.

Glabrous shrub or small tree, 6 meters high or less; leaves long-petiolate, lance-oblong to broadly ovate, 5 to 17 cm. long, acute or obtuse, entire, glaucous; flowers greenish white, in lax terminal panicles; calyx tubular-campanulate, 12 mm. long, 5-dentate; corolla tubular, about 4 cm. long, villosulous, with narrow limb; fruit a 2-celled capsule, 1 to 1.5 cm. long. "Virginio" (Chihuahua, Durango); "gigante" (Aguascalientes, Sinaloa, San Luis Potosí, Texas); "tabaquillo" (Oaxaca, Mexico); "tronadora" (Chihuahua, Guanajuato, Texas); "mostaza montés" (Oaxaca); "Don Juan" (Sonora); "lengua de buey" (Sinaloa); "marihuana" (Sinaloa, Sonora); "árbol de tabaco" (Durango); "tabaco cimarrón" (Mexico); "buena moza" (Querétaro); "tepozán extranjero" (Querétaro); "tabaco amarillo" (Jalisco); "gretaña" (Oaxaca, Reko); "tabacón," "tacote," "palo virgin" (Durango, Patoni); "conetón" (Texas); "palo virgen," "Marquiana," "hierba del gigante."

This plant is abundant in some parts of Mexico. It is reputed to be very poisonous. The leaves are often applied as poultices to relieve pain, especially headache.

2. **JUANULLOA** Ruiz & Pav. Fl. Peruv. Chil. Prodr. 27. 1794.

1. *Juanullosa mexicana* (Schlecht.) Miers, Ann. Mag. Nat. Hist. 4: 188. 1849.

Laureria mexicana Schlecht. Linnaea 8: 513. 1833.

Juanullosa aurantiaca Otto & Dietr. Allg. Gartenz. 12: 265. 1844.

Juanullosa hookeriana Miers, Ann. Mag. Nat. Hist. 4: 189. 1849.

Juanullosa elliptica Ruiz & Pav.; Dunal in DC. Prodr. 13¹: 530. 1852.

Veracruz, Oaxaca, and Chiapas; type from Hacienda de la Laguna, Veracruz.

Shrub, usually epiphytic; leaves short-petiolate, elliptic to ovate, 6 to 22 cm. long, rounded to acute at apex, acute to rounded at base, glabrous above, stellate-puberulent or tomentose beneath, entire; flowers in few-flowered long-pedunculate cymes; calyx 2.5 to 3.5 cm. long, cleft into 5 oblong-lanceolate lobes, stellate-tomentulose; corolla tubular, 4 to 4.5 cm. long, orange or reddish; fruit baccate.

3. **CESTRUM** L. Sp. Pl. 191. 1753.

Shrubs or small trees; leaves petiolate, entire; flowers whitish, yellowish, red, or purple, in cymes; calyx 5-lobate or 5-dentate; corolla salverform or funnelform, with long tube, the limb with 5 usually spreading lobes; stamens included, the filaments filiform, often appendaged; fruit a 2-celled berry.

Corolla red, purple, or yellow, somewhat ampliate above, contracted at the mouth.

Calyx lobes very short, obtuse. Corolla yellow, glabrous----1. *C. flavescens*.

Calyx lobes usually elongate, acute to attenuate.

Corolla glabrous.

Leaves glabrous beneath-----2. *C. endlicheri*.

Leaves tomentose or villous beneath.

Calyx glabrous-----3. *C. purpureum*.

Calyx villous-----4. *C. roseum*.

Corolla puberulent or villous outside.

Corolla lobes broadly ovate or deltoid, short, erect---5. *C. fasciculatum*.

Corolla lobes lance-oblong, elongate, spreading-----6. *C. benthami*.

Corolla usually white or greenish, the tube gradually broadened from base to apex, not contracted at the mouth.

Filaments appendaged at the point of insertion.

Leaves tomentose, pubescent, or puberulent beneath.

Pubescence of stellate hairs.

Corolla more than twice as long as the calyx-----7. *C. lanatum*.

Corolla less than twice as long as the calyx-----8. *C. pacificum*.

Pubescence of simple hairs.

Corolla tube 8 to 10 mm. long-----9. *C. dumetorum*.

Corolla tube 18 mm. long-----10. *C. hirtellum*.

Leaves glabrous beneath.

Leaves coriaceous, mostly 5 to 8 cm. wide-----11. *C. laurifolium*.

Leaves thin or only slightly coriaceous, mostly less than 5 cm. wide.

Calyx 4 to 6 mm. long.

Corolla 20 to 26 mm. long-----12. *C. oblongifolium*.

Corolla 15 mm. long-----13. *C. pedunculare*.

Calyx 2 to 3 mm. long-----14. *C. nocturnum*.

Filaments not appendaged.

Tube of the corolla twice as long as the calyx or shorter.

Calyx 10 to 15 mm. long-----15. *C. fulvescens*.

Calyx 8 mm. long or less.

Calyx villous or tomentose-----16. *C. confertiflorum*.

Calyx glabrous.

Calyx 4 mm. long-----17. *C. anagyris*.

Calyx 6 to 8 mm. long-----18. *C. thyrsoides*.

Tube of the corolla usually more than 3 times as long as the calyx.

Corolla 8 to 12 mm. long; stigma short-exserted-----19. *C. diurnum*.

Calyx 14 to 25 mm. long or larger; stigma usually included.

Calyx 2 to 2.5 mm. long-----20. *C. viride*.

Calyx 4 to 6 mm. long.

Leaves thick, the lateral nerves nearly obsolete; corolla brownish or rufescent when dry-----21. *C. laxum*.

Leaves thin, the lateral nerves conspicuous beneath; corolla greenish when dry-----22. *C. nitidum*.

1. *Cestrum flavescens* Greenm. Proc. Amer. Acad. 34: 572. 1899.

Type from Cuernavaca, Morelos, altitude 1,500 meters.

Shrub, about 1 meter high; leaves slender-petiolate, oblong-ovate to rounded-ovate, 3 to 5 cm. long, acuminate to very obtuse at apex; flowers pedicellate; calyx 5 mm. long, glabrous; corolla 2 to 2.5 cm. long, orange.

2. *Cestrum endlicheri* Miers, Lond. Journ. Bot. 5: 151. 1846.

Meyenia corymbosa Schlecht. Linnaea 8: 252. 1833. Not *Cestrum corymbosum* Schlecht. 1832.

Veracruz; type from Chiconquiaco.

Glabrous shrub; leaves lance-oblong or ovate-oblong, 13 cm. long or less, long-acuminate, rounded at base; flowers in lax elongate corymbs; calyx 5 to 6 mm. long; corolla red, 2 to 2.5 cm. long.

3. *Cestrum purpureum* (Lindl.) Standl.

Habrothamnus purpureus Lindl. in Edwards, Bot. Reg. 30: pl. 43. 1844.

Habrothamnus paniculatus Mart. & Gal. Bull. Acad. Brux. 12²: 148. 1845.

Not *Cestrum paniculatum* H. B. K. 1819.

Cestrum elegans Schlecht. Linnaea 19: 261. 1847.

Cestrum sylvaticum Dunal in DC. Prodr. 13¹: 603. 1852.

Cestrum elegans truncatum Fernald, Proc. Amer. Acad. 35: 571. 1900.

Veracruz and Oaxaca; described from cultivated plants.

Shrub, 1 to 3.5 meters high; leaves short-petiolate, ovate to lance-oblong, 6.5 to 12 cm. long, acuminate, rounded or obtuse at base, subcoriaceous; flowers in dense terminal cymes; calyx 5 to 6 mm. long, purplish; corolla purple, 1.5 to 2.5 cm. long; fruit red-purple, 10 to 12 mm. long. "Flor del soldado" (Veracruz, Ramírez); "flor de colmena" (Veracruz, Seler).

Cestrum elegans truncatum is a form with subtruncate corolla limb.

4. *Cestrum roseum* H. B. K. Nov. Gen. & Sp. 3: 59. pl. 197. 1819.

Cestrum chiapense T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Hidalgo to Chiapas; type from Morán, Hidalgo; reported from Oaxaca.

Shrub; leaves oblong to elliptic-oval, 6.5 cm. long or less, acute to rounded at apex, thin, petiolate; flowers sessile or nearly so, crowded, terminal and axillary; corolla pink or purplish, 2 to 2.5 cm. long. "Hediondilla" (Hidalgo, Oaxaca, Ramírez).

It is possible that *C. chiapense* is a distinct species, but the specimens agree well with the descriptions of *C. roseum*.

5. *Cestrum fasciculatum* (Schlecht.) Miers, Lond. Journ. Bot. 5: 151. 1846.

Meyenia fasciculata Schlecht. Linnaea 8: 251. 1833.

Cestrum hartwegi Dunal in DC. Prodr. 13¹: 599. 1852.

Veracruz, Puebla, and Oaxaca; type from Chiconquiaco, Veracruz. Guatemala.

Shrub, 1 to 2 meters high; leaves lance-oblong to broadly ovate, 13 cm. long or less, acute, rounded or obtuse at base, short-petiolate; flowers in dense, chiefly terminal cymes; calyx about 6 mm. long, villosulous or glabrate; corolla about 2 cm. long, red-purple; fruit globose, 12 mm. long. "Hierba del perro" (Oaxaca, Ramírez).

6. *Cestrum benthami* Miers, Lond. Journ. Bot. 5: 151. 1846.

Habrothamnus tomentosus Benth. Pl. Hartw. 49. 1840. Not *Cestrum tomentosum* L. f. 1781.

Hidalgo, Puebla, Oaxaca, and Mexico; type from Real del Monte, Hidalgo.

Shrub, 1 to 2 meters high; leaves oblong-lanceolate to broadly ovate, 12 cm. long or less, acute or acuminate, obtuse or rounded at base, villous-tomentose beneath; flowers sessile, fasciculate chiefly terminal; calyx 8 to 10 mm. long, villous; corolla purple, 2.5 to 3 cm. long; fruit 1 to 1.5 cm. long.

7. *Cestrum lanatum* Mart. & Gal. Bull. Acad. Brux. 12²: 18. 1845.

Durango and Tepic to Chiapas and Veracruz; type from Mirador, Veracruz. Central America.

Shrub, 2 to 6 meters high; leaves mostly lanceolate or lance-oblong, 6 to 15 cm. long, acute to long-acuminate, densely stellate-tomentose beneath, at least when young; cymes dense, axillary and terminal; calyx densely tomentose; corolla greenish white, 13 to 17 mm. long; fruit about 1 cm. long. "Ahuacatillo" (Guanajuato); "candelilla" (Durango); "zorrillo" (Costa Rica); "chacuaco" (Veracruz); "palo hediondo," "huele de noche" (El Salvador).

The plant has a strong and disagreeable odor. A decoction of the wood is said to have cathartic properties, and is employed as a remedy for fevers. The black fruit is reported to yield a dye. The leaves are sometimes placed in hens' nests to keep away vermin.

8. *Cestrum pacificum* T. S. Brandeg. Erythea 7: 6. 1899.

Socorro Island.

Shrub, stellate-tomentose throughout; leaves oblong-ovate to broadly ovate, 6 to 11 cm. long, acute or obtuse, sometimes glabrate above in age; flowers mostly sessile, in terminal and axillary cymes; corolla 12 mm. long.

9. *Cestrum dumetorum* Schlecht. Linnaea 7: 61. 1832.

?*Cestrum semivestitum* Dunal in DC. Prodr. 13¹: 651. 1852.

Nuevo León to Veracruz, Oaxaca, and Morelos; type from Veracruz.

Shrub, 2 to 6 meters high; leaves lanceolate to oblong-ovate, 16 cm. long or less, usually long-acuminate, glabrous above, sparsely villosulous or glabrate beneath; cymes small, mostly axillary; corolla about 1.5 cm. long, greenish yellow; fruit 1 cm. long or smaller, black. "Potonxihuite" (Oaxaca); "galán," "huele de día" (Nuevo León); "palo hediondo" (Tamaulipas, El Salvador); "chacuaco," "hediondilla," "tepozán" (Veracruz); "huele de noche" (Veracruz, El Salvador); "tiscuite," "hediondo" (El Salvador).

A decoction of the plant is employed in Tamaulipas as a remedy for cutaneous diseases. In El Salvador the plant is reputed to be poisonous to cattle.

10. *Cestrum hirtellum* Schlecht. Linnaea 7: 62. 1832.

Type from Hacienda de la Laguna, near Jalapa, Veracruz.

Leaves broadly or narrowly lanceolate, obtuse or acute, glabrate in age; calyx about 3 mm. long; corolla greenish white.

11. *Cestrum laurifolium* L'Hér. Stirp. Nov. 4: 69. 1785.

Cestrum alaternoides Desf. Tabl. Ecol. Bot. Mus. 70. 1804.

Michoacán and Guerrero to Veracruz. West Indies; Central America.

Shrub or small tree, 6 meters high or less, glabrous throughout or nearly so; leaves mostly elliptic-oblong and 11 to 16 cm. long, lustrous, acute or short-acuminate; cymes lateral or axillary; calyx 2.5 to 3.5 mm. long; corolla 12 to 16 mm. long, greenish white; fruit 7 to 9 mm. long. "Galán de día" (Cuba), "tiscuite," "palo hediondo," "huele de noche" (El Salvador).

12. *Cestrum oblongifolium* Schlecht. Linnaea 19: 266. 1847.

?*Cestrum lancifolium* Schlecht. Linnaea 19: 267. 1847.

Type from Los Reyes; the type of *C. lancifolium* collected between Los Baños and Puente de Dios, Veracruz.

Shrub, 1 to 1.5 meters high; leaves lance-oblong, 11 cm. long or less, acuminate, glabrous; calyx 4 mm. long, pubescent.

13. *Cestrum pedunculare* Pavón; Dunal in DC. Prodr. 13¹: 618. 1852.

Type from somewhere in Mexico.

Leaves ovate-lanceolate, 5 cm. long or less, acuminate, glabrous; flowers in axillary pedunculate racemes; calyx 5 to 6 mm. long, glabrous.

14. *Cestrum nocturnum* L. Sp. Pl. 191. 1753.

Cestrum nocturnum mexicanum O. E. Schluz in Urban, Symb. Antill. 6: 256. 1909.

Coahuila to Guerrero, Oaxaca, and Veracruz. West Indies and Central America.

Shrub, 4.5 meters high or less, glabrous throughout or nearly so; leaves mostly oblong-lanceolate, 5 to 12 cm. long, acuminate; flowers mostly in axillary cymes; corolla 18 to 25 mm. long, greenish white; fruit 8 to 10 mm. long. "Huele de noche" (Puebla, Coahuila, Veracruz, Jalisco, Oaxaca, Guatemala); "hierba hedionda" (*Ramírez*); "pipiloxihuitl" (*Ramírez*); "galán de tarde" (Oaxaca, *Reko*); "galán de noche" (Guatemala, Cuba); "dama de noche" (Porto Rico, Philippines); "reina de la noche" (Guatemala); "palo hediondo" (El Salvador).

The flowers are very fragrant, especially at night. The juice and the fruit are reported to be poisonous, but an extract of the plant has been employed as an antispasmodic, especially for the treatment of epilepsy.

The Mexican and Central American material (*C. nocturnum mexicanum* O. E. Schulz) differs from the West Indian in having slightly smaller flowers. *C. graciliflorum* Dunal¹ is probably a synonym.

15. *Cestrum fulvescens* Fernald, Proc. Amer. Acad. 35: 572. 1899.

Cestrum arborescens T. S. Brandeg. Zoe 5: 256. 1908.

Michoacán to Puebla and Oaxaca; type from mountains of Telixtlahuaca, Oaxaca, altitude 2,000 meters.

Shrub, glabrous throughout or nearly so; leaves narrowly lanceolate to elliptic-oblong, 11 cm. long or less, acute or acuminate; cymes mostly axillary and racemiform, lax, the flowers mostly pedicellate; calyx angulate, somewhat inflated, contracted below into a slender stipe; corolla 2 to 2.5 cm. long; fruit 10 to 12 mm. long.

16. *Cestrum confertiflorum* Schlecht. Linnaea 19: 263. 1847.

Cestrum terminale Dunal in DC. Prodr. 13¹: 608. 1852.

Jalisco, Michoacán, and Mexico; type from Angangueo, Michoacán.

Shrub, about 2 meters high; leaves oblong-lanceolate, 9 to 15 cm. long, acuminate, glabrous, pale beneath; cymes dense, chiefly in terminal panicles; calyx 6 to 7 mm. long; corolla 14 to 16 mm. long. "Hierba de la mula" (Mexico, *Villada*).

17. *Cestrum anagyris* Dunal in DC. Prodr. 13¹: 608. 1852.

Mexico; type from Toluca.

Leaves ovate-elliptic, 5 cm. long or less, acute, glabrous; flowers pedicellate; corolla 10 to 11 mm. long.

18. *Cestum thyrsolideum* H. B. K. Nov. Gen. & Sp. 3: 63. 1818.

Cestrum persicaefolium Dunal in DC. Prodr. 13¹: 608. 1852.

Cestrum involucratum Dunal in DC. Prodr. 13¹: 610. 1852.

Michoacán, Mexico, Puebla, and Tlaxcala; type from Chalco, Mexico.

¹ In DC. Prodr. 13¹: 669. 1852.

Shrub, 1 to 2.5 meters high, glabrous throughout or nearly so; leaves petiolate, mostly oblong-lanceolate, 8 to 18 cm. long, acuminate or rarely obtuse, pale beneath; flowers in terminal paniced cymes; corolla about 1.5 cm. long.

19. *Cestrum diurnum* L. Sp. Pl. 191. 1753.

Sinaloa (probably cultivated) and Yucatán. West Indies.

Shrub, usually about a meter high; leaves oblong or oblong-elliptic, 6.5 to 12 cm. long, acute or obtuse, glabrous; flowers mostly in axillary pedunculate racemes; calyx 3.5 mm. long, glabrous or somewhat tomentose; corolla white; fruit about 6 mm. long. "Juan de noche" (Yucatán); "galán de día" (Cuba).

20. *Cestrum viride* Moric.; Dunal in DC. Prodr. 13¹: 606. 1852.

Described from plants cultivated in Mexico; specimens from Puebla and Michoacán or Guerrero perhaps belong here.

Shrub, 3 to 4 meters high; leaves oblong-lanceolate, 17 cm. long or less, long-acuminate, glabrous, short-petiolate, rounded or obtuse at base; flowers in axillary or terminal, often paniced cymes; corolla about 1.5 cm. long.

21. *Cestrum laxum* Benth. Pl. Hartw. 33. 1840.

Cestrum psychotriaefolium Schlecht. Linnaea 19: 265. 1847.

Cestrum bourgeauianum Fernald, Proc. Amer. Acad. 35: 572. 1900.

San Luis Potosí and Guanajuato to Mexico and Oaxaca; type from León, Guanajuato.

Shrub, 2 to 4.5 meters high, glabrous throughout or nearly so; leaves lanceolate to oblong or oblong-elliptic, 10 cm. long or less, acute or acuminate; cymes axillary and terminal, the flowers mostly pedicellate; corolla 16 to 22 mm. long. "Paloma" (Veracruz).

22. *Cestrum nitidum* Mart. & Gal. Bull. Acad. Brux. 12³: 19. 1845.

Michoacán to Morelos and Oaxaca; type from mountains of Oaxaca.

Shrub or small tree, 1.5 to 6 meters high, glabrous throughout or nearly so; leaves slender-petiolate, lanceolate to elliptic, 7 to 11 cm. long, acuminate; cymes chiefly in terminal panicles, the flowers mostly pedicellate; corolla 22 to 30 mm. long.

DOUBTFUL SPECIES.

CESTRUM AMYGDALIFOLIUM Dunal in DC. Prodr. 13¹: 653. 1852. Assigned doubtfully to Mexico.

CESTRUM EHRENBERGII Dunal in DC. Prodr. 13¹: 613. 1852. Type from Chapultepec.

CESTRUM MULTINERVIUM Dunal in DC. Prodr. 13¹: 611. 1852. Type collected between Tula and Tampico.

CESTRUM PROPINQUUM Mart. & Gal. Bull. Acad. Brux 12³: 147. 1845. Type from Jalapa, Veracruz.

4. *SWARTZIA* Gmel. Syst. Nat. 2: 360. 1791.

Shrubs, often scandent; leaves entire; flowers large, white or yellow; calyx tubular, 2 to 5-lobate; corolla funnelform, the lobes broad, imbricate, spreading in anthesis; stamens 5, the filaments filiform; fruit baccate, 2-celled.

Calyx and lower surface of leaves tomentose or pubescent.....1. *S. guttata*.
Calyx and leaves glabrous.....2. *S. nitida*.

1. *Swartzia guttata* (Don) Standl.*Solandra guttata* Don in Edwards, Bot. Reg. pl. 1551. 1832.

Durango and Zacatecas, and perhaps elsewhere.

Plants subscandent, 7 meters long or more, the stems 5 to 7 cm. in diameter; leaves petiolate, lance-elliptic to broadly elliptic, 7 to 15 cm. long, abruptly short-acuminate, glabrate above, loosely tomentose beneath or finally glabrate; calyx 6 to 7 cm. long; corolla about 20 cm. long, cream-colored, changing in age to snuff-colored and orange, with bands of purple inside. "Floripondio del monte" (Durango).

The flowers are fragrant.

2. *Swartzia nitida* (Zucc.) Standl.*Solandra nitida* Zucc. in Roem. Coll. Bot. 128. 1809.*Datura maxima* Sessé & Moc. Pl. Nov. Hisp. 25. 1887.*Solandra selerae* Dammer; Loesener, Bull. Herb. Boiss. 3: 617. 1895.*Solandra hartwegii* N. E. Brown, Kew Bull. Misc. Inf. 1911: 345. 1911.

Veracruz, Puebla, and Oaxaca.

Scandent or erect shrub, glabrous; leaves long-petiolate, oblong to broadly elliptic, 7 to 18 cm. long, obtuse or abruptly short-acuminate, lustrous; calyx 5 to 7 cm. long, the lobes acuminate; corolla 18 to 25 cm. long, yellow, the limb 20 cm. broad or less. "Tecomaxochitl" (Nahuatl); "copa de oro"; "bolsa de Judas"; "gorro de Napoleón"; "tetona" (Veracruz).

A showy plant, often cultivated for ornament. The water contained in the calyx before the flowers open is said to be applied to the eyes to relieve inflammation.

This species has been reported from Mexico as *Solandra grandiflora* Swartz, a West Indian plant. *Solandra macrantha* Dunal, described from Cuba, is probably a synonym of *S. nitida*.

5. **DATURA** L. Sp. Pl. 179. 1753.

REFERENCE: Safford, Synopsis of the genus *Datura*, Journ. Washington Acad. Sci. 11: 173-189. 1921.

Shrubs or small trees, often herbs; leaves petiolate, entire, dentate, or lobate; flowers large, solitary; calyx elongate-tubular, persistent or deciduous; corolla funnelform, the limb 5-lobate; fruit capsular or baccate.

Several herbaceous species occur in Mexico.

Calyx spathaceous, the limb split along one side but otherwise entire.

1. **D. candida.**

Calyx limb 5-lobate.

Calyx longer than the narrow tubular portion of the corolla—2. **D. arborea.**

Calyx shorter than the narrow tubular portion of the corolla.

3. **D. suaveolens.**1. *Datura candida* (Pers.) Pasquale, Cat. Ort. Bot. Nap. 36. 1867.*Brugmansia candida* Pers. Syn. Pl. 1: 216. 1805.

Sinaloa to Veracruz and Oaxaca. Central America.

Shrub, 2.5 to 4.5 meters high; leaves long-petiolate, broadly ovate to oblong-ovate, 40 cm. long or less, acuminate, entire or repand, villosulous or glabrate; flowers sweet-scented; corolla white, about 25 cm. long, the lobes caudate-acuminate. "Floripondio" (Querétaro, Jalisco, San Luis Potosí, Oaxaca, El Salvador, Nicaragua); "floripundio," "trómbita" (Michoacán, León); "campanilla blanca" (Colima); "almizclillo" (Ramírez) "campana" (Guatemala); "reina de la noche" (Costa Rica); "florifundia," "floricundia" (El Salvador).

This plant is common in cultivation in the warmer parts of Mexico, being extremely showy when in flower. It has usually been known as *D. arborea*. Some of the cultivated forms have double flowers. It is, probably, this species of which Acosta wrote in 1606, as follows: "It is true that many of these flowers [of New Spain] are only good to look at, for their odor is not good, or is ordinary, or else they have none at all, but there are some of excellent odor. Such are those that grow on a tree called *floripondio*, which has no fruit, but bears only flowers, which are larger than fleur de lys, shaped like hand-bells, all white, and having within filaments such as one sees in a lily. It bears flowers all the year long, whose odor is wondrously sweet and pleasant, especially in the fresh morning air. The Viceroy Don Francisco de Tolledo sent some of these trees to King Philip, as a thing worthy of being planted in the royal gardens."

2. *Datura arborea* L. Sp. Pl. 179. 1753.

The only Mexican specimens seen are from Sinaloa, where the plant is probably cultivated. Native of South America, the type from Peru.

Shrub or small tree; leaves broadly ovate or elliptic, acuminate, entire or repand, villosulous; corolla white, 15 to 18 cm. long, the lobes long-cuspidate; fruit subglobose, about 6 cm. long, "*Floripondio*" (Colombia, Peru, Ecuador); "*borrachero*," "*guante*" (Colombia); "*floripundio*" (Sinaloa).

In Peru the leaves are applied as poultices to sores to relieve pain and accelerate suppuration.

Datura sanguinea Ruiz & Pav., a South American species with red flowers, is cultivated about the City of Mexico.

3. *Datura suaveolens* Humb. & Bonpl.; Willd. Enum. Pl. 227. 1809.

Yucatán, probably in cultivation. Central and South America.

Shrub or small tree; leaves broadly ovate to oblong-ovate, acuminate, mostly entire, finely villosulous or glabrate; corolla white, 25 to 30 cm. long, the lobes cuspidate. "*Campanilla*," "*flor de campana*," "*floripundio blanco*," "*árbol de la bibijagua*" (Cuba).

6. *LYCIUM* L. Sp. Pl. 191. 1753.

Shrubs, sometimes scandent, usually spiny; leaves entire, small; flowers solitary or fasciculate in the axils or in terminal cymes, white or purplish; calyx campanulate or tubular-campanulate, 3 to 5-lobate; corolla funnelform or salverform, with short or elongate tube, the limb 4 or 5-lobate; stamens included or exserted; fruit a globose or ovoid, 2-celled berry.

The fruit of the Mexican species is edible but insipid. The Indians formerly made considerable use of it, sometimes drying and preserving it until winter. The leaves of *L. barbarum* L., of the Mediterranean region, have been employed as a substitute for Chinese tea. The young shoots of *L. europaeum* L. are said to be eaten as a vegetable in Spain and Italy.

Corolla tube 12 mm. long or more, tubular, only slightly ampliate above.

Lobes of the calyx equaling or longer than the tube.

Stamens exserted; lobes of the calyx nearly or fully twice as long as the tube.....1. *L. macrodon*.

Stamens included; lobes of the calyx about equaling the tube.

Leaves glabrous.....2. *L. schaffneri*.

Leaves glandular-puberulent.....3. *L. puberulum*.

Lobes of the calyx shorter than the tube.

Stamens exserted-----4. *L. exsertum*.

Stamens included.

Leaves obovate to broadly elliptic, 5 to 20 mm. wide--5. *L. umbellatum*.

Leaves spatulate-oblongate, usually less than 5 mm. wide.

6. *L. gracilipes*.

Corolla tube 8 mm. long or less, often ampliate above.

Pedicels strongly compressed, sharply angulate above; calyx lobes very unequal, glabrous-----7. *L. carinatum*.

Pedicels not compressed or sharply angulate; calyx lobes not very unequal or, if so, puberulent.

Calyx lobes narrow, lanceolate or subulate, equaling or longer than the tube.

Leaves glabrous; calyx lobes 1 to 1.5 mm. long----8. *L. geniculatum*.

Leaves usually puberulent; calyx lobes mostly 2 to 4 mm. long.

9. *L. richii*.

Calyx lobes broad, usually deltoid, shorter than the tube.

Lobes of the corolla longer than the tube-----10. *L. carolinianum*.

Lobes of the corolla shorter than the tube or rarely equaling it.

Leaves sparsely short-pilose-----11. *L. retusum*.

Leaves glabrous or minutely puberulent.

Corolla 7 to 10 mm. long.

Leaves glabrous.

Leaves 3 mm. wide or less-----12. *L. berlandieri*.

Leaves mostly 4 to 7 mm. wide-----13. *L. torreyi*.

Leaves puberulent-----14. *L. cedrosense*.

Corolla 4 to 6 mm. long.

Tube of the corolla not exceeding the calyx lobes.

15. *L. californicum*.

Tube of the corolla not exceeding the calyx lobes.

Corolla lobes spreading or ascending-----16. *L. barbinodum*.

Corolla lobes recurved-----17. *L. peninsulare*.

1. *Lycium macrodon* A. Gray, Proc. Amer. Acad. 6: 46. 1862.

Sonora. Type from southern Nevada or California.

Spiny shrub; leaves oblong-oblongate or elliptic, 1 to 4 cm. long, obtuse or acute, glabrous; calyx 1 cm. long or less; corolla pale lilac, about 1.5 cm. long; fruit orange.

2. *Lycium schaffneri* A. Gray; Hemsl. Biol. Centr. Amer. Bot. 2: 426. 1882.

Zacatecas and San Luis Potosí; type from San Luis Potosí.

Leaves lance-oblong or oblongate-oblong, 1.5 to 3.5 cm. long, obtuse or acute, sessile or nearly so; calyx 4 mm. long, glabrous; corolla 1.5 cm. long; fruit about 8 mm. long.

3. *Lycium puberulum* A. Gray, Proc. Amer. Acad. 6: 46. 1862.

Western Texas, along the Rio Grande, and doubtless occurring in Mexico.

Spiny shrub, about a meter high; leaves obovate or oblongate-oblong, 8 to 15 mm. long, obtuse; calyx lobes spreading or recurved; corolla nearly 1.5 cm. long, white, the lobes deltoid.

4. *Lycium exsertum* A. Gray, Proc. Amer. Acad. 20: 305. 1885.

Sonora; type from Altar.

Spiny shrub, 1 to 2 meters high; leaves spatulate-obovate or elliptic, 1 to 3.5 cm. long, acute to rounded at apex, viscid-puberulent; flowers slender-pedicellate; calyx about 6 mm. long, viscid-puberulent; corolla lobes very short, rounded; fruit orange or red.

5. *Lycium umbellatum* Rose, Contr. U. S. Nat. Herb. 1: 74. 1890.

Baja California; type from La Paz.

Shrub, 2 to 3.5 meters high, unarmed or with spinose branchlets; leaves 1.5 to 3 cm. long, obtuse or rounded at apex, short-petiolate, viscid-puberulent; flowers long-pedicellate; calyx 6 to 8 mm. long, tubular; corolla purple, 1.5 cm. long.

6. *Lycium gracilipes* A. Gray, Proc. Amer. Acad. 12: 81. 1877.

Northern Sonora. Arizona; type from Williams Fork.

Leaves 1 to 2 cm. long, obtuse, attenuate to base, viscid-puberulent; flowers long-pedicellate; calyx tubular-campanulate, 6 mm. long; corolla about twice as long as the calyx, purple or whitish, the lobes rounded.

7. *Lycium carinatum* S. Wats. Proc. Amer. Acad. 24: 65. 1889.

Sonora; type from Guaymas.

Thorny, glabrous shrub, about 1 meter high; leaves linear-spatulate or narrowly spatulate, 5 to 20 mm. long, obtuse; flowers slender-pedicellate; corolla white, 4 to 6 mm. long. "Sal sieso" (Palmer).

8. *Lycium geniculatum* Fernald, Proc. Amer. Acad. 35: 566. 1900.

Oaxaca and Puebla; type from Tehuacán, Puebla.

Spiny shrub; leaves oblong or obovate, 2.5 cm. long or less, obtuse or acute, very glaucous, slender-petiolate; flowers in small terminal cymes, long-pedicellate; corolla 12 mm. long, the lobes cordate.

9. *Lycium richii* A. Gray, Proc. Amer. Acad. 6: 46. 1862.

Lycium palmeri A. Gray, Proc. Amer. Acad. 8: 292. 1870.

Lycium pringlei A. Gray, Proc. Amer. Acad. 20: 305. 1885.

Baja California, Sonora, and Sinaloa; type from La Paz, Baja California. Southern California.

Spiny shrub, 1.5 to 2.5 meters high, finely puberulent throughout; leaves obovate or oblanceolate, usually about 1 cm. long, obtuse or acute, sessile or nearly so; flowers short-pedicellate; calyx about 3 mm. long; corolla lilac, 8 to 10 mm. long; fruit red. "Frutilla" (Baja California).

10. *Lycium carolinianum* Walt. Fl. Carol. 84. 1788.

?*Lycium quadrifidum* Sessé & Moc.; Dunal in DC. Prodr. 13¹: 513. 1852.

In saline marshes or alkaline soil, Baja California, Michoacán, and Tamaulipas. Southern United States.

Glabrous spiny shrub, the long branches trailing or subscandent; leaves oblanceolate-oblong to linear-spatulate, 3 cm. long or less, obtuse or acute; flowers slender-pedicellate; calyx irregularly lobate; corolla purple, the limb subrotate, about 12 mm. broad.

11. *Lycium retusum* Robins. & Fern. Proc. Amer. Acad. 30: 120. 1894.

Type from Oputo, Sonora.

Shrub, 2 to 3 meters high; leaves broadly obovate, 2 cm. long or less, petiolate, rounded or retuse at apex, cuneate at base; flowers slender-pedicellate; calyx tubular, 5 mm. long, glandular-pubescent; corolla 8 mm. long.

12. *Lycium berlandieri* Dunal in DC. Prodr. 13¹: 520. 1852.

?*Lycium brevipes* Benth. Bot. Voy. Sulph. 40. 1844.

Lycium senticosum Miers, Ann. Mag. Nat. Hist. II. 14: 138. 1854.

Lycium stolidum Miers, Ann. Mag. Nat. Hist. II. 14: 191. 1854.

Baja California to Nuevo León and Hidalgo. Western Texas; type from San Antonio.

Spiny shrub, 1 to 2.5 meters high; leaves linear-spatulate, obtuse, about 1 cm. long; flowers on long or short pedicels. "Cilindrillo" (Coahuila).

13. *Lycium torreyi* A. Gray, Proc. Amer. Acad. 6: 47. 1862.

Chihuahua. Western Texas to southern California; type collected in Texas on the Rio Grande.

Spiny shrub, 1 to 2.5 meters high, glabrous; leaves 3.5 cm. long or less, obtuse or acute, attenuate to base; flowers short-pedicellate; corolla about 1 cm. long, purplish; fruit red. "Garambullo" (Chihuahua); "tomatillo" (New Mexico).

14. *Lycium cedrosense* Greene, Pittonia 1: 268. 1889.

Lycium andersonii pubescens S. Wats. Proc. Amer. Acad. 24: 65. 1889.

Baja California; type from Cedros Island.

Spiny shrub, finely puberulent throughout; leaves obovate to narrowly spatulate, 1 cm. long or less, obtuse; flowers short-pedicellate.

15. *Lycium californicum* Nutt.; A. Gray in Brewer & Wats. Bot. Calif. 1: 542. 1876.

Baja California. Southern California; type from San Diego.

Low, stiff shrub; leaves linear or nearly so, 1 cm. long or less, very fleshy; flowers short-pedicellate; corolla white, the limb with 4 rounded lobes.

16. *Lycium barbinodum* Miers, Ann. Mag. Nat. Hist. II. 14: 138. 1854.

Sonora and Sinaloa to Zacatecas and Coahuila.

Shrub, 1 to 2 meters high, with spinose branchlets; leaves linear-spatulate, mostly 1 cm. long or less, obtuse; corolla white. "Agrita" (Zacatecas).

17. *Lycium peninsulare* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 359. 1916.

Baja California; type from San José del Cabo.

Spiny glabrous shrub; leaves linear-spatulate to obovate, 2 cm. long or less, rounded or obtuse at apex; flowers on short or elongate pedicels.

Probably not distinct from *L. barbinode*.

7. **ACNISTUS** Schott, Wien. Zeitschr. 4: 1180. 1829.

Unarmed shrubs; leaves entire; pedicels solitary or fasciculate; calyx campanulate, truncate or 5-dentate, not accrescent; corolla tubular or funnel-form, 5-lobate, the lobes induplicate-valvate; stamens 5; fruit a globose 2-celled berry.

Corolla 12 mm. long-----1. **A. macrophyllus**.
Corolla 8 mm. long-----2. **A. pringlei**.

1. **Acnistus macrophyllus** (Benth.) Standl.

Lycium macrophyllum Benth. Pl. Hartw. 49. 1840.

Acnistus benthami Miers, Lond. Journ. Bot. 4: 342. 1845.

Michoacán; type from Morelia.

Leaves petiolate, oblong, about 10 cm. long, acute at base and apex, glabrous above, puberulent beneath; calyx cupuliform, 3 to 4 mm. long.

2. **Acnistus pringlei** Fernald, Proc. Amer. Acad. 40: 56. 1904.

Type from Valley of Zamora, Michoacán, altitude 1,500 meters.

Shrub, 3 to 4.5 meters high; leaves elliptic-lanceolate or lance-oblong 4 to 11 cm. long, acute, thinly tomentulose or glabrate beneath; calyx 2 to 3 mm. long, glabrous, the lobes obtuse; corolla glabrous; fruit about 7 mm. in diameter.

Probably not distinct from *A. macrophyllus*.

8. SOLANUM L. Sp. Pl. 184. 1753.

REFERENCES: Dunal in DC. Prodr. 13¹: 27-387. 1852; O. E. Schulz in Urban, Symb. Antill. 6: 149-249. 1909; Fernald, A revision of the Mexican and Central American Solanums of the subsection *Torvaria*, Proc. Amer. Acad. 35: 557-562. 1900.

Shrubs or herbs, sometimes scandent, the pubescence often of branched hairs; leaves entire, lobed, or pinnate; flowers usually cymose, racemose, or umbellate; calyx campanulate, 5-dentate or 5-lobate; corolla rotate, 5-angulate or 5-parted; filaments short, the anthers sometimes unequal, connate or connivent; fruit a globose berry.

Many herbaceous species occur in Mexico. Hemsley lists 139 species of *Solanum* from Mexico and Central America, but it is doubtful whether so many occur in the region. A rather large number of shrubby species are known to the writer only from Dunal's descriptions, and only a few of them have been placed in the following list. Many of them are based upon Pavón specimens which may have come from South America rather than Mexico.

The genus contains several species of economic importance, among which may be noted the potato, *Solanum tuberosum* L., native of the South American Andes, and the eggplant ("berenjena"), *Solanum melongena* L., a native of Asia and Africa.

A. Anthers short, the terminal pores usually anterior; plants never prickly. Flowers mostly axillary, the pedicels solitary or fasciculate.

Calyx 5-lobate-----1. *S. geminiflorum*.

Calyx with numerous (usually 10) lobes, or the lobes obsolete.

Pubescence of the leaves of simple hairs.

Calyx lobes obsolete-----2. *S. pringlei*.

Calyx lobes well developed.

Calyx hirsute with long hairs-----3. *S. amatitlanense*.

Calyx hirtellous with short subappressed hairs.

4. *S. nyctaginoides*.

Pubescence of branched hairs, or the leaves sometimes glabrous.

Pedicels and calyx hispid-----5. *S. purpusii*.

Pedicels and calyx glabrous or finely stellate-pubescent.

Leaves usually rounded or obtuse at apex, nearly or fully as broad as long, broadly rounded or subcordate at base---6. *S. lambii*.

Leaves acute to acuminate, much longer than broad or, if obtuse, acute at base.

Corolla 6 mm. long-----7. *S. sideroxyloides*.

Corolla over 1 cm. long.

Leaves densely and finely stellate-pubescent beneath.

8. *S. lentum*.

Leaves glabrous beneath or nearly so.

Leaves small, 5 cm. long or less-----9. *S. nocturnum*.

Leaves mostly 6 to 14 cm. long.

Leaves subcoriaceous, lustrous-----10. *S. chiapense*.

Leaves thin, dull-----11. *S. stephanocalyx*.

Flowers in cymes, racemes, or umbels, these all or mostly pedunculate.

B. Leaves pinnate or pinnate-lobate, or hastate-lobate, sometimes simple but the plants then scandent.

Leaves entire or hastate-lobate at base, or only the lower ones pinnatisect.

- Leaves hastate-lobate at base.
 Corolla 5-parted-----29. *S. triquetrum*.
 Corolla 5-angulate-----30. *S. xanti*.
- Leaves not hastate-lobate.
 Anthers linear, about 3 times as long as broad; leaves glabrous beneath except along the costa-----12. *S. jasminoides*.
 Anthers broadly oblong or oval, less than twice as long as broad; leaves short-villous beneath-----13. *S. macrantherum*.
- Leaves all pinnate or pinnate-lobate.
 Pubescence of fine branched hairs; lobes of the leaves obtuse.
 14. *S. palmeri*.
 Pubescence of simple hairs; leaf segments acute or acuminate.
 Corolla about 5 mm. long-----15. *S. appendiculatum*.
 Corolla about 10 mm. long.
 Leaves glabrous beneath-----16. *S. seaforthianum*.
 Leaves villosulous beneath-----17. *S. galeotti*.
- BB. Leaves simple, entire or toothed, never hastate-lobate; plants commonly erect.
- C. Mature leaves densely stellate-pubescent beneath over the whole surface.
 Flowers in few-flowered lateral umbels.
 Corolla lobes ascending-----18. *S. lignescens*.
 Corolla lobes reflexed.
 Hairs on the upper surface of the leaves mostly simple.
 19. *S. plurifurcipilum*.
 Hairs on the upper surface of the leaves all branched.
 20. *S. jaliscanum*.
- Flowers in many-flowered cymes, these often terminal.
 Younger branches with coarse, conspicuously stipitate, branched hairs-----21. *S. umbellatum*.
 Younger branches with fine stellate hairs, these sessile or nearly so.
 Leaves glabrous on the upper surface or nearly so, attenuate at base-----27. *S. cervantesii*.
 Leaves densely stellate-pubescent on the upper surface or, if glabrate, obtuse or rounded at base.
 Petioles very short, less than 1 cm. long; calyx shallowly and obtusely denticulate-----22. *S. salviifolium*.
 Petioles usually more than 1 cm. long; calyx deeply dentate.
 Ovary tomentose; leaves velutinous-tomentose on the upper surface-----23. *S. verbascifolium*.
 Ovary glabrous; leaves stellate-scaberulous on the upper surface or glabrate.
 Hairs on the lower surface of the leaf extremely minute, the leaves appearing glabrous-----24. *S. plumense*.
 Hairs on the lower surface of the leaf conspicuous.
 25. *S. bicolor*.
- CC. Mature leaves glabrous beneath or nearly so, the pubescence, if any, chiefly along or near the costa, or the leaves sometimes rather densely pubescent with simple hairs.
 Flowers in large many-flowered cymes, these chiefly terminal.
 Branches winged-----26. *S. aligerum*.
 Branches not winged-----27. *S. cervantesii*.

Flowers in few-flowered lateral umbels or racemes.

Pubescence of the leaves of simple hairs.

Corolla about 5 mm. long-----28. *S. nigrum*.

Corolla about 10 mm. long-----30. *S. xanti*.

Pubescence none or of branched hairs.

Young branchlets with a feltlike tomentum_31. *S. brachystachys*.

Young branchlets glabrous or obscurely puberulent.

Leaves acuminate; pedicels usually recurved in fruit.

32. *S. nudum*.

Leaves mostly obtuse; pedicels erect in fruit--33. *S. diphyllum*.

AA. Anthers more or less elongate, the terminal pores posterior or directed upward; plants nearly always armed with prickles.

D. Prickles of the stems strongly recurved; leaves not prickly on the upper surface.

Leaves glabrous on the upper surface, or pubescent with simple hairs.

Leaves entire-----34. *S. oaxacantum*.

Leaves all or mostly pinnate-lobate-----35. *S. refractum*.

Leaves sparsely or densely stellate-pubescent on the upper surface.

Branches glabrous or nearly so-----36. *S. houstonii*.

Branches copiously pubescent, the indument variable in character.

Prickles of the stems large, few, mostly 3 to 6 mm. long.

Leaves cuneate-decurrent at base, sessile or nearly so.

37. *S. jamaicense*.

Leaves not cuneate-decurrent at base, petiolate.

Leaves green beneath, sparsely stellate-hirsute.

38. *S. donnell-smithii*.

Leaves whitish-tomentose beneath-----39. *S. amictum*.

Prickles of the stems small, numerous, most of them 2 mm. long or less-----40. *S. lanceifolium*.

DD. Prickles straight or only slightly curved, or sometimes wanting, rarely recurved but the leaves then prickly on the upper surface.

Fruit densely hirsute.

Prickles of the stem glandular-puberulent-----41. *S. hirtum*.

Prickles not glandular-puberulent-----42. *S. tequilense*.

Fruit glabrous or nearly so.

Pubescence of the upper surface of the leaves chiefly of long simple hairs.

Calyx and pedicels not prickly-----43. *S. mammosum*.

Calyx and pedicels prickly.

Leaves sparsely hirsute on the upper surface, with few scattered stellate hairs beneath-----44. *S. aculeatissimum*.

Leaves densely pilose above, densely stellate-pubescent beneath.

35. *S. chloropetalum*.

Pubescence of the upper surface of the leaves chiefly of fine stellate hairs.

Calyx accrescent after anthesis, usually closely investing the fruit and nearly or quite equaling it.

Leaves all entire-----46. *S. hindsianum*.

Leaves, at least most of them, undulate or lobate.

Shorter anthers 1.5 cm. long or more; leaves lobed nearly to the costa-----47. *S. azureum*.

Shorter anthers 1 cm. long or less; leaves usually shallowly lobate-----48. *S. amazonium*.

Calyx slightly if at all accrescent, much shorter than the fruit, usually spreading.

Fruit 3 cm. in diameter or larger-----49. *S. marginatum*.

Fruit usually less than 2 cm. in diameter.

Stems bristly-hispid, each bristle with a tuft of hairs at apex.

50. *S. hispidum*.

Stems not hispid.

Pubescence of the pedicels partly of gland-tipped hairs.

Leaves deeply lobate-----51. *S. hernandesii*.

Leaves shallowly lobate or entire.

Pedicels erect in fruit-----52. *S. torvum*.

Pedicels reflexed in fruit-----53. *S. madreense*.

Pubescence of the pedicels eglandular.

Anthers 8 to 10 mm. long-----54. *S. mitlense*.

Anthers about 5 mm. long.

Leaves acute to attenuate at base, entire.

55. *S. laurifolium*.

Leaves usually obtuse to subcordate at base, most of them

undulate or sinuate-lobate-----56. *S. diversifolium*.

1. *Solanum geminiflorum* Mart. & Gal. Bull. Acad. Brux. 12¹: 142. 1845.

Type from Chinantla, Oaxaca.

Glabrous shrub; leaves ovate-lanceolate, 7 to 10 cm. long, acuminate, attenuate at base, entire; pedicels geminate; flowers white, 6 mm. long.

Solanum hookerianum Spreng., listed by Hemsley, is a synonym of *S. havanense* Jacq., and is not known from Mexico.

2. *Solanum pringlei* Robins. & Greenm. Amer. Journ. Sci. 50: 160. 1895.

Jalisco and Michoacán; type from Lake Chapala, Jalisco.

Plants suffrutescent, about 2 meters high, the branches viscid-villous; leaves broadly ovate, 5 to 12 cm. long, long-acuminate, broadly rounded and short-decurrent at base, short-villous; pedicels geminate, recurved in fruit; corolla nearly 1.5 cm. long; fruit bright red, 1.5 cm. long, glabrous.

3. *Solanum amatitlanense* Coult. & Donn. Smith, Bot. Gaz. 37: 420. 1904.

Chiapas. Guatemala; type from Amatitlán.

Shrub, the branches hirsute with forked hairs; leaves on very short petioles, oblong-lanceolate or elliptic-oblong, 20 cm. long or less, long-acuminate, obtuse or acute at base and very unequal, entire, hirsute; pedicels fasciculate.

The writer has seen no material of *S. sylvicola* T. S. Brandeg.,¹ described from Finca Irlanda, Chiapas, which may be a synonym of this species.

4. *Solanum nyctaginoides* Dunal in DC. Prodr. 13¹: 172. 1852.

Hidalgo and probably elsewhere; described from somewhere in Mexico.

Slender shrub, 3 to 4.5 meters high, the branches hirtellous; leaves slender-petiolate, lanceolate to ovate-elliptic, 13 cm. long or less, long-acuminate, attenuate at base, pilose-hirsute, entire; pedicels fasciculate; corolla 10 to 14 mm. long; fruit globose, orange.

5. *Solanum purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 62. 1914.

Type from Finca Mexiquito, Chiapas.

Slender shrub, the branches hirsute with branched hairs; leaves short-petiolate, oblong-ovate, 12 cm. long or less, acuminate, rounded at base, entire, sparsely hirsute above, sparsely stellate-pubescent beneath; pedicels solitary or geminate; calyx lobes in fruit sometimes 1.5 cm. long; fruit 1.5 cm. in diameter.

¹ Univ. Calif. Publ. Bot. 6: 373. 1917.

6. *Solanum lambii* Fernald, Bot. Gaz. 20: 536. 1895.

Sinaloa and Jalisco; type from Villa Unión, Sinaloa.

Woody vine, the branches stellate-pubescent; leaves slender-petiolate, rounded-ovate, 4 cm. long or less, entire, finely stellate-pubescent or rarely glabrate; pedicels geminate or fasciculate; corolla bluish, 1.5 cm. long; fruit 5 to 6 mm. in diameter, glabrous.

7. *Solanum sideroxyloides* Schlecht. Linnaea 8: 253. 1833.

Type from Hacienda de la Laguna, Veracruz.

Shrub, the branches stellate-tomentose; leaves petiolate, ovate or oblong-ovate, 7 cm. long or less, acute or short-acuminate, obtuse at base, entire, brownish-tomentose beneath; pedicels fasciculate; corolla white; fruit glabrous.

8. *Solanum lentum* Cav. Icon. Pl. 4: 4. pl. 308. 1797.

Solanum stellatum lentum O. E. Schulz in Urban, Symb. Antill. 6: 189. 1909.

Tamaulipas, Veracruz, and Oaxaca. Cuba, Guatemala, and El Salvador.

Shrub, trailing or scandent, sometimes 3 meters long, the branches densely stellate-pubescent; leaves ovate or oblong-ovate, 6.5 cm. long or less, entire, obtuse or rounded at base; pedicels usually fasciculate; corolla usually violet, 14 to 18 mm. long; fruit red, 6 to 8 mm. in diameter, glabrous. "Quesillo," "manzana montés," "guaco" (El Salvador).

Closely related to *S. virgatum* Lam., a West Indian species, and perhaps not distinct.

9. *Solanum nocturnum* Fernald, Proc. Amer. Acad. 35: 570. 1900.

Guerrero and Oaxaca; type from Acapulco.

Woody vine, the branches minutely stellate-pubescent or glabrate; leaves slender-petiolate, acute or obtuse, entire, finely and sparsely stellate-pubescent when young but soon glabrous; pedicels solitary or geminate; corolla 12 to 15 mm. long; fruit 1 cm. in diameter.

10. *Solanum chiapense* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Type from Finca Irlanda, Chiapas.

Shrub, glabrous throughout, probably scandent; leaves on very short petioles, elliptic or lance-oblong, 10 cm. long or less, narrowed to the obtuse or acutish apex, obtuse or subacute at base, entire; pedicels solitary or geminate; anthers unequal.

11. *Solanum stephanocalyx* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 374. 1917.

Veracruz; type from Zacuapan.

Plants slender, herbaceous or fruticose, the branches puberulent or nearly glabrous; leaves petiolate, ovate or elliptic-ovate, 14 cm. long or less, acute to rounded at base, entire, puberulent beneath along the veins or glabrous; pedicels solitary or geminate; corolla 12 to 18 mm. long.

12. *Solanum jasminoides* Paxton, Mag. Bot. 8: pl. 5. 1841.

Morelos and Veracruz, naturalized; cultivated about the City of Mexico. Native of Brazil.

Plants scandent, suffrutescent, puberulent or glabrous; leaves slender-petiolate, triangular-ovate, 5 cm. long or less, narrowed to the obtuse or acute apex, rounded to subcordate at base, entire, glabrous or nearly so, the lower leaves usually parted or cleft; flowers slender-pedicellate, in large cymes; corolla white or bluish, nearly 2 cm. broad. "Flor de San Diego" (Veracruz).

13. *Solanum macrantherum* Dunal, Sol. Syn. 16. 1816.

Michoacán and Guanajuato to Veracruz and Chiapas.

Scandent shrub, the branches villosulous; leaves long-petiolate, ovate to broadly ovate, 13 cm. long or less, acuminate, rounded or truncate at base, entire, puberulent or short-villous beneath or sometimes glabrate; cymes large, many-flowered; corolla violaceous, 2 to 4 cm. broad; flowers sweet-scented; fruit red, about 1 cm. or less in diameter.

Solanum boldoense A. DC., described from Cuba, is a closely related species and perhaps not distinct. It has been reported from Mexico.

14. *Solanum palmeri* Vasey & Rose, Proc. U. S. Nat. Mus. 11: 532. 1889.

Baja California and the adjacent islands; type from San Quentín Bay.

Plants suffrutescent, minutely pubescent with branched hairs; leaves nearly all lobate, usually 3-lobate, the lower lobes sometimes very small or suppressed; flowers in few-flowered umbels; corolla violaceous, 1.5 cm. broad.

15. *Solanum appendiculatum* Dunal, Sol. Syn. 5. 1816.

High mountains, Mexico, Veracruz, and Oaxaca; type from Puente de la Madre de Dios, Guatemala.

Slender shrub, scandent to a height of 9 meters, the branches puberulent or glabrate; leaflets 3 or 5, lance-oblong to ovate, 5 cm. long or less, acuminate, acute at base, entire, very sparsely short-hirsute above, puberulent beneath along the veins; cymes small, few-flowered; corolla white; fruit 6 to 8 mm. in diameter.

16. *Solanum seaforthianum* Andrews, Bot. Rep. 8: pl. 504. 1797-1804.

Specimens seen from Baja California, Tamaulipas, Michoacán or Guerrero (?), and Yucatán, most of them probably from cultivated plants. West Indies, Central America, and northern South America.

Scandent shrub, 2 to 6 meters long, the branches sparsely puberulent or glabrate; leaflets 3 or 5, oblong-lanceolate to ovate, 8 cm. long or less, entire, the upper ones decurrent upon the petiole, glabrous or nearly so; cymes usually large and many-flowered; corolla violaceous, nearly 1 cm. long; fruit red, 6 to 9 mm. in diameter. "Plocha" (Yucatán); "guinda," "falsa belladonna," "jasmín de Italia" (Porto Rico); "Josefina," "dulceamarga" (El Salvador).

This is probably the plant reported from Mexico by various writers as *S. dulcamara* L., and said to be known as "gloria" and "gufa de jazmínillo." It is a handsome vine and is commonly cultivated in Mexico and Central America.

17. *Solanum galeotti* Dunal in DC. Prodr. 13¹: 82. 1852.

Type from Arío, Michoacán.

Scandent shrub; leaves long-petiolate, 5-parted, the segments ovate-oblong, 7 cm. long or less, acutish; corolla white.

Solanum stephanodes Schlecht.,¹ described from Cumbre del Obispo, appears, from the description, to be closely related.

18. *Solanum lignescens* Fernald, Proc. Amer. Acad. 33: 91. 1897.

Guerrero to Chiapas; type from Acapulco, Guerrero.

Shrub, the branches closely stellate-pubescent; leaves petiolate, ovate or elliptic, 7 cm. long or less, obtuse or acute, closely stellate-pubescent; umbels short-pedunculate; corolla white, 1.5 cm. broad; fruit glabrous, 1 cm. in diameter.

¹ *Linnaea* 19: 290. 1846.

19. *Solanum plurifurciculm* Bitter, Repert. Sp. Nov. Fedde 11: 15. 1912.

Type from Pacho Forest, near Jalapa, Veracruz, altitude 1,200 meters.

Shrub, 0.5 to 1 meter high, the stems pubescent with coarse branched hairs; leaves short-petiolate, ovate-oblong or ovate, 7.5 cm. long or less, acute, short-decurrent at base, entire; umbels short-pedunculate; corolla white, about 1 cm. broad.

The description of *S. ulmoides* Dunal¹ is strongly suggestive of this plant.

20. *Solanum jaliscanum* Greenm. Proc. Amer. Acad. 34: 571. 1899.

Barranca near Guadalajara, Jalisco, altitude 1,200 meters, the type locality.

Shrub, the branches stellate-pubescent; leaves ovate-oblong or lance-oblong, 13 cm. long or less, acute or obtuse, acute at base, entire, finely stellate-pubescent; umbels short-pedunculate; corolla about 1 cm. broad; fruit 1 cm. in diameter, glabrous.

21. *Solanum umbellatum* Mill. Gard. Dict. ed. 8. *Solanum* no. 27. 1768.

Solanum granuloso-leprosum Dunal in DC. Prodr. 13¹: 115. 1852.

Solanum cortex-virens Dunal in DC. Prodr. 13¹: 372. 1852.

Solanum receptum Heurck & Muell. Arg.; Heurck, Obs. Bot. 1: 46. 1870.

Sonora to Tamaulipas, Veracruz, and Oaxaca. West Indies and Central America.

Shrub or small tree, 1 to 6 meters high; leaves oblong-elliptic to oblanceolate, 20 cm. long or less, acuminate, long-attenuate at base, finely stellate-pubescent above, green, beneath pubescent with branched, chiefly stipitate hairs; cymes dense, many-flowered, long-pedunculate; corolla white, 7 to 9 mm. long; fruit yellow, 1 to 1.5 cm. in diameter. "Berenjena" (Sinaloa); "cazaniche" (Villada); "friegga-plato" (Nicaragua); "prendedera macho" (Cuba); "tapalayote" (El Salvador).

The specimens which belong here have nearly always been referred to *S. callicarpifolium* Kunth & Bouché.

22. *Solanum salviifolium* Lam. Tabl. Encycl. 2: 14. 1793.

Solanum geminifolium ("geminiflorum") Schlecht. Linnaea 5: 112. 1830.

Solanum schlechtendalianum Walp. Repert. Bot. 3: 61. 1844-45.

Michoacán or Guerrero to Chiapas, Tabasco, and Veracruz. West Indies and Central America.

Shrub or small tree, 2 to 4.5 meters high, the branches densely stellate-tomentose; leaves often subsessile, lance-oblong to broadly ovate, 15 cm. long or less, acuminate, rounded or subcordate at base, green above, usually glabrate, densely and finely stellate-tomentose beneath with whitish hairs; cymes long-pedunculate, becoming lateral; corolla white, 7 mm. long or less; fruit 7 mm. in diameter, glabrate.

23. *Solanum verbascifolium* L. Sp. Pl. 184. 1753.

Nearly throughout Mexico except Baja California. Southern Florida; Central America; Old World tropics.

Shrub or small tree, 2 to 10 meters high, the branches finely stellate-tomentose; leaves petiolate, ovate to lanceolate, 25 cm. long or less, acute or acuminate, rounded at base or decurrent, entire, velvety-tomentose on both surfaces; cymes long-pedunculate; corolla white, 7 to 9 mm. long; fruit yellowish, 6 to 12 mm. in diameter. "Salvadora" (Tamaulipas); "saca-manteca" (Sinaloa); "guardolobo" (Nuevo León); "xtuhuy," "tom-paap," "xaxox" (Yucatán, Maya); "zoza" or "sosa" (Morelos, Veracruz, San Luis Potosí); "hierba de San Pedro" (Nuevo León); "hoja de manteca" (Conzatti);

¹In DC. Prodr. 13¹: 130. 1852.

"galantea" (Oaxaca, *Reko*); "friegaplato," "berenjena" (Veracruz); "tabaco cimarrón," "prendedera hedlonda," "prendedera macho," "pendejera macho" (Cuba); "berenjena de paloma," "berenjena cimarrona," "tabacón pelado" (Porto Rico); "tapalayote" (El Salvador).

The soft velvet-like leaves are used for cleaning dishes. They are also heated and applied to the forehead to relieve headache, and applied as poultices to ulcers and boils.

24. *Solanum plumense* Fernald, Proc. Amer. Acad. 35: 569. 1900.

Type from Pluma, Oaxaca.

Shrub, the branches very minutely stellate-puberulent; leaves ovate-lanceolate, 10 to 18 cm. long, long-acuminate, acutish to rounded at base, entire; cymes long-pedunculate; corolla white, 1.5 cm. broad; fruit 1 cm. in diameter.

25. *Solanum bicolor* Willd.; Roem. & Schult. Syst. Veg. 4: 661. 1819.

Solanum callicarpifolium Kunth & Bouché, Ind. Sem. Hort. Berol. 10. 1845.

Sinaloa to Chiapas and Yucatán. Lesser Antilles, Central America, and northern South America.

Shrub, 1.5 to 3 meters high, the branches finely stellate-pubescent; leaves elliptic to oblong-ob lanceolate, usually 10 to 30 cm. long, acute or short-acuminate, decurrent at base, entire, green above; cymes long-pedunculate; corolla white, about 7 mm. long; fruit 6 to 8 mm. in diameter, yellow. "Saca-manteca" (Sinaloa).

26. *Solanum aligerum* Schlecht. Linnaea 19: 301. 1846.

Michoacán, Mexico, Hidalgo, and Veracruz; type from Angangueo, Michoacán.

Shrub or small tree; leaves short-petiolate, oblong-lanceolate, 16 cm. long or less, acute at base, entire, glabrous above, barbate beneath along the costa or when young loosely tomentose with branched hairs; panicles pedunculate, lax; corolla white, 6 mm. long; fruit glabrous, 1 cm. in diameter.

27. *Solanum cervantesii* Lag. Nov. Gen. & Sp. 10. 1816.

Solanum pubigerum Dunal, Sol. Syn. 160. pl. 6. 1816.

San Luis Potosí and Guanajuato to Chiapas and Veracruz. Guatemala.

Shrub, 1 to 4.5 meters high, the branches puberulent or glabrous; leaves long-petiolate, lanceolate to oblong-elliptic, 24 cm. long or less, acute or acuminate, acute or decurrent at base, usually more or less pubescent beneath but often glabrous; cymes long-pedunculate; corolla white, 5 to 7 mm. long; fruit black, 5 to 7 mm. in diameter. "Hierba del perro" (San Luis Potosí).

The fruit is said to be eaten by children and to be harmless.

28. *Solanum nigrum* L. Sp. Pl. 186. 1753.

Solanum americanum Mill. Gard. Dict. ed. 8. *Solanum* no. 5. 1768.

Solanum oligospermum Bitter, Repert. Sp. Nov. Fedde 12: 80. 1913.

Nearly throughout Mexico. Widely distributed in tropical and temperate regions of both hemispheres.

Usually herbaceous but sometimes woody and as much as 3 meters high, the branches puberulent or villosulous; leaves long-petiolate, mostly ovate, 10 cm. long or less, acute or acuminate, obtuse or rounded at base, sinuate-dentate or frequently entire; umbels slender-pedunculate; corolla white or bluish, 2 to 4 mm. long; fruit 5 to 7 mm. in diameter, black. "Mora" (Jalisco, etc.); "chuchilitas" (Sonora); "tohonchichi" (Oaxaca); "hierba mora" (Tamaulipas, Durango, San Luis Potosí, Oaxaca, Sonora, Cuba, Porto Rico, El Salvador,

Costa Rica, Peru, Colombia); "chichiquelite" (Durango); "tzopilotlaquatl" (Ramírez); "thucupache xaqua" (Michoacán, Tarascan, León); "bitaxe" (Oaxaca, Zapotec, Reko); "mata-gallinas" (Porto Rico).

Black nightshade is a common weed in Mexico as well as in the United States. The berries are commonly believed to be poisonous and there is little doubt that they are in some instances, but some forms of the plant have been introduced into cultivation under the names "wonderberry" and "garden huckleberry," and their fruit is quite harmless and highly valued by many persons, especially for making pies. In Mexico and Central America the young shoots and leaves are commonly cooked as a pot herb, and the same practice is followed in Mauritius, Madagascar, and other countries. In Sinaloa the root is said to have been employed as a remedy for bubonic plague. Elsewhere in Mexico the fruit is a domestic remedy for erysipelas, and a decoction of the plant is employed as a fomentation for sore eyes and for various skin diseases. The leaves are sometimes applied as poultices to allay pain. In Europe the plant is generally reputed to have narcotic properties, and in Bohemia the leaves are placed in the cradles of infants to promote sleep.

Solanum nigrum is a somewhat variable plant, and many of the forms (including several from Mexico) have been described as distinct species.

29. *Solanum triquetrum* Cav. Icon. Pl. 3: 30. pl. 259. 1794.

Coahuila, Nuevo León, and San Luis Potosí. Western Texas.

Plants erect or subscandent, a meter high or less, suffrutescent, nearly glabrous; leaves 5 cm. long or less, most of them triangular-hastate or lance-hastate, acute or acuminate; cymes umbelliform, few-flowered; corolla white or violet; fruit red, about 1 cm. in diameter.

30. *Solanum xanti* A. Gray, Proc. Amer. Acad. 11: 90. 1876.

Northern Baja California. California; type from Fort Tejon.

Plants suffrutescent, the stems viscid-pubescent; leaves lanceolate to ovate, 1 to 4 cm. long, obtuse, entire or sometimes auriculate-lobate at base, viscid-pubescent; corolla blue or violet, about 2 cm. broad; fruit purplish black.

31. *Solanum brachystachys* Dunal in DC. Prodr. 13¹: 128. 1852.

Solanum lucidum Mart. & Gal. Bull. Acad. Brux. 12¹: 137. 1845. Not *S. lucidum* Moric. 1830.

Solanum venosum Sendtn. in Mart. Fl. Bras. 10: 29. 1846. Not *S. venosum* Humb. & Bonpl. 1819.

Mexico, Oaxaca, and Chiapas; type from Chalco, Mexico. Guatemala.

Shrub; leaves petiolate, lanceolate to elliptic, 6 to 9 cm. long, short-acuminate or acute, obtuse or acute at base, glabrous above, glabrous beneath or when young with a loose feltlike tomentum; corolla 8 to 10 mm. broad; fruit glabrous, about 1 cm. in diameter.

Solanum nigricans Mart. & Gal.,¹ described from Oaxaca, is a closely related plant and perhaps not distinct.

32. *Solanum nudum* H. B. K. Nov. Gen. & Sp. 3: 33. 1818.

Michoacán to Veracruz and Chiapas; type from Jalapa, Veracruz. Central America.

Shrub, 2 to 4.5 meters high, the branches glabrous; leaves oblong-lanceolate to elliptic, 15 cm. long or less, acute at base, usually barbate beneath along the costa; corolla white, 4 to 6 mm. long; fruit about 1 cm. in diameter.

The Mexican specimens have usually been referred to *S. triste* Jacq.

¹ Bull. Acad. Brux. 12¹: 134. 1845.

33. *Solanum diphyllum* L. Sp. Pl. 184. 1753.

Tepic to Tamaulipas, Veracruz, and Oaxaca. Guatemala and El Salvador.

Shrub, 1 to 1.5 meters high, the branches glabrous or obscurely puberulent; leaves petiolate, lanceolate to oblong-elliptic, 12 cm. long or less, acute or attenuate at base, lustrous, glabrous beneath; corolla white, 3 to 4 mm. long; fruit 6 to 7 mm. in diameter. "Amatillo," "hoja del golpe" (El Salvador).

34. *Solanum oaxacanthum* Dunal in DC. Prodr. 13¹: 204. 1852.

Solanum hamatile T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Oaxaca and Chiapas; type from Tehuantepec, Oaxaca.

Shrub, glabrous throughout, the branches armed with short remote recurved prickles; leaves long-petiolate, oblong-lanceolate to ovate-elliptic, 8 cm. long or less, acute, decurrent at base, thin, paler beneath and sometimes prickly along the costa; inflorescence few-flowered, the flowers long-pedicellate; corolla about 1 cm. long.

35. *Solanum refractum* Hook. & Arn. Bot. Beechey Voy. 304. 1839-40.

Sinaloa to Jalisco and Morelos; type from Tepic.

Shrub, usually scandent, the branches densely prickly; leaves mostly oblanceolate or obovate, 30 cm. long or less, obtuse to acuminate, long-attenuate to the base, sessile or nearly so, entire or usually lobate, prickly beneath, glabrous or pilose; flowers racemose-cymose, the inflorescences lax, many-flowered; corolla 12 mm. long, white; fruit about 5 cm. in diameter. "Toronja" (Sinaloa).

36. *Solanum houstoni* Dunal, Hist. Sol. 243. 1813.

Solanum tampicense Dunal in DC. Prodr. 13¹: 284. 1852.

Tamaulipas and Veracruz; type from Veracruz. Cuba; El Salvador.

Shrub, 1 to 2 meters high, the branches armed with stout recurved prickles; leaves petiolate, oblong or oblong-ovate, 13 cm. long or less, obtuse or acute, cuneate at base, irregularly lobate, sparsely stellate-pubescent; flowers in axillary umbels or racemes; corolla white, 6 to 11 mm. long; fruit red, 6 to 7 mm. in diameter, glabrous. "Ajicón" (Cuba); "huistomate," "huevo de gato" (El Salvador).

37. *Solanum jamaicense* Mill. Gard. Dict. ed. 8. *Solanum* no. 17. 1768.

Solanum cuneifolium Dunal, Hist. Sol. 193. pl. 22. 1813.

Oaxaca. West Indies; Central and South America; type from Jamaica.

Shrub, often scandent, the branches densely tomentose with chiefly stipitate, stellate hairs; leaves broadly ovate or elliptic, 25 cm. long or less, acute, angulate-lobate, densely tomentose with coarse stipitate stellate hairs, often prickly beneath; inflorescences lateral, few-flowered; corolla white, 8 mm. long; fruit orange, 4 to 6 mm. in diameter. "Berenjena" (Porto Rico).

38. *Solanum donnell-smithii* Coult. Bot. Gaz. 16: 144. 1891.

Veracruz, Oaxaca, and Chiapas. Central America; type from Escuintla, Guatemala.

Erect or scandent shrub, the branches hispid with coarse long-stipitate stellate hairs; leaves oblong to ovate, 16 cm. long or less, acute, usually obtuse at base, entire, lobate, or sinuate, usually prickly beneath; cymes few-flowered, lateral; calyx prickly; corolla 1.5 cm. long, parted nearly to the base, white; fruit glabrous, nearly 1 cm. in diameter. "Huistomate" (El Salvador).

39. *Solanum amictum* Moric.; Dunal in DC. Prodr. 13¹: 263. 1852.

Veracruz and perhaps elsewhere; type from Cordillera of Guichilaca.

Branches stellate-hirsute; leaves ovate-lanceolate, 20 cm. long or less, acuminate, sinuate-repand, stellate-pilose above; cymes lateral, many-flowered; calyx hirsute; fruit 6 mm. in diameter.

This species may not be correctly placed in the key. It is known to the writer only from description.

40. *Solanum lanceifolium* Jacq. Coll. Bot. 2: 286. 1788.

Tamaulipas, San Luis Potosí, and Veracruz. West Indies, Central America, and northern South America.

Shrub, usually scandent, the branches stellate-pubescent; leaves petiolate, ovate to oblong, 15 cm. long or less, acute or obtuse, acute to rounded at base, sparsely stellate-pubescent above, densely so beneath and usually prickly; inflorescences lateral, few-flowered, racemiform; corolla white, 9 to 12 mm. long; fruit red, 6 to 9 mm. in diameter.

41. *Solanum hirtum* Vahl, Symb. Bot. 2: 40. 1791.

Solanum flavescens Dunal; Poir. Encycl. Suppl. 3: 778. 1813.

Solanum molestum T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 331. 1920.

Veracruz and Yucatán. Guatemala; West Indies and northern South America.

Shrub, 2.5 meters high or less, the branches stellate-tomentose, densely prickly; leaves broadly ovate to suborbicular, 20 cm. long or less, acute or obtuse, cordate at base, sinuate-lobate, prickly, at least beneath, densely stellate-tomentose beneath; inflorescences lateral, 2 to 8-flowered; calyx 1 cm. long, deeply parted, the lobes obtuse or acutish; corolla white, 1.5 cm. long; fruit about 2 cm. in diameter, yellow, covered with long yellow hairs.

42. *Solanum tequilense* A. Gray, Proc. Amer. Acad. 22: 441. 1887.

Solanum huitlanum T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 192. 1915.

Tepic to Chiapas; type from Tequila, Jalisco. Guatemala.

Erect shrub, the branches stellate-tomentose, densely covered with long stout prickles; leaves oval to rounded-ovate, 40 cm. long or less, obtuse or acute, rounded or subcordate at base, densely stellate-tomentose, sinuate-repand, usually prickly on both surfaces, the prickles sometimes 3 cm. long; inflorescences few-flowered; fruit 2.5 to 3.5 cm. in diameter.

43. *Solanum mammosum* L. Sp. Pl. 187. 1753.

Reported from Veracruz by Hemsley, but perhaps erroneously; reported from Mexico by O. E. Schulz.¹ West Indies; Central and South America.

Plants herbaceous or suffrutescent, 1.5 meters high or less, densely pilose with long articulate hairs; leaves nearly as broad as long, 10 to 15 cm. long, shallowly cordate at base, irregularly lobate, the lobes obtuse or acute, usually armed on both surfaces with long stout prickles; inflorescences umbelliform, lateral, 1 to 6-flowered; corolla violaceous, about 2 cm. long; fruit 3 to 4.5 cm. in diameter, orange. "Berenjena" (Veracruz); "berenjenita peluda" (Tabasco, *Rovirosa*); "pichichío" (Costa Rica); "uña de gato" (Panama); "chichimora" (El Salvador); "chichihua" (Honduras); "chichigua," "chichita," "marimbita amarilla," "chichona" (Nicaragua); "rejalgar" (Colombia); "berenjena cimarrona," "berenjena de marimbo" (Porto Rico); "güirito" (Cuba); "chicha" (Guatemala).

The fruit is said to be very poisonous. In Costa Rica a decoction of the leaves is employed as a remedy for diseases of the kidneys and bladder. In El Salvador the seeds are said to be used as a remedy for colds.

44. *Solanum aculeatissimum* Jacq. Icon. Pl. Rar. 5. pl. 41. 1781-86.

Veracruz. Florida, West Indies, Central and South America; also in the Old World tropics.

¹ In Urban, Symb. Antill. 6: 206. 1909.

Plants suffrutescent, often procumbent, the branches densely covered with long prickles; leaves broadly ovate, 15 cm. long or less, acute, usually subcordate at base, lobate, the lobes acute or obtuse; inflorescences umbelliform, 2 to 5-flowered; corolla white, 1 to 1.5 cm. long; fruit orange, 2 to 3 cm. in diameter. "Berenjena" (Costa Rica).

45. *Solanum chloropetalum* Schlecht. *Linnaea* 19: 291. 1847.

?*Solanum porphyranthum* Dunal in DC. Prodr. 13¹: 244. 1852.

Hidalgo and Veracruz; type from Jalapa, Veracruz. Guatemala.

Plants suffrutescent, the branches armed with long, straight or sometimes curved prickles; leaves rounded-ovate, long-petiolate, 16 cm. long or less, acute or obtuse, cordate at base, shallowly sinuate-lobate, armed with stout prickles on both surfaces; inflorescences few-flowered; corolla greenish white, 1 to 1.5 cm. long; fruit yellow.

Solanum globiferum Dunal, a West Indian plant, reported from Mexico by Schulz, is probably not distinct.

46. *Solanum hindsianum* Benth. Bot. Voy. Sulph. 39. 1844.

Baja California and Sonora; type from Magdalena Bay, Baja California.

Shrub, 1 to 3 meters high, the branches finely stellate-tomentose, usually armed with long prickles; leaves petiolate, ovate to oblong, 4.5 cm. long or less, obtuse, rounded or subcordate at base, sometimes prickly beneath, covered with a dense close tomentum; inflorescence umbelliform, few-flowered; corolla light or dark violet, about 4 cm. broad; fruit about 1 cm. in diameter. "Mariola" (Baja California).

The plant is said to be employed in Baja California as an emmenagogue.

47. *Solanum azureum* Fernald, Proc. Amer. Acad. 35: 570. 1900.

Sinaloa; type from Topolobampo.

Shrub, the branches finely stellate-pubescent, armed with few slender prickles; leaves with numerous obtuse lobes, often prickly beneath, finely stellate-pubescent; peduncles with 10 or fewer flowers; corolla 4 to 5 cm. broad, violet; fruit 12 mm. in diameter.

48. *Solanum amazonium* Ker in Edwards, Bot. Reg. pl. 71. 1815.

Solanum obtusifolium Schlecht. *Linnaea* 5: 113. 1830. Not *S. obtusifolium* Dunal, 1813.

Solanum verae-crucis Steud. Nom. Bot. ed. 2. 2: 607. 1841.

Sonora and Chihuahua to Zacatecas, Oaxaca, Campeche, and Yucatán.

Shrub, the branches closely stellate-pubescent, usually armed with slender prickles; leaves ovate to oblong, 14 cm. long or less, obtuse or acute, obtuse to subcordate at base, sinuate or sinuate-lobate, sometimes entire, densely stellate-tomentose beneath and often prickly; inflorescences few-flowered; corolla blue or violet, commonly 4 to 5 cm. broad; fruit about 1.5 cm. in diameter. "Berenjena silvestre," "saca-manteca" (Sinaloa); "xkon-yakik" (Yucatán, Maya).

49. *Solanum marginatum* L. f. Suppl. Pl. 147. 1781.

Naturalized in the Valley of Mexico. Native of northeastern Africa.

Plants suffrutescent, 1 to 1.5 meters high, the branches white-tomentose, prickly; leaves oval or broadly ovate, 25 cm. long or less, obtuse, shallowly sinuate-lobate, armed with prickles, green and glabrate above, white-tomentose beneath; calyx prickly; corolla white, 2.5 cm. broad; fruit yellow, glabrous.

50. *Solanum hispidum* Pers. Syn. Pl. 1: 228. 1805.

Solanum chrysotrichum Schlecht. *Linnaea* 19: 304. 1847.

Michoacán to Veracruz and Chiapas. Guatemala; Peru (?).

Shrub, 4 meters high or less, the branches armed with short stout prickles; leaves ovate-oblong to broadly ovate, 20 cm. long or less, acute, obtuse to subcordate at base, subentire or usually lobate, often prickly, densely stellate-tomentose beneath, some of the hairs stipitate; corolla whitish, 12 to 15 mm. long; fruit 1 to 1.5 cm. in diameter. "Sosa" (Michoacán, Guerrero).

51. *Solanum hernandesii* Moc. & Sessé; Dunal in DC. Prodr. 13¹: 266. 1852.

Chiapas. Guatemala to Nicaragua.

Shrub, the branches fulvous-tomentose, armed with stout prickles; leaves 13 cm. long or less, truncate or subcordate at base, prickly, 5 to 7-lobate, the lobes often again lobate, stellate-tomentose; inflorescences few or many-flowered; corolla white, 10 to 13 mm. long; fruit 1 cm. in diameter. "Huistomate," "güistomate" (El Salvador).

52. *Solanum torvum* Swartz, Prodr. Veg. Ind. Occ. 47. 1788.

Solanum ferrugineum Jacq. Pl. Hort. Schönbr. 3: 46. pl. 334. 1798.

Veracruz and Chiapas. Florida, West Indies, Central America, and northern South America; also in the Old World tropics.

Shrub, 1 to 4 meters high, the branches stellate-pubescent, armed with short prickles; leaves broadly ovate, 20 cm. long or less, acute or acuminate, usually rounded or subcordate at base, sinuate-lobate, stellate-tomentose, often prickly; cymes few to many-flowered; corolla white, 10 to 12 mm. long; fruit 1 to 1.5 cm. in diameter, yellow. "Tomatillo" (Guatemala); "berenjena" (Costa Rica); "berenjena cimarrona" (Costa Rica, Porto Rico); "pendejera," "prendedera" (Cuba); "friega-platos" (Colombia).

The names "espina" (Yucatán), "friega-platos" (San Luis Potosí), and "conoca" (Jalisco) are reported for this species, but they probably relate to other species.

53. *Solanum madrense* Fernald, Proc. Amer. Acad. 35: 558. 1900.

Sonora and Chihuahua to Morelos and Oaxaca; type from Sierra de Alamos, Sonora. Central America.

Shrub, 1 to 4.5 meters high, the branches fulvous-tomentose, armed with short stout prickles; leaves ovate or broadly ovate, 18 cm. long or less, acute or obtuse, usually subcordate at base, subentire to sinuate-lobate, densely stellate-tomentose beneath, often prickly; inflorescence few or many-flowered; corolla 1.5 to 2 cm. long, white; fruit 1 to 1.5 cm. in diameter. "Berenjena" (Durango); "huistomate," "güistomate," "güis," "lava-platos" (El Salvador).

54. *Solanum mitlense* Dunal in DC. Prodr. 13¹: 314. 1852.

Guerrero and Oaxaca; type from Mitla, Oaxaca. Guatemala.

Shrub or small tree, 3 to 4.5 meters high, the branches densely and coarsely tomentose, armed with short prickles; leaves lanceolate to broadly ovate, 25 cm. long or less, obtuse to acuminate, acute to subcordate at base, shallowly sinuate-lobate, densely and loosely tomentose on both surfaces; cymes dense, many-flowered; corolla violet, 3 cm. broad; fruit 1 to 1.5 cm. broad. "Coyotomatl" (Puebla).

55. *Solanum laurifolium* Mill. Gard. Dict. ed. 8. *Solanum* no. 20. 1768.

Solanum lanceolatum Cav. Icon. Pl. 3: 23. pl. 245. 1794.

Solanum cymosum Ortega, Hort. Matr. Dec. 1: 11. 1797.

Solanum macrophyllum Dunal, Hist. Sol. 199. pl. 17. 1813.

Solanum mexicanum Moc. & Sessé; Dunal in Poir. Encyl. Suppl. 3: 770. 1813.

Solanum hartwegii Benth. Pl. Hartw. 68. 1839.

Solanum floccosum Mart. & Gal. Bull. Acad. Brux. 12¹: 141. 1845.

Solanum molinum Fernald, Trees & Shrubs 1: 97. pl. 49. 1903.

San Luis Potosí to Morelos, Oaxaca, and Puebla. Martinique.

Shrub, 1 to 2.5 meters high, the branches stellate-tomentose, armed with few short prickles or often unarmed; leaves oblong, elliptic-oblong, or oblanceolate, 18 cm. long or less, obtuse or acute, densely stellate-tomentose beneath or finely stellate-pubescent, unarmed; cymes many-flowered; corolla pale blue, 12 to 15 mm. long; fruit 6 to 10 mm. in diameter.

56. *Solanum diversifolium* Schlecht. *Linnaea* 19: 297. 1846.

Solanum torvum ochraceo-ferrugineum Dunal in DC. Prodr. 13¹: 160. 1852.

Solanum ochraceo-ferrugineum Fernald, Proc. Amer. Acad. 35: 560. 1900.

Baja California and Sinaloa to Tamaulipas, Veracruz, and Oaxaca; type from Papantla, Veracruz. Central America.

Shrub, 1 to 3 meters high, the branches stellate-tomentose, armed with few short prickles or sometimes unarmed; leaves ovate-oblong to broadly ovate, 18 cm. long or less, acute or obtuse, usually sinuate-lobate but sometimes entire, stellate-tomentose, usually unarmed; cymes few or many-flowered; corolla white or bluish, 12 to 16 mm. long; fruit 1 to 1.5 cm. in diameter. "Salvadora" (Tamaulipas); "berenjena" (Sinaloa).

Palmer reports that in Tamaulipas the fruit is employed for poisoning rats.

9. *ATHENAEA* Sendtn. in Mart. Fl. Bras. 10: 133. 1846.

1. *Athenaea nelsonii* Fernald, Proc. Amer. Acad. 35: 567. 1900.

Type collected between Tumbala and El Salto, Chiapas.

Shrub (?), the stems viscid-villous; leaves petiolate, broadly ovate, 20 cm. long or less, cuspidate-acuminate, deeply cordate at base, entire or with a few sharp teeth, sparsely villosulous beneath; pedicels fasciculate, 3 cm. long or less; calyx glandular-villous, campanulate, with 5 narrow lobes; corolla 1.5 to 2 cm. long, yellowish, deeply 5-lobate; fruit red, inclosed in the calyx.

DOUBTFUL SPECIES.

ATHENAEA XALAPENSIS (H. B. K.) Hemsl. Biol. Centr. Amer. Bot. 2: 422. 1882. *Withania xalapensis* H. B. K. Nov. Gen. & Sp. 3: 13. 1819. Type from Jalapa, Veracruz.

10. *WITHANIA* Pauquy, Diss. Bellad. 14. 1824.

1. *Withania melanocystis* Robinson, Proc. Amer. Acad. 26: 171. 1896.

Type from Tamasopo Canyon, San Luis Potosí.

Shrub, 1.5 to 2.5 meters high; leaves lanceolate or lance-oblong, 3 to 6 cm. long, acute, entire, petiolate, finely pubescent; pedicels axillary, fasciculate, 5 to 10 mm. long; calyx 5-dentate, accrescent, in fruit about 2 cm. long, bladder-like, contracted at the mouth; corolla rotate-campanulate, 1 cm. long, pale yellow with dark spots in throat, 5-lobate to the middle; fruit baccate, red, globose.

The true position of this plant is somewhat doubtful. The other species of the genus are natives of the Old World.

11. *BRACHISTUS* Miers, Ann. Mag. Nat. Hist. II. 3: 264. 1849.

Shrubs or small trees; leaves entire; pedicels geminate or fasciculate; calyx short, broadly campanulate, with 5 to 10 setaceous or minute teeth, not or scarcely accrescent; corolla broadly campanulate, the limb 5-angulate or shallowly lobate; fruit a globose berry.

Larger leaves acutely acuminate-----1. *B. diversifolius*.
Larger leaves obtuse or obtusely short-acuminate-----2. *B. pringlei*.

1. *Brachistus diversifolius* (Klotzsch) Miers, Ann. Mag. Nat. Hist. II. 3: 268. 1849.

Witheringia diversifolia Klotzsch; Walp. Repert. Bot. 3: 29. 1844.

Veracruz, Morelos, and Chiapas.

Slender shrub, 1.5 to 2.5 meters high; leaves lanceolate or lance-ovate, 4 to 11 cm. long, acute at base, thinly pilose or glabrate, the pairs of leaves very unequal, one of each pair small and often obtuse; flowers long-pedicellate, the pedicels usually recurved; corolla greenish yellow, about 7 mm. broad; fruit 6 to 8 mm. in diameter.

2. *Brachistus pringlei* S. Wats. Proc. Amer. Acad. 25: 159. 1890.

Nuevo León, Tamaulipas, and San Luis Potosí to Oaxaca; type from Sierra de la Silla, Nuevo León.

Slender shrub; leaves broadly ovate to oblong-ovate, 4.5 cm. long or less, abruptly contracted at base, sparsely pubescent or densely so beneath; corolla greenish yellow, 8 mm. broad; calyx lobes linear, somewhat elongate in fruit.

DOUBTFUL SPECIES.

BRACHISTUS LIGUSTRINUS (Dunal) Hemsl. Biol. Centr. Amer. Bot. 2: 423. 1882. *Fregirardia ligustrina* Dunal in DC. Prodr. 13¹: 507. 1852. Type from "Desierto Viejo." Scarcely of this genus, but the generic position of the plant is doubtful.

12. *BASSOVIA* Aubl. Pl. Guian. 1: 217. 1775.

Shrubs or small trees; leaves entire or sinuate; pedicels usually fasciculate, sometimes umbellate; calyx broadly campanulate, 5 to 10-dentate or truncate, not or scarcely accrescent; corolla subrotate, cleft to the middle or lower; fruit a 2-celled globose berry.

Pubescence of the leaves of stellate hairs.....1. *B. stellata*.

Pubescence of simple hairs.

Leaves sinuate-dentate.....2. *B. stramoniifolia*.

Leaves entire.

Stems setose-pilose.....3. *B. setosa*.

Stems glabrous or short-villous.

Leaves barbate beneath in the axils of the lateral nerves...4. *B. foliosa*.

Leaves not barbate beneath.

Leaves glabrous beneath; corolla 12 to 14 mm. long.

5. *B. escuintlensis*.

Leaves sparsely short-villous beneath; corolla 6 to 7 mm. long.

6. *B. mexicana*.

1. *Bassovia stellata* Greenm. Proc. Amer. Acad. 41: 246. 1905.

Hidalgo and Veracruz; type from Trinidad Iron Works, Hidalgo, altitude 1,500 meters.

Shrub, 1 to 2 meters high; leaves ovate or oblong-ovate, 5 to 9 cm. long, acuminate, entire, glabrous above or nearly so, stellate-tomentose beneath or finally glabrate; flowers numerous, long-pedicellate; calyx with short rounded lobes; corolla 5 to 6 mm. long.

2. *Bassovia stramoniifolia* (H. B. K.) Standl.

Witheringia stramoniifolia H. B. K. Nov. Gen. & Sp. 3: 13. 1819.

Brachistus stramoniifolius Miers, Ill. S. Amer. Pl. 2: 7. 1849.

Bassovia donnell-smithii Coulter, Bot. Gaz. 16: 145. 1891.

Tepic and Jalisco to Veracruz; type collected between La Banderilla and Jalapa, Veracruz. Guatemala and El Salvador.

Shrub, about 3 meters high; leaves ovate or ovate-elliptic, 5 to 11 cm. long, acute or acuminate, oblique and often subcordate at base, short-villous, especially beneath; corolla about 1 cm. long. "Belladonna montés" (El Salvador).

3. *Bassovia setosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 373. 1917.

Type from Zacuapan, Veracruz.

Low slender shrub; leaves lance-oblong or ovate-oblong, 3 to 4.5 cm. long, acute at base and apex, setose-pilose; flowers few, short-pedicellate; calyx with 5 lanceolate lobes; corolla about 6 mm. long, hirtellous; fruit 5 mm. in diameter.

4. *Bassovia foliosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 373. 1917.

Type from Zacuapan, Veracruz.

Shrub; leaves oblong or ovate-oblong, 7 to 12 cm. long, short-acuminate, acute at base, glabrous except along the costa beneath; flowers umbellate, the umbels pedunculate, 5 to 7-flowered; calyx shallowly 5-lobate; fruit 5 mm. in diameter.

5. *Bassovia escuintlensis* (Coulter) Standl.

Brachistus escuintlensis Coulter, Bot. Gaz. 16: 144. 1891.

Bassovia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 372. 1917.

Veracruz and Chiapas. Guatemala; type from Escuintla.

Shrub, the stems glabrous or very minutely puberulent; leaves ovate to ovate-oblong, mostly 10 to 25 cm. long, acuminate, abruptly decurrent at base, thin; flowers long-pedicellate, usually numerous; calyx truncate; fruit about 7 mm. in diameter.

6. *Bassovia mexicana* Robinson, Proc. Amer. Acad. 26: 171. 1891.

Nuevo León, San Luis Potosí, and Veracruz; type from Tamasopo Canyon, San Luis Potosí.

Shrub, 1 to 4.5 meters high, the branches glabrous or sparsely short-villous; leaves long-petiolate, broadly ovate to ovate-oblong, 5 to 17 cm. long, acuminate, usually obtuse or rounded at base; flowers numerous, long-pedicellate; calyx truncate; fruit 6 to 10 mm. in diameter.

Perhaps not distinct from *B. macrophylla* (H. B. K.) Benth. & Hook.

13. **LITHOPHYTUM** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 188. 1911.

A single species is known.

1. *Lithophytum violaceum* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 188. 1911.

Type from Santa Lucía, Puebla.

Shrub; leaves fasciculate at the nodes, oval, 4 to 7 mm. long, obtuse, entire, 3-nerved, glabrous, ciliolate; flowers pedicellate at the nodes; calyx 3 to 4 mm. long, campanulate, 5-lobate, puberulent; corolla 8 mm. long, violaceous, puberulent, salverform; anthers longitudinally dehiscent; ovary 1-celled, 2 to 4-ovulate.

It is not certain that the plant belongs to the Solanaceae. The material seen by the writer is too fragmentary for critical examination.

149. **SCROPHULARIACEAE.** Figwort Family.

Shrubs or more commonly herbs; leaves opposite or sometimes alternate or verticillate, entire or toothed (in the genera treated here), estipulate; flowers perfect, usually irregular; calyx inferior, 5-lobate or 5-dentate; corolla

gamopetalous, varying from rotate to funnelform, often bilabiate; stamens usually 4 and didynamous, attached to the corolla tube, the anthers commonly 2-celled; style simple; fruit capsular, many-seeded.

Numerous genera are represented in Mexico only by herbaceous species.

Leaves all alternate.

Stamens 4; leaves entire-----1. **LEUCOPHYLLUM**.

Stamens 2; leaves crenate-----2. **GHIESBREGHTIA**.

Leaves all or chiefly opposite.

Capsule dehiscent by subapical pores. Corolla tubular, red.

3. **GALVEZIA**.

Capsule dehiscent by valves.

Calyx 5-cleft nearly or quite to the base.

Sterile stamen present, nearly or quite as long as the fertile ones.

4. **PENTSTEMON**.

Sterile stamen none or minute-----5. **RUSSELIA**.

Calyx tubular or campanulate, the lobes usually shorter than the tube.

Pedicels bracteate; peduncles usually several-flowered.

Calyx tubular-campanulate, 5-dentate-----6. **BERENDTIA**.

Calyx campanulate, 5-lobate-----7. **HEMICHAENA**.

Pedicels ebracteate, 1-flowered-----8. **DIPLACUS**.

1. **LEUCOPHYLLUM** Humb. & Bonpl. Pl. Aequin. 2: 95. 1809.

Low shrubs, the pubescence of branched hairs; leaves alternate, entire; pedicels solitary in the leaf axils; calyx 5-cleft; corolla funnelform-campanulate, purple, the 5 lobes rounded, subequal; stamens 4.

The species listed are the only ones known.

Leaves green, glabrate.

Corolla lobes glabrous within-----1. **L. pringlei**.

Corolla lobes villous within-----2. **L. laevigatum**.

Leaves densely stellate-tomentulose, whitish.

Corolla rather broadly campanulate, the lobes nearly equaling the tube.

3. **L. texanum**.

Corolla narrowly campanulate, the lobes one-third to one-half as long as the tube.

Leaves acute or attenuate at base-----4. **L. minus**.

Leaves abruptly contracted and usually rounded at base.

5. **L. ambiguum**.

1. **Leucophyllum pringlei** (Greenm.) Standl.

Faxonanthus pringlei Greenm. Trees & Shrubs 1: 23. pl. 12. 1905.

Puebla; type collected on limestone hills near Tehuacán.

Shrub, 30 to 60 cm. high; leaves linear or spatulate-linear, 1.5 cm. long or less, acute or obtuse; sepals about 8 mm. long; corolla dark purple, 2 to 2.5 cm. long, barbate in the throat.

2. **Leucophyllum laevigatum** Standl., sp. nov.

Type collected between Ramos and Inde, Durango (Nelson 4689; U. S. Nat. Herb. no. 332744).

Young branches densely and finely stellate-tomentose; leaves oblanceolate-spatulate, 1 to 2 cm. long, 3 to 6 mm. wide, rounded or emarginate at apex, attenuate to a very short petiole, sparsely stellate-puberulent when young but soon glabrous; sepals linear, 2 to 3 mm. long; corolla narrowly campanulate, 1.5 cm. long, the lobes villous-barbate within, nearly as long as the tube; capsule about 6 mm. long.

3. *Leucophyllum texanum* Benth. in DC. Prodr. 10: 344. 1846.

Coahuila, Nuevo León, and Tamaulipas. Western Texas; type from Laredo.

Shrub, sometimes 2.5 meters high, densely stellate-tomentulose throughout; leaves mostly obovate, 2.5 cm. long or less, obtuse or rounded at apex, acute at base, sessile or nearly so; sepals lanceolate; corolla 1.8 to 2.5 cm. long. "Cenizo" (Tamaulipas, Nuevo León, Texas); "palo cenizo" (Nuevo León); "hierba del cenizo" (Coahuila).

The plant is employed locally as a remedy for fever and ague. It is probably this species which was mentioned by Berlandier¹ as occurring in Texas where it was known as "cenicilla." Berlandier states that an infusion of the leaves was used by the Indians as a febrifuge. He proposed a new genus for the plant and called it *Teranea frutescens*, in honor of General Mier y Teran, the director of the expedition, but no formal description of the genus was published.

4. *Leucophyllum minus* A. Gray in Torr. U. S. & Mex. Bound. Bot. 115. 1859.

Chihuahua to Nuevo León and Zacatecas. Western Texas and southern New Mexico; type collected in Texas along the Pecos River.

Shrub, sometimes 1 meter high, finely stellate-tomentulose throughout; leaves spatulate-obovate, 13 mm. long or less, rounded at apex; sepals linear; corolla 1.8 to 2.5 cm. long, purple but often violet when dry.

5. *Leucophyllum ambiguum* Humb. & Bonpl. Pl. Aequin. 2: 95. pl. 109. 1809.

Leucophyllum campanulatum Miers, Ann. Mag. Nat. Hist. II. 5: 254. 1850. Zacatecas to Hidalgo.

Shrub, 1 to 3 meters high, stellate-tomentose throughout; leaves petiolate, orbicular or broadly elliptic, 2 cm. long or less, rounded at apex; sepals linear-lanceolate; corolla about 1.5 cm. long.

2. *GHIESBREGHTIA* A. Gray, Proc. Amer. Acad. 8: 629. 1873.

A single species is known.

1. *Ghiesbreghtia grandiflora* A. Gray, Proc. Amer. Acad. 8: 630. 1873.

Chiapas (type locality). Guatemala.

Tree, 7.5 meters high or less; leaves alternate, petiolate, elliptic or elliptic-oblong, 3 to 6.5 cm. long, obtuse, coarsely crenate above the middle, acute at base, pubescent; flowers solitary in the leaf axils; calyx 5-parted, the lobes linear or oblong, obtuse; corolla yellowish, about 6 cm. long, bilabiate, the upper lip erect, bilobate, the lower 3-parted; stamens 2; capsule 2 to 2.5 cm. long.

3. *GALVEZIA* Dombey; Juss. Gen. Pl. 119. 1789.

Plants suffrutescent; leaves mostly opposite, entire; flowers axillary or subracemose, red; calyx small, 5-parted; corolla tubular, the upper lip erect, bilobate, the lower lip trifid; stamens 4.

Leaves linear or oblong-linear-----1. *G. juncea*.
Leaves oval to lanceolate-----2. *G. glabrata*.

1. *Galvezia juncea* (Benth.) A. Gray, Proc. Amer. Acad. 22: 311. 1887.

Maurandia juncea Benth. Bot. Voy. Sulph. 41. 1844.

Saccularia veatchii Kellogg, Proc. Calif. Acad. 2: 17. 1863.

Baja California; type from Magdalena Bay.

Shrub 1 to 2.5 meters high, the branches terete, glabrous; leaves 1 cm. long or less, glabrous, soon deciduous; pedicels glandular-puberulent or glabrous; corolla 3 cm. long, short-pilose; capsule 6 to 8 mm. long, erect.

¹ Diario de viaje de la Comisión de Límites, p. 276. 1850.

2. Galvezia glabrata T. S. Brandeg. *Zoe* 5: 167. 1903.

Southern Baja California; type from San Felipe.

Plants suffrutescent, the branches sometimes scandent; leaves often ternate, petiolate, 1 to 3 cm. long, obtuse or acute, glabrous; pedicels glabrous; corolla 2 to 3 cm. long; capsule often cernuous.

Galvezia speciosa pubescens T. S. Brandeg.¹ is a pubescent plant which is probably a form of this species.

4. PENTSTEMON Schmidel, *Icon. Pl.* 2. 1762.

Shrubs or more commonly herbs; leaves opposite, entire or dentate; flowers showy, the peduncles usually branched and arranged in terminal thrysiform panicles; calyx 5-parted; corolla bilabiate, the upper lip bilobate, the lower trifid; perfect stamens 4.

Numerous herbaceous species occur in Mexico.

Leaves linear or nearly so.

Corolla 3 cm. long, red.....1. *P. pinifolius*.

Corolla 1.5 cm. long, pink.....2. *P. linarioides*.

Leaves oblong to broadly ovate.

Leaves cordate or subcordate at base.....3. *P. cordifolius*.

Leaves acute at base.

Corolla tubular.....4. *P. baccharifolius*.

Corolla funnelform.....5. *P. antirrhinoides*.

1. Pentstemon pinifolius Greene, *Bot. Gaz.* 6: 218. 1881.

Northeastern Sonora. Southern Arizona and New Mexico; type collected near Clifton, Arizona.

Plants woody below, about 30 cm. high; leaves narrowly linear, 2.5 cm. long or less, glabrous, very numerous and somewhat crowded, entire; corolla tubular, the lips short.

2. Pentstemon linarioides A. Gray in Torr. *U. S. & Mex. Bound. Bot.* 112. 1859.

Northeastern Sonora and mountains of Baja California. Western Texas to Arizona and Utah; type from Organ Mountains, New Mexico.

Plants often woody below, 30 cm. high or less; leaves about 1 cm. long, crowded, entire, minutely puberulent; corolla funnelform.

3. Pentstemon cordifolius Benth. *Scroph. Ind. Introd.* 7. 1835.

Northern Baja California. Southern California.

Plants suffrutescent, the stems long and subscandent, finely puberulent; leaves sessile or short-petiolate, ovate or broadly ovate, 4 cm. long or less, acute, serrate or denticulate, scabrous-puberulent; corolla tubular, bright red, 3.5 to 4 cm. long.

4. Pentstemon baccharifolius Hook. in Curtis's *Bot. Mag. pl.* 4627. 1852.

Pentstemon baccharifolius schaffneri Hemsl. *Biol. Centr. Amer. Bot.* 2: 443. 1882.

San Luis Potosí. Western Texas.

Plants suffrutescent, 60 cm. high or less, the branches glabrous or puberulent; leaves sessile or petiolate, oblong or elliptic-oblong, 5 cm. long or less, obtuse, entire or serrate, usually glabrous; corolla deep red, 2.5 to 3 cm. long.

¹*Zoe* 5: 167. 1903.

5. *Pentstemon antirrhinoides* Benth.; A. DC. in DC. Prodr. 10: 594. 1846.
Baja California. Southern California.

Shrub, 1.5 meters high or less, the branches puberulent or glabrous; leaves elliptic to oblong, 1.5 cm. long or less, entire or serrate; corolla yellow, 1.5 to 2.5 cm. long.

5. **RUSSELIA** Jacq. Enum. Pl. Carib. 6. 1760.

REFERENCE: Robinson, Proc. Amer. Acad. 35: 319-321. 1900.

Shrubs, the branches usually angulate; leaves opposite or verticillate, usually furnished with numerous resin glands; flowers red, mostly in cymes; calyx 5-cleft; corolla tubular, the limb somewhat bilabiate, 5-lobate, the lobes rounded; stamens 4.

Stems 4-angulate.

Leaves entire.

Corolla about 18 mm. long-----1. *R. subcoriacea*.

Corolla about 13 mm. long-----2. *R. campechiana*.

Leaves crenate or serrate.

Stems with thin wings along the angles-----3. *R. tetraptera*.

Stems not winged.

Calyx lobes gradually attenuate, the tips not subulate; flowers 2 to 2.4 cm. long-----4. *R. jaliscensis*.

Calyx lobes with subulate tips; flowers 1.5 cm. long or less.

Leaves cordate at base-----5. *R. floribunda*.

Leaves rounded to acute at base.

Larger leaves cuneate-attenuate at base-----6. *R. cuneata*.

Larger leaves rounded at base-----7. *R. sarmentosa*.

Stems terete or with 6 or more angles.

Stems glabrous or very minutely puberulent.

Peduncles filiform, much elongate and exceeding the bracts, 1 to 3-flowered-----8. *R. equisetiformis*.

Peduncles short, the primary ones shorter than the subtending leaflike bracts, several or many-flowered.

Stems, at least the older ones, terete-----9. *R. multiflora*.

Stems conspicuously angulate.

Stems very minutely puberulent-----10. *R. obtusata*.

Stems glabrous.

Corolla 11 to 12 mm. long-----11. *R. trachypleura*.

Corolla 15 to 18 mm. long-----12. *R. verticillata*.

Stems tomentose or pilose, the hairs conspicuous.

Larger stems conspicuously angulate-----13. *R. polyedra*.

Larger stems terete or nearly so.

Leaves entire-----14. *R. purpusii*.

Leaves serrate or crenate.

Leaves cordate and clasping at base-----15. *R. rotundifolia*.

Leaves obtuse or acute at base.

Corolla 8 to 9 mm. long-----16. *R. tepicensis*.

Corolla about 14 mm. long-----17. *R. pringlei*.

1. *Russelia subcoriacea* Robins. & Seat. Proc. Amer. Acad. 28: 113. 1893.

Type from Tamasopo Canyon, San Luis Potosí.

Plants glabrous; leaves very short-petiolate, ovate, 6 cm. long, acuminate, lustrous above; calyx lobes acuminate.

2. *Russelia campechiana* Standl., sp. nov.

Type from Apazote, near Yohaltum, Campeche (*Goldman* 467; U. S. Nat. Herb. no. 396830).

Stems quadrangular, glabrous; petioles 7 to 9 mm. long; leaves ovate, 5 to 7.5 cm. long, 2.5 to 4 cm. wide, acuminate, rounded at base, coriaceous, entire, lustrous, glabrous; cymes many-flowered, equaling the leaflike bracts, short-pedunculate; calyx lobes ovate, subulate-acuminate; corolla 13 mm. long, the throat yellow-barbate.

3. *Russelia tetraptera* Blake, Proc. Biol. Soc. Washington 33: 120. 1920.

Tepic; type collected near the city of Tepic.

Stems glabrous; leaves sessile or short-petiolate, deltoid-ovate, 7 cm. long or less, acute or acuminate; corolla 8 to 10 mm. long.

4. *Russelia jaliscensis* Robinson, Proc. Amer. Acad. 35: 319. 1900.

Jalisco to Mexico; type from barranca near Guadalajara.

Stems glabrous; leaves rhombic-ovate or ovate, 3 cm. long or less, petiolate, thin, sparsely pubescent or glabrate; peduncles 2 or 3-flowered.

5. *Russelia floribunda* H. B. K. Nov. Gen. & Sp. 2: 359. 1817.

Guerrero and Oaxaca; type collected between Río Papagallo and Venta de Tierra Colorada.

Stems glabrous or pubescent; leaves subsessile, rounded-ovate, obtuse or acute, 7.5 cm. long or less, coarsely crenate; corolla 1 cm. long.

Russelia syringaefolia Schlecht. & Cham.,¹ described from Papantla, Veracruz, is a closely related plant and perhaps synonymous.

6. *Russelia cuneata* Robinson, Proc. Amer. Acad. 44: 613. 1909.

Michoacán or Guerrero to Oaxaca; type from El Ocote.

Plants suffrutescent, about 1 meter high, the branches glabrous; leaves sessile or short-petiolate, ovate or rhombic-ovate, obtuse, crenate; corolla about 1 cm. long.

7. *Russelia sarmentosa* Jacq. Enum. Pl. Carib. 25. 1760.

Veracruz and Yucatán. Central America; Cuba.

Stems glabrous; leaves short-petiolate, broadly ovate, 5 cm. long or less, acute, subcoriaceous, coarsely crenate-serrate; corolla about 1 cm. long. "Lluvia de coral" (Nicaragua).

8. *Russelia equisetiformis* Schlecht. & Cham. Linnaea 6: 377. 1831.

Russelia juncea Zucc. Flora 1832²: Beibl. 99. 1832.

Sinaloa (perhaps only cultivated) to Veracruz; type from Papantla, Veracruz. Guatemala.

Plants glabrous, herbaceous or suffrutescent; leaves small, ovate or lanceolate, caducous; inflorescence much branched; corolla usually 2 cm. long. "Arete de la cocinera" (Veracruz); "lluvia de coral;" "coralillo;" "lluvia de fuego," "coralitos" (Colombia).

A rather showy plant, common in cultivation in tropical and subtropical regions.

9. *Russelia multiflora* Sims in Curtis's Bot. Mag. pl. 1528. 1813.

Russelia paniculata Mart. & Gal. Bull. Acad. Brux. 12²: 19. 1845.

Veracruz, Puebla, Oaxaca, and Chiapas. Guatemala.

Plants suffrutescent, 1.5 meters high or less; leaves short-petiolate, ovate, 6 cm. long or less, often ternate, acuminate; corolla about 1 cm. long. "Sapoyolillo" (Chiapas, *Seler*).

¹ Linnaea 6: 376. 1831.

10. *Russelia obtusata* Blake, Proc. Biol. Soc. Washington 33: 119. 1920.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Stems with much thickened, obtuse angles; leaves short-petiolate, ovate or elliptic, 3 cm. long or less, obtuse, crenate or serrate, obtuse or acute at base; calyx lobes acute; corolla 12 to 14 mm. long.

11. *Russelia trachypleura* Robinson, Proc. Amer. Acad. 36: 474. 1901.

Type from Sierra de Tepoxtlán, Morelos, altitude 2,250 meters.

Stems 6-angulate, the angles roughened by small callosities; leaves short-petiolate, opposite or ternate, elliptic-ovate, 3 cm. long or less, obtuse or acute, serrate; calyx lobes caudate-acuminate.

12. *Russelia verticillata* H. B. K. Nov. Gen. & Sp. 2: 360. 1817.

Russelia deamii Robinson, Proc. Amer. Acad. 36: 474. 1901.

Chihuahua and Durango to Guerrero and Morelos; type from Puente de la Madre de Dios. Central America.

Stems 6-angulate; leaves short-petiolate, ovate or elliptic, 2.5 cm. long or less, obtuse or acute, thin, serrate, glabrous or villous.

Russelia deamii is a form with villous leaves. It may be specifically distinct, but it seems more probable that it is only a form of *R. verticillata*.

13. *Russelia polyedra* Zucc. Abh. Akad. Wiss. Muenchen 2: 328. 1832-36.

Russelia retrorsa Greene, Pittonia 1: 176. 1888.

Baja California and Sonora to Tamaulipas, Veracruz, and Chiapas. Central America.

Plants suffrutescent, 2.5 meters high or less, the stems 6-angulate, sparsely or densely pubescent; leaves short-petiolate, ovate or broadly ovate, 6 cm. long or less, acute, rounded to acute at base; corolla about 1.5 cm. long. "Hierba de la sueña" (Tamaulipas); "coral de la playa," "coral" (Oaxaca).

It is probable that the proper name for this species is *R. ternifolia* H. B. K.¹ The description of that species agrees well with *R. polyedra* except that the leaves are described as larger than in any specimens seen by the writer.

14. *Russelia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 385. 1913.

Type from Baños del Carrizal, Veracruz.

Branches densely pubescent; leaves ovate, 6.5 cm. long or less, acuminate, subcordate at base, short-petiolate, pubescent beneath; calyx lobes ovate, subulate-acuminate; corolla about 1.5 cm. long.

15. *Russelia rotundifolia* Cav. Icon. Pl. 5: 9. pl. 415. 1799.

Guerrero.

Shrub, the branches densely pubescent; leaves reniform to rounded-ovate, sessile, 8 cm. long or less, obtuse or rounded at apex, coriaceous, densely pubescent beneath and with prominent and reticulate venation; corolla about 1 cm. long.

16. *Russelia tepicensis* Robinson, Proc. Amer. Acad. 35: 321. 1900.

Russelia furfuracea T. S. Brandeg. Zoe 5: 219. 1905.

Sinaloa and Tepic; type from Zopilote, Tepic.

Stems striate, densely pubescent; leaves sessile or short-petiolate, mostly ternate, ovate to rounded-ovate, 4.5 cm. long or less, obtuse, rounded to acute at base, crenate or serrate; flowers in short dense cymes.

17. *Russelia pringlei* Robinson, Proc. Amer. Acad. 43: 26. 1907.

Guerrero; type from limestone cliffs of Iguala Canyon, altitude 750 meters.

Plants 1 to 2 meters high, the stems densely pubescent, striate; leaves short-petiolate, ovate, 1 to 1.5 cm. long, acute, serrate, densely glandular beneath; cymes short, few-flowered.

¹ Nov. Gen. & Sp. 2: 359. 1817.

6. BERENDTIA A. Gray, Proc. Amer. Acad. 7: 379. 1868.

Shrubs; leaves opposite, entire or toothed; peduncles axillary, 1 to 5-flowered; calyx tubular-campanulate, 5-dentate, 5-costate; corolla tube ampliate above, the limb bilabiate, the lobes spreading; stamens 4.

The species listed are the only ones known.

Plants glabrous.....1. *B. levigata*.

Plants copiously pubescent.

Peduncles mostly 3 to 5-flowered.....2. *B. coulteri*.

Peduncles 1-flowered.

Flowers 3.5 to 5 cm. long.....3. *B. rugosa*.

Flowers about 1.5 cm. long.....4. *B. spinulosa*.

1. *Berendtia levigata* Robins. & Greenm. Proc. Amer. Acad. 32: 39. 1896.

Puebla; type from Tehuacán.

Shrub, 1 meter high or less; leaves ovate-elliptic to lance-oblong, 4.5 cm. long or less, short-petiolate, acute, dentate above the middle; peduncles 1-flowered; corolla about 4 cm. long, orange with crimson spots.

2. *Berendtia coulteri* A. Gray, Proc. Amer. Acad. 7: 380. 1868.

The type locality is not stated by Gray; Hemsley gives it as "Zimapán and San Blas to Guadalajara."

Leaves oblong or obovate, nearly entire; corolla tube scarcely exerted from the calyx, the limb about 12 mm. broad.

3. *Berendtia rugosa* (Benth.) A. Gray, Proc. Amer. Acad. 7: 380. 1868.

Diplacus rugosus Benth. in DC. Prodr. 10: 368. 1846.

Berendtia ghiesbrechtii A. Gray, Proc. Amer. Acad. 7: 380. 1868.

Chiapas.

Plants villous; leaves ovate or obovate-oblong, 3.5 cm. long, crenate-dentate above the middle; corolla tube 3 times as long as the calyx; corolla "scarlet."

4. *Berendtia spinulosa* S. Wats. Proc. Amer. Acad. 25: 159. 1890.

Known only from the Sierra Madre near Monterrey, Nuevo León, on limestone ledges.

Much-branched shrub, glandular-hispidulous throughout; leaves linear-oblong to elliptic-oblong, acute or obtuse, sessile or short-petiolate, entire or with a few obscure teeth, the margins revolute; corolla yellow.

7. HEMICHAENA Benth. Pl. Hartw. 78. 1841.

A single species is known.

1. *Hemichaena fruticosa* Benth. Pl. Hartw. 78. 1841.

Leucocarpus fruticosus Benth. in DC. Prodr. 10: 336. 1846.

Oaxaca and Chiapas. Central America; type from Quezaltenango, Guatemala.

Plants herbaceous or suffrutescent, about 1 meter high, viscid-villous, the branches terete; leaves opposite, ovate-oblong or oblong-lanceolate, 12 cm. long or less, acute or acuminate, sessile and clasping, dentate; flowers in few-flowered pedunculate axillary cymes; calyx campanulate, 5-lobate, scarcely angulate; corolla about 4 cm. long, the tube broad, the limb 5-lobate, bilabiate; stamens 4.

8. DIPLACUS Nutt. Ann. Nat. Hist. 1: 137. 1838.

Shrubs; leaves opposite, entire or toothed; flowers axillary, solitary, large and showy; calyx tubular, 5-angulate, obliquely 5-dentate; corolla funnelform, the limb bilabiate, the upper lip bilobate, the lower 3-lobate; stamens 4.

The species of this genus are often placed in *Mimulus*.

Corolla red-----1. *D. puniceus*.
Corolla yellow-----2. *D. longiflorus*.

1. *Diplacus puniceus* Nutt. Ann. Nat. Hist. 1: 137. 1838.

Northern Baja California, ranging from sea level to 900 meters. Southern California; type collected near San Diego.

Shrub, about a meter high; leaves sessile, linear to linear-oblong, 6 cm. long or less, entire or serrate, glutinous and sometimes sparsely pubescent beneath; flowers pedicellate, the calyx glabrous or nearly so; corolla 3.5 to 4.5 cm. long.

2. *Diplacus longiflorus* Nutt. Ann. Nat. Hist. 1: 139. 1838.

Diplacus stellatus Kellogg, Proc. Calif. Acad. 2: 18. 1863.

Diplacus arachnoideus Greene, Bull. Calif. Acad. 1: 210. 1885.

Baja California. Southern California; type from Santa Barbara.

Shrub, 1 to 1.5 meters high; leaves linear to ovate-oblong, 5 cm. long or less, sessile or short-petiolate, entire or nearly so, usually with sparse pubescence of branched hairs beneath; calyx often villous; corolla 3.5 to 5.5 cm. long.

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UNITED STATES NATIONAL MUSEUM

CONTRIBUTIONS

FROM THE

UNITED STATES NATIONAL HERBARIUM

VOLUME 23, PART 5

TREES AND SHRUBS OF MEXICO

(BIGNONIACEAE-ASTERACEAE)

By PAUL C. STANDLEY



WASHINGTON
GOVERNMENT PRINTING OFFICE
1926

BULLETIN OF THE UNITED STATES NATIONAL MUSEUM
II

TREES AND SHRUBS OF MEXICO

By PAUL C. STANDLEY.

150. BIGNONIACEAE. Bignonia Family.

Trees or shrubs, often woody vines; leaves opposite or ternate, simple or usually compound, the terminal leaflet frequently replaced by a tendril; flowers perfect, irregular, usually large and showy; calyx inferior, gamosepalous, often closed in bud, spathaceous, truncate, or 5-dentate; corolla gamopetalous, the limb 5-lobate, the lobes usually somewhat unequal; stamens usually 4, inserted on the upper part of the corolla tube; fruit capsular or baccate, often very large.

Pyrostegia venusta (Ker) Baill. is often cultivated in Mexico. It is a vine with bifoliolate leaves and large clusters of long narrow red-orange flowers, native of Brazil. In El Salvador it is called "San Carlos." *Tecomaria capensis* (Thunb.) Fenzl, a native of South Africa, also is frequently cultivated. It is a vine with pinnate leaves and large, orange-red or scarlet, very showy flowers.

Plants scandent; leaves, at least some of them, with tendrils, and bifoliolate.

Tendrils with sharp-pointed hooked tips; corolla yellow-----1. **BIGNONIA**.

Tendrils without sharp-pointed hooked tips; corolla not yellow.

Disk absent. Flowers purple or pink; fruit linear-----2. **CYDISTA**.

Disk present at base of ovary.

Calyx apparently double, with 2 or 3 interior lobelike appendages. Flowers purple or pink; capsule oblong-elliptic, smooth.

3. **AMPHILOPHIUM**.

Calyx simple, not appendaged.

Corolla white, turning yellowish; fruit muricate, oblong or elliptic.

4. **PITHECOCTENIUM**.

Corolla pink, purple, or orange-red; fruit not muricate.

Corolla orange-red, coriaceous, 9 to 11 cm. long.

5. **PHAEDRANTHUS**.

Corolla pink or purple; corolla less than 9 cm. long.

Capsule oblong or ellipsoid.

Corolla coriaceous-----6. **DISTICTIS**.

Corolla thin-----7. **ADENOCALYMNA**.

Capsule linear. Corolla thin.

Calyx campanulate or tubular-campanulate 8. **ARRABIDAEA**.

Calyx broadly campanulate or saucer-shaped.

9. **PETASTOMA**.

Plants erect; leaves never with tendrils, simple, digitately 5 to 9-foliolate, pinnate, or rarely 3-foliolate.

Leaves pinnate. Flowers yellow-----10. **TECOMA**.

Leaves simple or digitately compound.

Leaflets 5 to 9; petioles not winged; fruit capsular.

Stamens pubescent; leaflets usually 7 or 9; corolla yellow.

11. **GODMANIA**.

Stamens glabrous; leaflets usually 5; corolla yellow, pink, or purple.

12. TABEBUIA.

Leaflets 1 to 3, rarely 5, but the petioles then broadly winged; fruit capsular or baccate.

Leaves simple, linear; fruit capsular.

Flowers yellow; seeds glabrous, broadly winged... **13. ASTIANTHUS.**

Flowers white or pink; seeds long-hairy, not winged... **14. CHILOPSIS.**

Leaves compound or, if simple, broader than linear; fruit baccate.

Leaves alternate, simple; fruit 2-celled..... **15. AMPHITECNA.**

Leaves opposite or fasciculate, simple or compound; fruit 1-celled.

Calyx spathaceous, slit along one side; fruit elongate, cylindric; plants usually armed with short spines; leaves 3-foliolate

16. PARMENTIERA.

Calyx campanulate, irregularly cleft or truncate; fruit globose or oval; plants unarmed; leaves simple or compound

17. CRESCENTIA.

1. BIGNONIA L. Sp. Pl. 622. 1753.

1. Bignonia unguis-cati L. Sp. Pl. 623. 1753.

?*Bignonia pubescens* L. Sp. Pl. ed. 2. 870. 1763.

?*Doxantha mexicana* Miers, Proc. Hort. Soc. Lond. **3**: 190. 1863.

Bignonia acutistipula Schlecht. Linnaea **26**: 375. 1854.

?*Bignonia lanuginosa* Hemsl. Biol. Centr. Amer. Bot. **2**: 491. 1882.

Bignonia californica T. S. Brandeg. Zoe **5**: 170. 1903.

Baja California and Sonora to Oaxaca, Yucatán, Veracruz, and Tamaulipas. West Indies; South America.

Woody vine, the branches often with aerial roots; leaves slender-petiolate; leaflets 2, the third one replaced by a tendril, this trifid, each branch ending in a sharp hook; leaflets lance-oblong to broadly ovate, 3 to 8 cm. long or larger, acute, obtuse to cordate at base, entire, thin, glabrous or pubescent; flowers yellow, the peduncles axillary, 1 or few-flowered; calyx campanulate, loose, 1.3 to 2 cm. long, subtruncate or irregularly lobate; corolla funnelform-campanulate, 4.5 to 7 cm. long; capsule linear, obcompressed, 30 to 40 cm. long, 1 to 1.5 cm. wide, smooth; seeds 2 to 2.5 cm. long, winged. "Xcanol-ak" (Yucatán, Maya); "bejuco legítimo," "San Pedro de guía" (Tamaulipas); "liana uñada," "pegapalo" (Porto Rico); "uña de gato" (Cuba, Porto Rico); "bejuco perdiz" (Cuba); "mano de cachora" (Sinaloa); "bejuco de uña" (El Salvador).

The plant is said to be used locally as a remedy for snake bites and manchineel (*Hippomane mancinella*) poisoning. It is reported also to have been employed as a febrifuge and for intestinal inflammation.

2. CYDISTA Miers, Proc. Hort. Soc. Lond. **3**: 191. 1863.

Scandent shrubs; leaves bifoliolate and often tendril-bearing, entire; flowers large, in chiefly terminal, few-flowered, lax racemes or panicles; calyx campanulate, truncate or 5-denticulate; corolla funnelform-campanulate; fruit capsular, linear, obcompressed, smooth; seeds compressed, broadly winged.

Corolla 5 to 8 cm. long..... **1. C. aequinoctialis.**

Corolla 3 to 4 cm. long..... **2. C. diversifolia.**

1. Cydista aequinoctialis (L.) Miers, Proc. Hort. Soc. Lond. **3**: 191. 1863.

Bignonia aequinoctialis L. Sp. Pl. 623. 1753.

Arrabidaea potosina Schum. & Loes. Bull. Herb. Boiss. **3**: 618. 1895.

Cydista potosina Loesener, Repert. Sp. Nov. Fedde **16**: 209. 1919.

Petastoma langlasseanum Kränzlein, Repert. Sp. Nov. Fedde **17**: 56. 1921.

Sinaloa to Tamaulipas, Veracruz, Yucatán, Tabasco, and Chiapas. West Indies; Central and South America.

Large vine; leaflets oblong to broadly ovate, 5 to 16 cm. long, acute or acuminate, usually obtuse or rounded at base, coriaceous, often very lustrous and with prominent reticulate venation, glabrous or sometimes sparsely hirtellous beneath; calyx 6 to 8 mm. long; corolla pink or pale purple, lepidote outside; fruit 25 to 40 cm. long or larger, 1.5 to 2 cm. wide, often with a dorsal ridge on each side. "Cebollín" (Michoacán, Guerrero); "chacanicab" (Yucatán, Maya); "bejuco tres-lomos" (Tabasco); "bejuco blanco," "liana de la sierra" (Porto Rico); "cuamecate blanco" (Nayarit); "cuero de vaca" (Sinaloa); "ajillo," "bejuco de ajo," "bejuco perdedor" (El Salvador).

The material referred here is variable and perhaps susceptible of division into two or more species. When crushed, the vine exhales a strong odor of garlic.

2. *Cydista diversifolia* (H. B. K.) Miers, Proc. Hort. Soc. Lond. 3: 192. 1863.

Bignonia diversifolia H. B. K. Nov. Gen. & Sp. 3: 133. 1818.

Michoacán to Chiapas and Yucatán; type from Campeche.

Slender vine; leaflets broadly ovate to oblong-elliptic, 4 to 9 cm. long, acuminate, obtuse to cordate at base, glabrous; calyx 4 to 5 mm. long; corolla purple, finely lepidote. "Chacxnetoloc," "xcolak" (Yucatán, Maya).

3. *AMPHILOPHIUM* Kunth, Journ. de Phys. 87: 451. 1818.

Scandent shrubs; leaves opposite, 3-foliolate or the terminal leaflet absent or replaced by a tendril, the leaflets entire; flowers large, purple, in a terminal panicle; calyx campanulate, the limb ampliate, sinuate, bearing 2 or 3 lobelike appendages within; corolla tube cylindric, the limb longer than the tube, bilabiate, the posterior lip shallowly bilobate, the anterior one 3-lobate; stamens 4; capsule oblong-elliptic, thick, compressed, smooth or nearly so; seeds broadly winged.

Leaflets finely stellate-pubescent beneath-----1. ***A. molle*.**

Leaflets merely lepidote beneath, or often barbate along the costa.

2. ***A. paniculatum*.**

1. *Amphilophium molle* Schlecht. & Cham. Linnaea 5: 120. 1830.

Tamaulipas and Veracruz; reported from Hidalgo. Central America.

Leaves long-petiolate, the leaflets long-petiolulate, broadly ovate or rounded-ovate, 6 to 10 cm. long, short-acuminate, usually cordate at base, stellate-pubescent or glabrate above; calyx about 1 cm. long; corolla 3 to 4 cm. long. "Cuchara de pico," "pico de pato," "cuchara de pato," "cucharillo" (El Salvador).

Doubtfully distinct from *A. paniculatum*.

2. *Amphilophium paniculatum* (L.) H. B. K. Nov. Gen. & Sp. 3: 149. 1818.

Bignonia paniculata L. Sp. Pl. 623. 1753.

Sinaloa to Guerrero; reported from Tabasco. Porto Rico and the Lesser Antilles; Guatemala to Peru and the Guianas.

Leaflets rounded-ovate, 4.5 to 10 cm. long, abruptly short-acuminate, cordate at base, minutely lepidote on both surfaces; corolla 3 to 4 cm. long; fruit 8 to 10 cm. long, 4 cm. wide, obtuse or acute at apex. "Pico de pato" (Tabasco, *Rovirosa*; Nicaragua); "liana de cuello" (Porto Rico).

4. *PITHECOCTENIUM* Mart.; DC. Prodr. 9: 193. 1845.

1. *Pithecoctenium echinatum* (Jacq.) Schum. in Engl. & Prantl, Pflanzenfam. 4^{3b}: 218. 1894.

Bignonia echinata Jacq. Enum. Pl. Carib. 25. 1760.

Pithecoctenium muricatum Moc.; DC. Prodr. 9: 194. 1845.

Pithecoctenium hexagonum DC. Prodr. 9: 195. 1845.

Sinaloa to Tamaulipas, Yucatán, and Oaxaca. Guatemala to Peru and Brazil; type from Cartagena, Colombia.

Large scandent shrub, the branches angulate; leaves opposite, long-petiolate, 3 or 2-foliolate, the terminal leaflet often replaced by a trifid tendril; leaflets ovate or rounded-ovate, 6 to 10 cm. long, usually short-acuminate, truncate or cordate at base, entire, finely lepidote and often pubescent; flowers white, turning yellow in age, in terminal racemes or panicles; calyx campanulate, subtruncate; corolla campanulate-funnelform, 4.5 to 5 cm. long, curved, tomentulose outside; fruit oblong or elliptic, 15 to 20 cm. long, 4.5 to 6.5 cm. wide, somewhat compressed, the valves hard and woody, densely covered with large sharp tubercles; seeds broadly winged, 6 to 8 cm. broad. "Güico" (Sinaloa); "xnetoloc" (Yucatán, Maya); "mariposa" (San Luis Potosí, Oaxaca; seeds); "palomitas" (seeds; San Luis Potosí, Oaxaca); "lengua de vaca" (Tamaulipas, Guatemala); "bejuco de huico" (Sinaloa, Oaxaca); "corneta" (Oaxaca); "hiedra bocina" (Herrera); "clarín" (Oaxaca); "petaquillas" (seeds; Morelos, Guatemala); "cucharilla" (Costa Rica); "hoja de cucharilla" (Guatemala); "peine de mico" (Nicaragua, Costa Rica); "tonalxochitl" (Nahuatl, *Reko*); "pico de pato," "bateíta" (El Salvador).

The large seeds are light and float through the air, hence the names "mariposas" ("butterflies") and "palomitas" ("little doves") applied to them. They are widely used in Mexico as a remedy for headache, being moistened and stuck upon the forehead. The hard portion of the seed is ground, mixed with tallow, and applied to the temples as a remedy for sore eyes (in Tamaulipas, according to Palmer). A decoction of the flowers is said to have been used by the Aztecs as a remedy for fevers. The curious rough fruits are used as back scratchers and pin-cushions.

DOUBTFUL SPECIES.

PITHECOCTENIUM TRIBRACHIATUM Loesener, Repert. Sp. Nov. Fedde 16: 209. 1919. Type from Zacuapan, Veracruz.

5. *PHAEDRANTHUS* Miers, Proc. Hort. Soc. Lond. 3: 182. 1863.

A single species is known.

1. *Phaedranthus buccinatorius* (DC.) Miers, Proc. Hort. Soc. Lond. 3: 182. 1863.

Pithecoctenium buccinatorium DC. Prodr. 9: 195. 1845.

Bignonia buccinatoria Mariet; DC. Prodr. 9: 195, as synonym. 1845.

Bignonia ghiesbreghtii Heller, Linnaea 30: 45. 1859.

Phaedranthus lindleyanus Miers, Proc. Hort. Soc. Lond. 3: 182. 1863.

Phaedranthus exsertus Miers, Proc. Hort. Soc. Lond. 3: 182. 1863.

Phaedranthus cinerascens Miers, Proc. Hort. Soc. Lond. 3: 182. 1863.

Jalisco and San Luis Potosí to Puebla.

Large vine; leaflets 2, the third one usually represented by a tendril, oblong to oval or ovate-elliptic, 5 to 9 cm. long, acute to rounded at apex, rounded or subcordate at base, entire, lepidote beneath, coriaceous; flowers purple-red, in few-flowered terminal panicles; calyx campanulate, 1 to 1.5 cm. long, obscurely 5-dentate, densely tomentose; corolla coriaceous, tubular-funnelform, 9 to 11 cm. long, tomentulose outside, the lobes short, rounded. "Trompetilla grande" (Querétaro); "clarín," "hiedra bocina" (*Ramírez*).

The plant is often cultivated in Mexico.

6. *DISTICTIS* Bureau, Monogr. Bignon. 46. 1864.

Scandent shrubs; leaves opposite, 2 or 3-foliolate, the terminal leaflet often represented by a tendril, the leaflets entire; flowers large and showy, purple or pink, in terminal racemes or panicles; calyx campanulate, truncate or 5-denticulate; corolla funnelform-campanulate; capsule oblong or elliptic, smooth, obcompressed; seeds broadly winged.

- Pubescence of simple hairs-----1. **D. laxiflora.**
 Pubescence of stellate hairs-----2. **D. rovirosana.**

1. **Distictis laxiflora** (DC.) Greenm. Proc. Amer. Acad. 33: 486. 1898.

Pithecoctenium laxiflorum DC. Prodr. 9: 195. 1845.

Pithecoctenium cinereum DC. Prodr. 9: 195. 1845.

Distictis cinerea Greenm. Proc. Amer. Acad. 33: 487. 1898.

Jalisco and Guanajuato to Puebla and Oaxaca; type from Oaxaca.

Woody vine; leaves bifoliolate, the leaflets broadly ovate to oblong-elliptic, 3 to 6 cm. long, acute to rounded at apex, rounded at base, entire, lepidote, pubescent; flowers purple, in few-flowered terminal racemes or panicles; calyx tomentulose; corolla 5.5 to 8.5 cm. long, densely tomentulose outside; capsule oblong-elliptic, 7 to 9 cm. long, 4 cm. long, nearly smooth, with a dorsal ridge on each valve, glabrous; seeds broadly winged. "Jeroliz morado" (Querétaro); "manto de la Virgen."

This plant is often cultivated in Mexico.

2. **Distictis rovirosana** Donn. Smith, Bot. Gaz. 20: 7. 1895.

Tabasco, the type from Atasta. Guatemala to Nicaragua.

Leaflets oblong-obovate to oval, 10 to 15 cm. long, caudate-acuminate, usually retuse, stellate-pubescent when young; calyx 5 to 6 mm. long, velutinous; corolla pink, about 5 cm. long; capsule oblong, 9.5 cm. long, 3.5 cm. wide. "Pie de gallo" (Tabasco).

Not seen by the writer.

7. **ADENOCALYMNA** Mart.; DC. Prodr. 9: 199. 1845.

Scandent shrubs; leaves normally bifoliolate, with a terminal tendril, but often trifoliolate, the leaflets entire; flowers large, pink or purple, in chiefly terminal racemes or panicles; calyx campanulate, truncate or 5-dentate, glandular within, pubescent; corolla elongate-funnelform; capsule oblong or broadly linear, compressed parallel with the septum or subterete, usually tuberculate-rugose; seeds usually broadly winged.

Calyx not conspicuously nerved; corolla 5 to 6 cm. long--1. **A. alboviolaceum.**

Calyx conspicuously nerved, the nerves tortuous, excurrent in the small calyx teeth; corolla 3 to 5 cm. long.

Corolla 3 to 3.5 cm. long-----2. **A. seleri.**

Corolla 4.5 to 5 cm. long-----3. **A. fissum.**

1. **Adenocalymna alboviolaceum** Loesener, Verh. Bot. Ver. Brand. 56: 100. 1923.

Oaxaca and Veracruz; type from Tehuantepec, Veracruz.

Leaflets ovate, obtuse or acutish, rounded or subcordate at base, 3 to 5 cm. long or larger, puberulent or glabrate beneath; calyx 5 to 6 mm. long, puberulent; corolla purplish, glabrous. "Loobaa-beete" (Oaxaca).

2. **Adenocalymna seleri** Loesener, Verh. Bot. Ver. Brand. 56: 101. 1923.

Type collected between Ticul and Tabi, Yucatán.

Leaflets ovate-lanceolate, villosulous and glandular-punctate beneath; calyx 6 to 8 mm. long, sparsely villosulous, the teeth scarcely 1 mm. long; corolla puberulent. "Oppol che."

3. **Adenocalymna fissum** Loesener, Verh. Bot. Ver. Brand. 56: 102. 1923.

Type from Xkombec, Yucatán.

Leaflets ovate-lanceolate, acute or obtuse at base, about 6.5 cm. long, puberulent on the nerves; inflorescence puberulent; calyx 8 mm. long, villosulous; corolla sparsely puberulent, cleft on one side.

8. **ARRABIDAEA** DC. Bibl. Univ. Genève 17: 126. 1838.

Scandent shrubs; leaves opposite, 2 or 3-foliolate, the leaflets entire, the terminal one often replaced by a tendril; flowers large or small, in chiefly terminal panicles; calyx campanulate, truncate or 5-denticulate; corolla funnelform-campanulate; fruit a linear capsule, obcompressed.

Corolla 1.3 to 1.8 cm. long.....1. **A. floribunda**.

Corolla 3.5 to 4.5 cm. long.

Corolla thinly villosulous outside.....2. **A. litoralis**.

Corolla densely and closely tomentellous.....3. **A. seleriana**.

1. **Arrabidaea floribunda** (H. B. K.) Loesener, Repert. Sp. Nov. Fedde 16: 209. 1919.

Bignonia floribunda H. B. K. Nov. Gen. & Sp. 3: 134. 1818.

Bignonia andrieuxii DC. Prodr. 9: 156. 1845.

?*Arrabidaea pseudochica* Kränzlein, Repert. Sp. Nov. Fedde 17: 19. 1921.

Oaxaca, Campeche (type locality), and Yucatán.

Leaflets 2, ovate to ovate-oblong, 9 cm. long or less, obtusely acuminate or obtuse, rounded or obtuse at base, glabrous, lustrous, the upper leaves, at least, purple when dried; panicles large and many-flowered; calyx 3 mm. long, truncate, purple-tomentulose; corolla purple, puberulent. "Xbaque ak" (Yucatán, Maya).

2. **Arrabidaea litoralis** (H. B. K.) Standl.

Bignonia litoralis H. B. K. Nov. Gen. & Sp. 3: 139. 1818.

Guerrero; type from Acapulco.

Large vine; leaflets 2 or 3, broadly ovate to elliptic, 13 cm. long or less, acuminate, rounded at base, pubescent or glabrate beneath; panicles large and many-flowered; calyx 3 to 4 mm. long, puberulent; corolla purple; fruit 20 to 35 cm. long, 10 to 13 mm. wide, glabrous. "Bejuco vaquero."

Palmer reports that the stems are used for clotheslines.

3. **Arrabidaea seleriana** Loesener, Verh. Bot. Ver. Brand. 56: 99. 1923.

Type from Tequisistlán, Oaxaca. Guatemala.

Leaves not known; flowers "pale red," 3 to scarcely 4 cm. long; calyx 3 to 6 mm. long, very shortly puberulent, obscurely 5-dentate.

9. **PETASTOMA** Miers, Proc. Hort. Soc. Lond. 3: 194. 1863.

1. **Petastoma patelliferum** (Schlecht.) Miers, Proc. Hort. Soc. Lond. 3: 195. 1863.

Bignonia patellifera Schlecht. Linnaea 8: 516. 1833.

Veracruz, Oaxaca, and Chiapas; type from Hacienda de la Laguna, Veracruz. Central America to Brazil.

Large woody vine; leaves opposite, bifoliolate, often ending in a tendril but the tendril more commonly absent; leaflets elliptic or broadly ovate, 5 to 13 cm. long, short-acuminate, rounded at base, densely pubescent or glabrate, entire; flowers purple, in large terminal leafy panicles; calyx broadly campanulate or saucer-shaped, truncate, glabrous or nearly so; corolla funnelform-campanulate, pale purple, 3.5 to 4 cm. long, glabrous outside except on the lobes; capsule obcompressed, linear, 20 to 30 cm. long, 10 to 13 mm. wide, smooth, glabrous; seeds winged, 15 to 17 mm. wide. "Bejuco de corral" (El Salvador).

10. **TECOMA** Juss. Gen. Pl. 139. 1789.

1. **Tecoma stans** (L.) H. B. K. Nov. Gen. & Sp. 3: 144. 1818.

Bignonia stans L. Sp. Pl. ed. 2. 871. 1763.

Tecoma mollis H. B. K. Nov. Gen. & Sp. 3: 144. 1818.

Tecoma stans velutina DC. Prodr. 9: 224. 1845.

Stenolobium stans Seem. Journ. Bot. 1: 88. 1863.

Stenolobium incisum Rose & Standl. Contr. U. S. Nat. Herb. 16: 174. 1913.

Stenolobium tronadora Loesener, Repert. Sp. Nov. Fedde 16: 210. 1919.

Stenolobium quinquejugum Loesener, Repert. Sp. Nov. Fedde 16: 211. 1919.

Nearly throughout Mexico. Widely distributed in tropical and subtropical America.

Shrub or small tree, 1 to 8 meters high; leaves opposite, pinnate, the leaflets 5 to 13, linear-lanceolate to ovate-lanceolate or elliptic, acute or acuminate, serrate or rarely entire, glabrous beneath or often pubescent or tomentose; flowers bright yellow, in terminal racemes or panicles; calyx tubular-campanulate, 5-dentate; corolla 3.5 to 5 cm. long, funnelform-campanulate, the limb somewhat bilabiate, 5-lobate; stamens 4; capsule linear, 10 to 20 cm. long, about 6 mm. broad, loculicidally dehiscent, compressed; seeds winged. "Retamo" or "retama" (Michoacán, Guerrero, Jalisco, Mexico, Durango); "tronador" or "tronadora" (Zacatecas, Guanajuato, Mexico, Hidalgo); "trompetilla" (Hidalgo); "trompeta" (Durango); "gloria" (Sinaloa); "kanlo," "xkanlol" (Yucatán, Maya); "guie-bichi" (Oaxaca, Zapotec, *Reko*); "tulasúchil" (Oaxaca); "palo de arco" (Chihuahua, Sonora, Oaxaca); "flor de San Pedro," "San Pedro" (Tamaulipas, San Luis Potosí, Veracruz, Durango, Coahuila, Mexico); "corneta amarilla" (Durango); "nixtamaxochitl" or "nextamalxochitl" (Nahuatl); "borla de San Pedro" (Chiapas, San Luis Potosí, Mexico); "hierba de San Nicolás," "hierba de San Pedro" (*Flores*); "flor amarilla" (Yucatán, Nicaragua); "miñona" (Nuevo León); "mazorca," "huachacata," "icheulili" (*Ramírez*); "sauco amarillo" (Cuba, Porto Rico); "roble amarillo," "ruibarba" (Porto Rico); "copete" (Panama); "sardinillo" (Nicaragua); "fresno," "chirlobirlos," "palo hueso" (Colombia); "tache," "tasto" (El Salvador); "candelillo" (Costa Rica); "garrocha" (Argentina, Uruguay); "garanguay amarillo," "guaran-guaran" (Argentina); "San Andrés," "marchucha," "tagualaishte" (El Salvador).

The shrub is sometimes known as "trumpet-flower" or "yellow elder." It is a showy plant and is common in cultivation. The flowers are slightly fragrant and are said to yield much honey. The wood is of little value but it was formerly used by the Indians for making bows. The roots are reported to be a powerful diuretic, and tonic, antisyphilitic, and vermifuge properties are ascribed to the plant. In Veracruz a decoction of the flowers and bark is administered for pains in the stomach, and in some parts of Mexico the plant has the reputation of alleviating and even curing diabetes. At Guadalajara the roots are said to be used for making a kind of beer.

The species is a variable one, but although the writer has spent a large amount of time in study of the extensive series of specimens available, it has been impossible to find any reliable characters by which to assign the material to two or more species. In the typical form the leaflets are usually glabrous. *T. stans velutina* is a form in which the leaflets are pubescent or tomentose beneath. This has usually been maintained as a distinct species, but there is every possible gradation between the forms with glabrous leaflets and those with tomentose ones. *Tecoma stans angustata* Rehder¹ (*Stenolobium incisum* Rose & Standl.) is a form common in northeastern Mexico and the adjacent United States in which the leaflets are unusually narrow and incised-serrate.

11. GODMANIA Hemsl. Diag. Pl. Mex. 35. 1879.

One other species has been described from Brazil.

1. *Godmania aesculifolia* (H. B. K.) Standl.

Bignonia aesculifolia H. B. K. Nov. Gen. & Sp. 3: 140. 1818.

¹ Mitt. Deutsch. Dendr. Ges. 1915: 227. 1915.

Tecoma fuscata DC. Prodr. 9: 218. 1845.

Godmania macrocarpa Hemsl. Diag. Pl. Mex. 35. 1879.

Guerrero to Chiapas. Central America and Venezuela; type collected near the city of Panama.

Tree, 4.5 to 8 meters high; leaves opposite, long-petiolate, digitately 5 to 9-foliolate, the leaflets obovate or oblanceolate-oblong, 6 to 17 cm. long, usually acuminate, acute at base, petiolulate, entire, pubescent or glabrate beneath; flowers in dense axillary corymbs; calyx broadly campanulate, 5-dentate; corolla yellow, with brownish lines, about 1 cm. long, campanulate, puberulent outside; stamens 4; capsule slender-cylindric, sometimes 90 cm. long, costate; seeds broadly winged. "Roble" (Oaxaca); "cacho de toro" (Chiapas); "corteza de chivo" (Costa Rica), "cortez blanco" (El Salvador).

12. **TABEBUIA** Gomes, Obs. Bot. 2: 7. 1803.

Trees; leaves opposite, long-petiolate, digitately 5 or 7-foliolate, the leaflets entire or toothed; flowers large, in terminal cymes or panicles; calyx tubular or campanulate, closed in bud, variously cleft or toothed in anthesis; corolla tube ampliate, the limb somewhat bilabiate; stamens 4; capsule slender-cylindric, subterete; seeds broadly winged.

The trees of this genus are very showy when in flower. They usually blossom when leafless. The name "guayacán" is said to be employed in Mexico for one or more of the species.

Calyx lepidote, 1.5 cm. long or larger; flowers purple or pink. 1. **T. pentaphylla**. Calyx densely pubescent or tomentose, at least at first, 1 cm. long or less or, if larger, the flowers yellow.

Flowers (yellow) in large pyramidal panicles. 2. **T. donnell-smithii**. Flowers in small, dense, usually headlike clusters.

Calyx covered with a fine close whitish tomentum; corolla pink or purple.

3. **T. palmeri**.

Calyx covered with long, short-barbate, fulvous or brown hairs; corolla yellow. 4. **T. chrysantha**.

1. **Tabebuia pentaphylla** (L.) Hemsl. Biol. Centr. Amer. Bot. 2: 495. 1882.

Bignonia leucoxylon L. Sp. Pl. 624. 1753. Not *Tabebuia leucoxylo* DC. 1845.

Bignonia pentaphylla L. Sp. Pl. ed. 2. 870. 1763.

Tecoma pentaphylla Juss. Gen. Pl. 139. 1789.

Tecoma leucoxylon Mart.; DC. Prodr. 9: 219. 1845.

Tamaulipas to Sinaloa, Oaxaca, and Veracruz. West Indies; Central America to Venezuela.

Shrub or tree, 2 to 20 meters high; leaflets 5, long-petiolulate, elliptic-oblong to elliptic or oblong-ovate, 20 cm. long or less, acute or acuminate, rounded to acute at base, entire, finely lepidote; flowers in short lax few-flowered corymbs; corolla 7 to 10 cm. long; fruit 20 to 35 cm. long or larger, about 12 mm. thick. "Maculiz," "maculiz prieto" (Tabasco); "palo yugo" (Michoacán, Guerrero); "roble" (San Luis Potosí, Guerrero); "roble blanco" (Oaxaca, San Luis Potosí, Cuba, Costa Rica, Porto Rico); "palo de rosa" (Tamaulipas, Oaxaca); "maquile" (*Ramírez*); "macuil" (Oaxaca); "amapola" (Sinaloa); "roble colorado" (El Salvador); "mano de león" (Honduras); "maculizo" (Guatemala, Honduras); "roble de yugo," "palo blanco," "leño blanco" (Cuba); "amapa rosa" (Nayarit); "rosa morada" (Colima); "maquiligua," "maquilisguat" (El Salvador).

This is an important timber tree in some parts of Mexico and Central America, and furnishes wood of excellent quality for house building, cabinet work, wagons, oars, and other purposes. In Europe the wood has been employed as a substitute for boxwood in engraving. In Cuba the plant is considered an antidote for poisoning by manchineel (*Hippomane mancinella*), and it has been used in some regions (the decoction, taken internally) as a remedy for snake bites. The powdered bark and leaves were formerly used in the Antilles as a febrifuge.

When in flower, *Tabebuia pentaphylla* is one of the most showy and most beautiful of American trees and an extensive stand of them is a sight long to be remembered. The blossoms exhibit great variation in color, ranging from nearly white to deep purple-pink. The color effect produced is strikingly like that seen in Japanese cherries.

Specimens from Central America identified as *Couralia rosea* (Bertol.) Donn. Smith do not appear to differ from *Tabebuia pentaphylla*.

2. *Tabebuia donnell-smithii* Rose, Bot. Gaz. 17: 418. *pl.* 26. 1892.

Colima. Guatemala and El Salvador; type from Cuyuta, Guatemala.

Tree, 15 to 25 meters high, the trunk often 1.2 meters in diameter; leaflets 5 or 7, long-petiolulate, oblong-elliptic, 25 cm. long or less, acuminate, rounded or subcordate at base, entire or sinuate-serrate, glabrate; panicles about 20 cm. long; calyx about 1.5 cm. long; corolla 4.5 to 5 cm. long; fruit 20 to 30 cm. long, 2.5 cm. wide, longitudinally ridged and irregularly tuberculate. "Primavera" (Colima); "cortez," "cortez blanco" (El Salvador).

The wood is exported from Mexico for veneering and cabinet work, and is reported to be known in trade as "white mahogany."

3. *Tabebuia palmeri* Rose, Contr. U. S. Nat. Herb. 1: 109. *pl.* 11. 1891.

Sonora to Guerrero; type from Alamos, Sonora.

Tree, 5 to 20 meters high; leaflets 5, long-petiolulate, elliptic-oblong to ovate-elliptic, 14 cm. long or less, acuminate, rounded at base, entire, densely pubescent or glabrate; calyx 5 to 6 mm. long; corolla 6.5 to 8 cm. long; fruit about 35 cm. long and 1.5 cm. thick, smooth. "Amapa" (Sonora, Sinaloa); "roble" (Guerrero); "amapa prieta," "amapa rosa" (Sinaloa).

The wood is said to be brown, with red lines, and very handsome, heavy, rather hard, resistant, taking a good polish, and durable when exposed to moisture. It is much used locally for building purposes and for cabinet work. A violet ink is said to be made from it.

4. *Tabebuia chrysantha* (Jacq.) Nicholson, Dict. Gard. 4: 1. 1887.

Bignonia chrysantha Jacq. Pl. Hort. Schoenbr. 2: 45. *pl.* 211. 1797.

?*Tecoma mexicana* Mart.; DC. Prodr. 9: 218. 1845.

Tecoma chrysantha DC. Prodr. 9: 221. 1845.

?*Tabebuia mexicana* Hemsl. Biol. Centr. Amer. Bot. 2: 495. 1882.

Tecoma palmeri Kränzlein, Repert. Sp. Nov. Fedde 17: 220. 1921.

Sonora to Chiapas. Central America to Venezuela; type from Caracas, Venezuela.

Small or large tree with scaly bark; leaflets 5, broadly obovate to elliptic-oblong, 18 cm. long or less, abruptly acuminate, rounded or subcordate at base, entire, stellate-pubescent or glabrate; calyx about 1 cm. long; corolla 5 to 6.5 cm. long; fruit 20 to 30 cm. long or larger, 12 to 15 mm. thick, smooth or tuberculate, stellate-tomentose or glabrate. "Verdecillo" (Michoacán, Guerrero); "amapa," "amapa prieta" (Sinaloa); "roble" (Guerrero); "guayacán," "corteza amarilla" (Costa Rica); "cortez," "cortez amarillo," "cortez coyote," "cortez negro" (El Salvador).

The flowers are sweet-scented. The wood is blackish and very hard.

13. ASTIANTHUS Don, Edinburgh Phil. Journ. 9: 262. 1823.

The genus consists of a single species.

1. Astianthus viminalis (H. B. K.) Baill. Hist. Pl. 10: 44. 1888.

Bignonia viminalis H. B. K. Nov. Gen. & Sp. 3: 132. 1819.

Astianthus longifolius Don, Edinburgh Phil. Journ. 9: 262. 1823.

Tecoma viminalis Hemsl. Biol. Centr. Amer. Bot. 2: 497. 1882.

Colima to Oaxaca, Puebla, and Veracruz; type collected between Mexcala and Estola, Guerrero. Guatemala.

Tree, sometimes 15 meters high, glabrous; bark gray or whitish, fissured; leaves mostly ternate, linear, 20 to 30 cm. long, attenuate to each end, entire; flowers yellow, in loose paniced cymes; calyx campanulate, 1 cm. long, 5-dentate; corolla funnelform, 5.5 to 6 cm. long, the lobes erose-dentate and somewhat crispate; fruit linear, 8 to 12 cm. long, 8 mm. broad, compressed, smooth or nearly so; seeds small, with broad thin white wings. "Ahuejote" (Oaxaca, etc.); "palo de agua," "flor de agua," "axochitl" (Oaxaca).

The tree usually grows along streams.

14. CHILOPSIS Don, Edinburgh Phil. Journ. 9: 261. 1823.

A single species is known.

1. Chilopsis linearis (Cav.) Sweet, Hort. Brit. 283. 1827.

Bignonia linearis Cav. Icon. Pl. 3: 35. pl. 269. 1794.

Chilopsis saligna Don, Edinburgh Phil. Journ. 9: 261. 1823.

Baja California and Sonora to Tamaulipas, Zacatecas, and Durango. Western Texas to southern California.

Slender shrub or tree, sometimes 9 meters high, with a trunk 30 cm. in diameter, the trunk short, the bark thin, irregularly ridged, scaly; leaves opposite and alternate, linear, 10 to 30 cm. long, attenuate to each end, entire, pubescent or glabrous; flowers purplish or white, in terminal racemes or narrow panicles; calyx bilabiate, 5-dentate; corolla 2.5 to 3.5 cm. long, somewhat bilabiate, 5-lobate; stamens 4; fruit linear, 10 to 30 cm. long, about 6 mm. thick, subterete, smooth; seeds long-hairy; wood soft, weak, close-grained, dark brown, its specific gravity about 0.59. "Mimbre" (Zacatecas, Chihuahua, Nuevo León, Durango).

The tree grows most commonly along arroyos. It is often planted because of its showy sweet-scented flowers. In the United States it is known as "desert willow" or "flowering willow," the leaves bearing a strong resemblance to those of some species of willow (*Salix*). The wood is sometimes used for fence posts and the tough slender branches for making baskets. A decoction of the flowers is employed locally for coughs and as a stimulant in cardiac diseases, and the dried flowers are often sold in the markets for these purposes.

15. AMPHITECNA Miers, Trans. Linn. Soc. Bot. 26: 163. 1868.**1. Amphitecna macrophylla** (Seem.) Miers; Baill. Rev. Hort. 1882: 465. 1882.

Crescentia macrophylla Seem. Kew Journ. Bot. 6: 274. 1854.

Veracruz and Tabasco; type from Teapa, Tabasco. Guatemala.

Shrub or small tree, glabrous; leaves alternate, borne at the ends of the branches, oblanceolate or oblong-oblanceolate, 40 to 75 cm. long, acute or acuminate, long-attenuate to the base, sessile or nearly so, entire; flowers long-pedicellate, fasciculate on old wood; calyx closed in bud, splitting in anthesis; corolla funnelform-campanulate, greenish, about 5 cm. long; fruit baccate, oval or ellipsoid, 5 cm. or more in diameter. "Huiro de montaña" (Tabasco, *Rovirosa*).

16. PARMENTIERA DC. Prodr. 9: 244. 1845.

Trees, usually armed with spines; leaves alternate or subopposite, mostly trifoliolate; flowers large, greenish, pedicellate, solitary or fasciculate on old wood; calyx closed in bud, in anthesis cleft along one side and spathe-like; corolla tube dilated and campanulate, curved, the limb somewhat bilabiate, 5-lobate; stamens 4; ovary 2-celled; fruit elongate, terete, indehiscent, with fleshy pericarp, smooth or costate; seeds small, numerous, not winged.

One other species is known, *P. cereifera* Seem., the candle-tree of Panama.

Fruit short and thick, costate; leaflets mostly acute and entire. **1. *P. edulis*.**
Fruit long and slender, smooth or nearly so; leaflets usually very obtuse and often toothed. **2. *P. aculeata*.**

1. *Parmentiera edulis* DC. Prodr. 9: 244. 1845.

?*Crescentia edulis* Desv. Journ. de Bot. Desv. 4: 113. 1814.

?*Parmentiera foliolosa* Miers, Trans. Linn. Soc. Bot. 26: 166. 1870.

?*Parmentiera lanceolata* Miers, Trans. Linn. Soc. Bot. 26: 167. 1870.

Sinaloa to Tamaulipas, Campeche, and Oaxaca; type from Yautepec, Morelos. Guatemala and El Salvador.

Tree, 4.5 to 9 meters high, the branches armed with short stout incurved spines; leaves glabrous, long-petiolate, the petiole naked or narrowly winged, the leaflets elliptic, ovate, or obovate, 3 to 8.5 cm. long, acute or abruptly attenuate at base; corolla about 7 cm. long; fruit 10 to 16 cm. long and 2 cm. thick or larger. "Chote" (Tamaulipas, San Luis Potosí); "cuajilote," "huajilote," "cuachilote," "guajilote" (Oaxaca, Tamaulipas, Veracruz, Jalisco, Morelos, Campeche, Sinaloa, Costa Rica, El Salvador, Guatemala; from the Nahuatl *cuau-xilotl*); "gueto-xiga" (Oaxaca, Zapotec, *Reko*).

The tree is often cultivated for its shade and fruit. The fruit is sweet and edible, and is eaten either raw or cooked. It is sometimes made into pickles or preserves and also roasted in ashes. Stock of all kinds are fond of it. It is considered a good remedy for colds; the roots are used as a diuretic, especially in the treatment of dropsy, and the juice of the leaves was formerly, at least, dropped into the ears as a cure for deafness. The flowers are greenish white or greenish yellow, and the fruit green tinged with yellow.

The name *Crescentia edulis* Desv. has no connection with *Parmentiera edulis* DC., and it is not certain that Desvaux's name relates to the present plant. He describes the leaves as simple, but his description of the fruit points to *Parmen-tiera edulis*.

2. *Parmentiera aculeata* (H. B. K.) Seem. Bot. Voy. Herald 183. 1854.

Crescentia aculeata H. B. K. Nov. Gen. & Sp. 3: 158. 1818.

Colima, Campeche, and Yucatán; type from Campeche.

Shrub or tree, 3.5 to 7.5 meters high, the branches armed with stout spines; leaves long-petiolate, the petioles not winged, the leaflets suborbicular to obovate, 1 to 3 cm. long, abruptly decurrent at base, puberulent or glabrous; calyx 2 cm. long; fruit 18 to 25 cm. long, about 1 cm. thick. "Xkat-cunc," "kaat," "pepina" (Yucatán).

The flowers are said to be green. This species has been reported from Yucatán as *P. cereifera* Seem.

17. CRESCENTIA L. Sp. Pl. 626. 1753.

Unarmed trees; leaves alternate or fasciculate, simple or trifoliolate (rarely 5-foliolate); flowers large, yellowish, solitary or fasciculate along the trunk and larger branches; calyx closed in bud, in anthesis campanulate and irregularly cleft; corolla tube campanulate, the limb oblique, 5-lobate; stamens 4; fruit large, oval or globose, indehiscent, the pericarp hard and shell-like; seeds numerous, exalate, imbedded in pulp.

Leaves simple.....1. *C. kujete*.
 Leaves trifoliolate.....2. *C. alata*.

1. *Crescentia kujete* L. Sp. Pl. 626. 1753.

Guerrero to Chiapas, Yucatán, Veracruz, and Tamaulipas. Southern Florida, West Indies, and Central and South America; cultivated in the Old World tropics.

Tree, sometimes 10 meters high, with a trunk 20 cm. in diameter, the branches long and often drooping, the bark thin, close, gray; leaves persistent, oblanceolate to spatulate, 5 to 16 cm. long, acute to rounded at apex, attenuate to base, entire, glabrous or puberulent beneath; corolla yellowish marked with purple, 5 to 8 cm. long, the lobes usually crispate; fruits commonly oval, 15 to 30 cm. long; wood soft, close-grained, flexible. "Güiro," "huas" "lunch" (Yucatán); "jícara" or "jícara" (the former the tree, the latter the fruit; Tabasco, Oaxaca, Guerrero, Yucatán, El Salvador, Nicaragua); "cujete" (Yucatán); "cirián" (Guerrero, *Palmer*); "tecomate," (Oaxaca); "cuautecomate"; "tecomatl"; "árbol de las calabazas" "guaje" (*Herrera*); "pog" (Oaxaca, Totonac, *Ramírez*); "morro" (Guatemala); "calabazo," "güiro totumo" (*Sessé & Mocino*); "güira cimarrona" (Cuba, El Salvador); "güira" (Cuba); "calabacero," "guacal" (Costa Rica); "palo de turtumas," "calabazo," "calabaza," "palo de calabaza" (Panama); "morro guacalero" (Guatemala); "mate" (Colombia, Ecuador); "totumo" (Colombia, El Salvador); "cutuco" (El Salvador); "totuma" (Cuba); "jícara de cuchara," "jícara de guacal," "huacal" (El Salvador).

The calabash tree is a common plant of southern Mexico, noteworthy because of its large fruits, many of which are borne close to the trunk. The seeds are sometimes cooked and eaten. The pulp is much used in domestic medicine and is said to have emollient, expectorant, laxative, and astringent properties. It is employed chiefly as a healing agent for wounds and as a remedy for disturbances of the respiratory system. The fruit is often eaten by cattle during the dry season, but it is said that it often produces abortion. Seemann states that the sap was employed in Panama for dyeing silk black. The wood is of little value, but is often used for various purposes. The hard shell of the fruit, which resembles a gourd, has been used in Mexico from ancient times for making "jicaras" or drinking cups, which are often ornamented by carving and painting. Vessels thus made are sufficiently substantial for moderate use over fire.

2. *Crescentia alata* H. B. K. Nov. Gen. & Sp. 3: 158. 1819.

Parmentiera alata Miers, Trans. Linn. Soc. Bot. 26: 166. 1870.

Baja California and Sonora to Chiapas; Morelos and Veracruz (probably cultivated); type from Acapulco, Guerrero. Central America; cultivated in Guam and the Philippines, and probably elsewhere.

Tree, 5 to 14 meters high, with gray bark and long spreading irregular branches; leaves long-petiolate, the petiole broadly winged and resembling a leaflet, the leaflets usually 3 but sometimes 5, linear to obovate, 2 to 9 cm. long, obtuse or rounded at apex, entire, coriaceous, glabrous; corolla about 6 cm. long, greenish yellow striped with brown; fruit globose or ovoid, 5 to 12 cm. in diameter or often much larger. "Cirián" (Michoacán, Guerrero); "tecomate" (Sinaloa); "morro" (Chiapas, Guatemala); "ayal" or "ayale" (Sonora, Sinaloa); "cuautecomate" (Michoacán); "huajericián," "tecomatl," "cuautecomatl" (*Ramírez*); "cuaste-comatl" "güiro," "guaje cirián" (*Nueva Farm. Mex.*); "huiró" (*Ramírez*); "cuiro"; "jayacaste" (Sinaloa); "raspa-guacal" (Costa Rica); "hoja cruz" (Philippines); "jícara" (Guam); "morrito," "cutuco," "cuchara" (El Salvador).

The wood is used locally for making wagons and other articles. The flowers have a strong unpleasant odor. The fruit is employed in domestic medicine like that of *C. kujete*, and the roots also are used medicinally. The pulp is sweet, since it contains much sugar, and is said to be fermented sometimes to obtain alcohol.

A decoction of the leaves is reported to be used for promoting the growth of the hair. In Nicaragua a cooling drink is made from the seeds. The shells of the fruits are much used for making cups, as in the case of *Crescentia cujete*.

The earliest account of this species and of *C. cujete* is that given by Oviedo (Lib. VIII, Cap. IV), part of which is translated below. The leaves which resemble a cross are, of course, those of *C. alata*, in which the resemblance is very striking.

"The *Higüero* is a large tree like the mulberry trees of Castile. It is a kind of calabash, round or somewhat elongate; and the round ones are very round, of which the Indians make cups or other vessels, for drinking. The wood is strong and good for chairs and other purposes. It is flexible and strong, and when worked resembles in grain pomegranate or hawthorn. The leaf of this tree is long and narrow, and the widest part is at the tip, from which it narrows to the base where it is attached, as I sketch it here. In times of scarcity the Indians eat this fruit. I refer to the interior—which is like a green calabash. When dried and the interior removed, to make a vessel of the *higüera*, the vessel has a luster like a gourd, and indeed it is a gourd of the sort I have described. These fruits or calabashes are so large that the larger ones are like a water-jar that holds a gallon of water, and some are no larger than a closed fist; and thus they make of them vessels of the size that the dimensions permit. These trees are common in Hispaniola and all the islands of these Indies and in the Spanish Main. * * * I may state that the leaf of the *higüero* is long and narrow, and the widest part is near the tip, from which it narrows to the base where it is attached, as I said above, and this is seen plainly in plate 3, figure 3. But there are other *higüeros* in Tierra-Firme which are different, not in the fruit or in any other particular I have mentioned, but only in the leaves, as shown in plate 3, figure 4, each leaf in the form of a cross, as I have drawn it; and this seems to me a very noteworthy thing, in which appears a testimony of the cross, a thing of which these people can not have been ignorant. These *higüero* trees, which have the leaves all formed like crosses, I have seen in the Province of Nicaragua, especially in Negrando, where lies the city of León, and in other parts of that country; and marveling upon the leaves, I gathered some to show in Spain, as I did show them, and I still have some in my possession. But in Nicaragua, where as I have said there are many of these trees, they call the tree *guacal*. The precious vessels of the *higüeros* are found in Darién and in the Gulf of Urabá, with handles of gold, and so handsome that the most powerful king might drink from them without reproach. And these come through the channels of trade from the great river of San Juan, which empties into the Gulf of Urabá."

DOUBTFUL GENERA.

LUNDIA SCHUMANNIANA Kränzlein, Repert. Sp. Nov. Fedde 17: 120. 1921. Described from Campeche, but according to the author the locality is doubtful.

151. GESNERIACEAE. Gesneria Family.

Shrubs or usually herbs, often epiphytic or scandent; leaves opposite or verticillate, simple, entire or toothed; flowers usually showy, axillary or terminal, solitary, umbellate, or cymose, perfect, commonly irregular; calyx inferior or adnate to the ovary, the lobes entire or dentate; corolla gamopetalous, the tube elongate, ventricose, straight or curved, the limb usually bilabiate, 5-lobate; stamens 4 or 2, some of them frequently sterile, the anthers 2-celled; disk present at base of ovary; style simple, the stigma capitate or bilamellate; fruit capsular or rarely fleshy, 1-celled; seeds numerous.

Numerous herbaceous plants of this family, representing several genera, occur in Mexico.

Ovary wholly or partly inferior.

Ovary partly inferior; calyx cleft to the ovary-----1. **KOHLERIA**.

Ovary wholly inferior; calyx tube developed.

Lobes of the calyx as long as the tube, narrow and acute; corolla tube only slightly exceeding the calyx; flowers solitary-----2. **SOLENOPHORA**.

Lobes of the calyx much shorter than the tube; corolla tube much exceeding the calyx; flowers umbellate-----3. **HIPPODAMIA**.

Ovary superior.

Disk ringlike, not separated into glands-----4. **BESLERIA**.

Disk separated into several glands, but only one of them usually well developed.

Filaments free or nearly so-----5. **DRYMONIA**.

Filaments united below into a tube.

Anthers free-----6. **ALLOPLECTUS**.

Anthers coherent-----7. **COLUMNEA**.

1. **KOHLERIA** Regel, Flora 31: 250. 1848.

Plants herbaceous or suffrutescent; leaves opposite or verticillate; flowers usually red, axillary or in terminal leafy racemes; calyx tube adnate to the ovary, the limb 5-lobate; corolla tube ventricose, the lobes subequal, short; fruit a bivalvate capsule.

Flowers in terminal leafy racemes, the leaves of the inflorescence much reduced; stigma deeply bilobate.

Calyx lobes obtuse, the pubescence brown or red, loose and spreading.

1. **K. spicata**.

Calyx lobes acute, the pubescence whitish, appressed-----2. **K. longifolia**.

Flowers in axillary long-pedunculate umbels, or the peduncles rarely 1-flowered, the leaves of the inflorescence little if at all reduced; stigma only shallowly lobate.

Leaves glabrous on the upper surface.

Branches appressed-pilose-----3. **K. fruticosa**.

Branches glabrous-----4. **K. viminalis**.

Leaves appressed-pilose on the upper surface.

Calyx lobes in anthesis equaling or shorter than the campanulate tube.

5. **K. deppeana**.

Calyx lobes in anthesis usually twice as long as the tube, if shorter the tube narrowly turbinate.

Leaves glabrous beneath except along the veins-----6. **K. martensii**.

Leaves densely appressed-pilose beneath-----7. **K. elegans**.

1. **Kohleria spicata** (H. B. K.) Hanst. Linnaea 29: 520. 1858.

Gesneria spicata H. B. K. Nov. Gen. & Sp. 2: 393. pl. 188. 1817.

Gesneria schiedeana Hook. in Curtis's Bot. Mag. pl. 4152. 1845.

Isoloma spicatum Decaisne, Rev. Hort. 1848: 465. 1848.

Kohleria schiedeana Hanst. Linnaea 29: 518. 1858.

Isoloma schideanum Hemsl. Biol. Centr. Amer. Bot. 2: 479. 1882.

Veracruz and Oaxaca. Guatemala to Venezuela; type from Colombia.

Plants herbaceous or suffrutescent, often epiphytic, the stems villous-hirsute with appressed or spreading hairs; leaves mostly ternate, short-petiolate, lance-oblong or ovate-oblong, 7 to 15 cm. long, acute or acuminate, obtuse to attenuate at base, crenate, scabrous above, villous-sericeous beneath; corolla scarlet, 18 to 20 mm. long, densely villous.

2. **Kohleria longifolia** (Lindl.) Hanst. Linnaea 29: 525. 1858.

Gesneria longifolia Lindl. in Edwards, Bot. Reg. 1841: Misc. 92. 1841.

Isoloma longifolium Decaisne, Rev. Hort. 1848: 465. 1848.

Kohleria chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 66. 1914.

Chiapas. Guatemala (type locality) and El Salvador.

Plants chiefly herbaceous, the stems appressed-villous with white hairs; leaves opposite or ternate, short-petiolate, oblong-lanceolate, 8 to 16 cm. long, acuminate, obtuse to attenuate at base, crenate, villous-sericeous, more densely so beneath; corolla about 18 mm. long, villous. "Digital montés," "diente de perro" (El Salvador).

3. *Kohleria fruticosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 67. 1914.

Type from Cerro del Boquerón, Chiapas.

Plants suffrutescent; leaves opposite, short-petiolate, oblong-lanceolate, 5 to 8.5 cm. long, acuminate, obtuse or acute at base, serrulate, ciliate, sparsely appressed-villous beneath; peduncles 1-flowered, equaling or shorter than the leaves; calyx lobes lance-linear, fully twice as long as the tube; corolla 3 cm. long.

4. *Kohleria viminalis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 194. 1915.

Type from Finca Irlanda, Chiapas.

Shrub; leaves short-petiolate, ovate-lanceolate, 3 to 6 cm. long, acuminate, cuneate at base, denticulate, hirsutulous beneath along the veins; peduncles 1-flowered, 7 cm. long; calyx lobes linear-lanceolate, 1 cm. long; corolla red, 3 cm. long, pubescent.

Not seen by the writer.

5. *Kohleria deppeana* (Schlecht. & Cham.) Fritsch in Engl. & Prantl, Pflanzenfam. 4^{3b}: 174. 1894.

Gesneria deppeana Schlecht. & Cham. Linnaea 5: 110. 1830.

Gesneria lasiantha Zucc. Pl. Nov. 1: 300. 1839.

Gesneria elongata Mart. & Gal. Bull. Acad. Brux. 9²: 32. 1842. Not *G. elongata* H. B. K. 1817.

Veracruz, Oaxaca, and Guerrero; reported from Morelos and Chiapas; type from Jalapa, Veracruz. Guatemala.

Plants herbaceous or suffrutescent; leaves mostly opposite, on long or short petioles, oblong-lanceolate or oblong-ovate, 6 to 17 cm. long, acuminate, obtuse or acute at base, crenate or serrate, villous-sericeous; peduncles equaling or shorter than the leaves, usually 3 or 4-flowered, the pedicels shorter than the peduncles; corolla bright red, about 2.8 cm. long, villous or puberulent.

6. *Kohleria martensii* Fritsch, Bot. Jahrb. Engler 50: 428. 1913.

Gesneria triflora Mart. & Gal. Bull. Acad. Brux. 9²: 33. 1842. Not *Kohleria triflora* Regel, 1848.

Veracruz; type from Mirador.

Plants slender, suffrutescent, the stems appressed-villous or glabrate; leaves opposite, short-petiolate, lance-oblong or ovate-lanceolate, acuminate, acute at base, crenate-serrate, sparsely appressed-pilosulous above; inflorescences longer than the leaves, mostly 3-flowered, the pedicels equaling or shorter than the peduncles; calyx lobes slightly shorter than the narrowly turbinate tube; corolla nearly 3 cm. long.

7. *Kohleria elegans* (Decaisne) Loesener, Bull. Herb. Boiss. 7: 574. 1899.

Moussonia elegans Decaisne; Planch. Fl. Serr. Jard. 5: pl. 189. 1849.

?*Moussonia papillosa* Hanst. Linnaea 34: 288. 1865-66.

Isoloma jaliscanum S. Wats. Proc. Amer. Acad. 25: 159. 1890.

Kohleria collina T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 66. 1914.

Kohleria pedunculata T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 67. 1914.

Tepic to Chiapas. Type from Guatemala.

Plants herbaceous or suffrutescent, the stems villous with mostly spreading hairs; leaves opposite, on short or long petioles, ovate-oblong, 5 to 12 cm. long, acuminate, obtuse or rounded at base, serrate or crenate, usually scabrous above and villous-sericeous beneath; inflorescences equaling or shorter than the leaves, 1 to 4-flowered, the pedicels commonly longer than the peduncles; corolla 3 to 3.5 cm. long.

EXCLUDED SPECIES.

KOHLERIA SAXICOLA T. S. Brandeg. Univ. Calif. Pub. Bot. 6: 66. 1914.
According to Brandeg¹ this is *Diastema rupestre* T. S. Brandeg.

2. SOLENOPHORA Benth. Pl. Hartw. 68. 1840.

A single species is known.

1. Solenophora coccinea Benth. Pl. Hartw. 68. 1840.

Type from mountains of Chinantla, Oaxaca.

Shrub, 1 to 2 meters high, the branches minutely puberulent; leaves opposite, petiolate, ovate, 15 to 20 cm. long, acuminate, narrowed and oblique at base, duplicate-serrate; pedicels axillary, solitary, 7.5 to 10 cm. long; flowers scarlet, about 6 cm. long; calyx adnate to the ovary below, the lobes narrowly lanceolate, denticulate; corolla glabrous, the lobes fimbriate-crenate; capsule 5-angulate.

3. HIPPODAMIA Decaisne, Rev. Hort. III. 2: 464. 1848.

Plants suffrutescent; leaves opposite, large; flowers orange or whitish, umbellate; calyx adnate to the ovary below, the lobes short and broad; corolla pubescent, the tube elongate, the lobes laciniate.

Corolla whitish. Umbels sessile or nearly so..... **1. H. obscura.**
Corolla orange.

Umbels subsessile..... **2. H. endlicheriana.**

Umbels pedunculate..... **3. H. insignis.**

1. Hippodamia obscura (Hanst.) Fritsch in Engl. & Prantl, Pflanzenfam. 4^{3b}: 183. 1894.

Solenophora obscura Hanst. Linnaea 34: 315. 1865-66.

Type from Chinantla, Oaxaca.

Stems hirtous; leaves serrate, sparsely scaberulous; pedicels shorter than the calyx, the latter villous, the lobes acute, serrate.

2. Hippodamia endlicheriana (Heller) Fritsch in Engl. & Prantl, Pflanzenfam. 4^{3b}: 183. 1894.

Arctocalyx endlicherianus Heller; Fenzl in Otto & Dietr. Allg. Gartenz. 16: 307. 1848.

Solenophora endlicheriana Hanst. Linnaea 34: 314. 1865-66.

Type from Mirador, Veracruz.

Stems suffrutescent, long-hirsute; leaves long-petiolate, broadly elliptic, 45 cm. long or less, acuminate, duplicate-serrate, long-hirsute; pedicels equaling or shorter than the calyx; calyx inflated, hirsute, the lobes rounded-ovate, crenulate; corolla 6.5 to 7.5 cm. long, hirsute.

3. Hippodamia insignis (Mart. & Gal.) Decaisne, Rev. Hort. 1848: 464. 1848.

Besleria insignis Mart. & Gal. Bull. Acad. Brux. 9²: 37. 1842.

Solenophora insignis Hanst. Linnaea 34: 314. 1865-66.

Type from mountains of Oaxaca, altitude 1,200 meters. Costa Rica.

Stems hirsute; leaves obliquely ovate-lanceolate or elliptic, acuminate, duplicate-serrate, short-hirsute above, pubescent beneath along the veins but elsewhere glabrous; pedicels as long as the calyx; calyx hirsute, the lobes rounded-ovate, serrulate; corolla sparsely hirsute.

4. BESLERIA L. Sp. Pl. 619. 1753.

Plants suffrutescent; leaves opposite, thin; inflorescence axillary, the flowers usually yellow; calyx inferior, campanulate or inflated, shallowly or deeply

¹ Univ. Calif. Publ. Bot. 6: 193. 1915.

5-lobate; corolla tube cylindric, straight or oblique, slightly ampliate above; disk annular; fruit usually globose, indehiscent.

Calyx large, equaling the corolla.

Calyx hirsute.....1. **B. cyrtanthemum**.

Calyx appressed-pubescent.....2. **B. deflexa**.

Calyx small, shorter than the corolla.

Leaves hirsute.....3. **B. hirsuta**.

Leaves glabrous or with appressed hairs.

Leaves glabrous beneath.....4. **B. glabra**.

Leaves with sparse appressed hairs beneath.....5. **B. chiapensis**.

1. **Besleria cyrtanthemum** Hanst. *Linnaea* 34: 321. 1865-66.

Cyrtanthemum hirsutum Oerst. *Dansk. Vid. Selsk. Skrivt.* 5: 130. *pl.* 20, *f.* 20-31. 1861.

Type from Oaxaca.

Stems hirsute-tomentose above; leaves long-petiolate, obliquely oblong-elliptic, 18 to 23 cm. long, short-acuminate, acute at base, obsoletely serrate, pilose above, pilosulous beneath; pedicels shorter than the calyx; posterior calyx lobe nearly 2.5 cm. long; corolla glabrous.

2. **Besleria deflexa** (Oerst.) Hanst. *Linnaea* 34: 321. 1865-66.

Cyrtanthemum deflexum Oerst. *Dansk. Vid. Selsk. Skrivt.* 5: 130. *pl.* 20, *f.* 32-39. 1861.

Type from Oaxaca.

Stems hirsute above; leaves elongate-oblong or subfalcate-elliptic, short-attenuate, suboblique at base, entire, minutely appressed-pilose above, glabrate beneath; peduncles 4 to 8 mm. long; corolla glabrous.

3. **Besleria hirsuta** (Oerst.) Hanst. *Linnaea* 34: 326. 1865-66.

Gasteranthopsis hirsuta Oerst. *Dansk. Vid. Selsk. Skrivt.* 5: 129. *pl.* 10, *f.* 9-13. 1861.

Type material from Tepinapa and Chinantla, Oaxaca.

Stems hirsute above; leaves petiolate, elongate-oblong, 20 cm. long, acuminate, attenuate at base, obsoletely serrate; peduncles much shorter than the petioles; calyx lobes obtuse.

4. **Besleria glabra** Hanst. *Linnaea* 34: 325. 1865-66.

Gasteranthopsis glabra Oerst. *Dansk. Vid. Selsk. Skrivt.* 5: 129. *pl.* 10, *f.* 1-8. 1861.

Type from Chinantla, Oaxaca.

Stems glabrous; leaves petiolate, 18 to 23 cm. long, obliquely elliptic-oblong, acute at base; peduncles shorter than the petioles; calyx lobes obtuse; corolla 18 mm. long.

5. **Besleria chiapensis** T. S. Brandeg. *Univ. Calif. Publ. Bot.* 6: 64. 1914.

Oaxaca and Chiapas; type from Finca Mexiquito, Chiapas.

Branches glabrous or appressed-pilose; leaves slender-petiolate, elliptic-oblong, 6 to 13 cm. long, acuminate, acute at base, obscurely serrulate; peduncles about as long as the petioles; corolla red, 2 cm. long.

Perhaps not distinct from *B. glabra*.

5. **DRYMONIA** Mart. *Nov. Gen. & Sp.* 3: 57. 1829.

1. **Drymonia chiapensis** T. S. Brandeg. *Univ. Calif. Publ. Bot.* 6: 64. 1914.

Type from Finca Mexiquito, Chiapas.

Plants scandent, the young branches puberulent; leaves elliptic, 10 to 13 cm. long, acute, cuneate at base, sinuate-dentate, hirsutulous above, paler and pubescent beneath; flowers solitary, the pedicels 15 cm. long; calyx lobes ovate-

cordate, acute, dentate, 18 mm. long; corolla reddish, puberulent at base, 4 cm. long.

Not seen by the writer.

6. **ALLOPLECTUS** Mart. Nov. Gen. & Sp. 3: 53. 1829.

Plants suffrutescent, the stems often scandent and rooting; leaves opposite; flowers fasciculate or solitary in the axils; calyx inferior, 5-parted, usually red, the lobes dentate or cristate; corolla usually whitish, the tube cylindric or ventricose; fruit globose or ovoid, dehiscent or indehiscent.

Corolla about 5 cm. long.....1. **A. tetragonus**.
Corolla about 3 cm. long.....2. **A. strigosus**.

1. **Alloplectus tetragonus** (Oerst.) Hanst. Linnaea 34: 368. 1865-66.

Glossoloma tetragonum Oerst. Dansk. Vid. Selsk. Skrivt. 5: 41. pl. 7. 1861.

Chiapas. Central America; type from Turrialba, Costa Rica.

Scandent shrub, the branches villous-hirsute; leaves long-petiolate, elliptic or oblong-elliptic, 15 to 25 cm. long, acuminate, obtuse or acute at base, serrulate, sparsely pilose; pedicels shorter than the petioles; calyx red, 2.5 to 3 cm. long, hirsute, the lobes laciniate-dentate; corolla pink, densely villous-hirsute.

2. **Alloplectus strigosus** (Oerst.) Hanst. Linnaea 34: 374. 1865-66.

Saccoplectus strigosus Oerst. Dansk. Vid. Selsk. Skrivt. V. 5: 118. 1861.

Type material from Chinantla, Tepinapa, and Tintalcingo, Oaxaca.

Stems hirsute-tomentose above, finally glabrous; leaves long-petiolate, obliquely elliptic-oblong, the larger ones 20 to 22 cm. long, acuminate, narrowed at base, puberulent; pedicels 12 mm. long; calyx nearly 2.5 cm. long, the lobes shallowly and remotely serrate, red; corolla puberulent.

DOUBTFUL SPECIES.

ALLOPLECTUS GLABER DC. Prodr. 7: 546. 1839. Type from mountains of Mazatlán (Guerrero?). Stems said to be glabrous.

7. **COLUMNEA** L. Sp. Pl. 638. 1753.

Shrubs, usually scandent and rooting; leaves opposite; flowers usually red or yellowish, solitary or fasciculate in the axils; calyx inferior, 5-parted, the lobes usually entire; corolla tube often gibbous at base, straight or incurved, usually ventricose; fruit commonly baccate and indehiscent.

Corolla yellow, not spotted.....1. **C. flava**.

Corolla red, or yellow spotted with red.

Corolla red, not spotted.....2. **C. erythrophoea**.

Corolla yellowish, with large, dark red spots.....3. **C. schiedeana**.

1. **Columnea flava** Mart. & Gal. Bull. Acad. Brux. 11²: 39. 1842.

Type from mountains of Oaxaca.

Plants scandent, the branches fulvous-pilose; leaves subsessile, oblong-lanceolate, sericeous-villous; peduncles shorter than the leaves; calyx lobes ovate, acute, entire, reddish, hirsute; corolla villous.

2. **Columnea erythrophoea** Decaisne, Rev. Hort. 39: 172. 1867.

Described from cultivated plants, grown from seeds collected in Chiapas.

Branches fleshy; leaves short-petiolate, lanceolate to elliptic, acuminate, glabrous except beneath along the nerves; calyx deep rose, the segments cordate-acuminate, dentate; corolla 8 cm. long, villous.

3. **Columnea schiedeana** Schlecht. Linnaea 8: 249. 1833.

Veracruz, Puebla, and Oaxaca; type material from Misantla and Hacienda de la Laguna, Veracruz.

Scandant shrub, the fleshy branches reddish-villous above; leaves short-petiolate, obliquely oblong or lanceolate, 5 to 10 cm. long, acute, very oblique at base, sericeous or somewhat tomentose, especially beneath, often tinged with red; flowers slender-pedicellate; calyx red, the lobes lanceolate or ovate, acuminate, entire or remotely dentate, rounded at base, villosulous; corolla 5.5 to 6 cm. long villous; fruit globose, white.

152. ACANTHACEAE. Acanthus Family.

Shrubs or herbs, rarely small trees, the pubescence usually of simple hairs; leaves opposite, mostly entire, commonly marked with linear cystoliths, estipulate; flowers perfect, small or large, usually irregular, bracteate and bibracteolate; calyx inferior, the 5 (rarely 4) segments usually united for less than half their length, often nearly free; corolla gamopetalous, the tube slender or broad, the limb subequally 5-lobate or more commonly bilabiate; perfect stamens 4 or 2, attached to the corolla tube, the fifth stamen (or 2 of the others also) sometimes represented by staminodia; style simple, usually bilobate at apex; fruit capsular, usually stipitate, 2-celled, elastically dehiscent; seeds 2 or several.

A large number of herbaceous plants of the family, some of them belonging to genera not listed here, occur in Mexico.

Fertile stamens 4.

Corolla limb with subequal lobes.

Flowers in large dense terminal spikes furnished with large bracts.

1. **BARLERIA.**

Flowers not spicate.

Anthers 1-celled.....2. **HOLOGRAPHIS.**

Anthers 2-celled.

Calyx lobes narrow, acute or acuminate, not coriaceous...3. **RUELLIA.**

Calyx lobes broad, obtuse, coriaceous.....4. **BRAVAISIA.**

Corolla limb bilabiate.

Flowers in very dense spikes, subtended by large bracts; corolla tube long and slender.....5. **APHELANDRA.**

Flowers in small interrupted spikes, the bracts small and inconspicuous; corolla tube short, ampliate.....6. **BERGINIA.**

Fertile stamens 2.

Calyx with 3 segments.....7. **LOUTERIDIUM.**

Calyx with 4 or 5 segments.

Anther cells parallel, equal, both inserted at the same height upon the filament.

Staminodia (sterile stamens) present.

Flowers in axillary few-flowered cymes....8. **CHILERANTHEMUM.**

Flowers in terminal, simple or paniculate racemes.

9. **ODONTONEMA.**

Staminodia none.

Corolla lobes widely spreading, longer than the tube; flowers small.

10. **CARLOWRIGHTIA.**

Corolla lobes erect-recurved, often shorter than the tube; flowers large.

11. **ANISACANTHUS.**

Anther cells unequal, inserted at different heights.

Calyx tubular, 5-dentate.....12. **NEOHALLIA.**

Calyx deeply 5-lobate or 5-parted.

Calyx lobes broad, foliaceous.....13. **TABASCINA.**

Calyx lobes usually linear or subulate.

Anther cells not mucronate at base.....14. **JACOBINIA.**

Anther cells mucronate or calcarate at base.

Corolla tube usually ampliate above-----15. **JUSTICIA**.

Corolla tube slender, not or scarcely ampliate.

Corolla lobes abruptly spreading-----16. **SIPHONOGLOSSA**.

Corolla lobes not abruptly spreading, the posterior lip erect or nearly so-----17. **BELOPERONE**.

1. **BARLERIA** L. Sp. Pl. 636. 1753.

1. **Barleria micans** Nees; Benth. Bot. Voy. Sulph. 146. 1844.

Barleria discolor Nees; Benth. Bot. Voy. Sulph. 146. 1844.

Tepic to Morelos, Veracruz, and Chiapas. Guatemala to Colombia; type from Taboga Island, Panama.

Plants herbaceous or fruticose, 1 to 1.5 meters high; leaves ovate to narrowly lanceolate, 10 to 25 cm. long, long-acuminate, attenuate or abruptly decurrent at base, sparsely strigose or hirtellous; flowers in large dense terminal spikes, the bracts large, lance-ovate to broadly ovate, acute or obtuse, strigose and hirsute-ciliate, bluish when dry; calyx lobes very unequal, 2 of them narrow, the other 2 large and resembling the bracts; corolla 5 to 5.5 cm. long, yellow, turning bluish purple when dry, the tube long and slender, the 5 lobes subequal, spreading; stamens 4; seeds 2 in each cell. "Ojo de buey" (Veracruz).

2. **HOLOGRAPHIS** Nees in DC. Prodr. 11: 728. 1847.

Holographis (?) *ilicifolia* T. S. Brandeg.,¹ the only other species assigned to the genus, has not been seen by the writer.

1. **Holographis ehrenbergiana** Nees in DC. Prodr. 11: 728. 1847.

Tamaulipas and San Luis Potosí to Puebla; type from Hacienda de Guadela.

Slender shrub; leaves petiolate, elliptic-oblong to oblong-ovate or broadly ovate, 1 to 3 cm. long, obtuse or rounded at apex, acute or obtuse at base, scaberulous above, whitish-puberulent beneath; flowers axillary, solitary or in few-flowered clusters; calyx 5-parted, the lobes linear-lanceolate, 5 to 6 mm. long; corolla about 1.5 cm. long, puberulent, the tube very short, the throat obconic, the lobes of the limb subequal; stamens 4, the anthers lanate.

3. **RUELLIA** L. Sp. Pl. 634. 1753.

Shrubs or more commonly herbs; leaves entire or serrulate; flowers large, axillary, solitary, fasciculate, or cymose, the bracts usually narrow and inconspicuous; calyx 5-parted or deeply 5-lobate, the segments linear or lanceolate, subequal; corolla tube straight or incurved, abruptly dilated into a campanulate throat, the lobes spreading, subequal, contorted; stamens 4; capsule clavate or oblong-linear, stipitate, the seeds usually 6 or more.

Numerous herbaceous species occur in Mexico.

Corolla contracted at the mouth, the lobes small, 3 mm. long or less.

Corolla glabrous-----1. **R. cupheoides**.

Corolla pilose-----2. **R. sororia**.

Corolla not contracted at the mouth, the lobes large.

Leaves glabrous beneath.

Leaves 1 to 3 cm. long; tube of the corolla shorter than the throat.

3. **R. peninsularis**.

Leaves mostly 4 to 15 cm. long; tube of the corolla equaling or longer than the throat.

Calyx in anthesis 5 mm. long or less; capsule glabrous or nearly so.

4. **R. alboviolacea**.

¹ Zoe 5: 236. 1906.

Calyx in anthesis 8 to 10 mm. long; capsule densely pruinose-puberulent.

5. *R. albiflora*.

Leaves finely or coarsely pubescent beneath.

Corolla lobes 5 mm. long or less-----6. *R. albicaulis*.

Corolla lobes 1 cm. long or larger.

Calyx lobes 3 to 6 mm. wide, lanceolate or linear-lanceolate.

Corolla throat not saccate below, the tube equaling or longer than the throat-----7. *R. speciosa*.

Corolla throat strongly saccate at base, the tube much shorter than the throat.

Leaves broadly deltoid-ovate; corolla glabrous outside.

8. *R. bourgaei*.

Leaves lance-oblong; corolla pilose outside-----9. *R. palmeri*.

Calyx lobes less than 2 mm. wide, linear.

Flowers in large cymes; calyx about 5 cm. long-----10. *R. jaliscana*.

Flowers mostly solitary; calyx 2.5 cm. long or less.

Pubescence of the branches eglandular; corolla white.

11. *R. leucantha*.

Pubescence of the branches of gland-tipped hairs; corolla purple or purplish.

Pubescence of the leaves of stellate hairs.

12. *R. hirsuto-glandulosa*.

Pubescence of the leaves of simple hairs-----13. *R. californica*.

1. *Ruellia cupheoides* Fernald, Proc. Amer. Acad. 36: 502. 1901.

Type from limestone mountains above Iguala, Guerrero, altitude 1,200 meters.

Slender shrub, 1 to 1.5 meters high, the branchlets short-pilose; leaves elliptic-ovate, 3 to 5 cm. long, short-acuminate, entire, short-pilose or glabrate; peduncles 1 to 3-flowered, longer than the leaves; calyx 1.5 to 2 cm. long, the lobes linear-lanceolate; corolla red, 3.5 cm. long.

2. *Ruellia sororia* Standl., sp. nov.

Type collected between Chilapa and Tixtla, Guerrero (Nelson 2160; U. S. Nat. Herb. no. 908023).

Shrub, the branchlets cinereous-puberulent and somewhat glandular-viscid; leaves petiolate, elliptic-ovate, 3 to 4.5 cm. long, acute, obtuse or acute at base, entire, whitish-pilose above, densely so beneath; flowers in dense few-flowered cymes, short-pedicellate; calyx 1.5 cm. long, the lobes linear, densely covered with short gland-tipped hairs and with some longer white eglandular ones; corolla 3.5 cm. long, glandular-pilose outside, the tube about 17 mm. long, 2 mm. thick, the throat about 15 mm. long and 7 mm. thick, very oblique, the lobes erect, 3 mm. long; anthers 3 mm. long, exceeding the corolla lobes.

In form the corolla is like that of *R. cupheoides*.

3. *Ruellia peninsularis* (Rose) I. M. Johnston, Proc. Calif. Acad. IV. 12: 1172. 1924.

Calophanes peninsularis Rose, Contr. U. S. Nat. Herb. 1: 75. 1890.

Baja California and Sonora; type from La Paz, Baja California.

Shrub, about 1 meter high, the leaves and young parts glutinous, glabrous throughout; leaves broadly ovate to oblong-ovate, acute or acuminate, rounded at base, entire; flowers solitary, short-pedicellate; calyx 5 to 6 mm. long, the lobes linear-subulate; corolla purple, 3 to 5 cm. long, the throat about 1 cm. broad.

4. *Ruellia alboviolacea* Lindau, Bull. Herb. Boiss. II. 4: 318. 1904.

Type from La Victoria, Michoacán or Guerrero, altitude 900 meters.

Shrub, 1 meter high, the branches glabrous; leaves narrowly oblong-lanceolate, 8 to 12 cm. long, long-acuminate, acute at base, entire, glabrous; peduncles several-flowered; calyx lobes linear-subulate; corolla about 3.5 cm. long, white with violet center, the throat 1 cm. broad, obscurely puberulent outside.

5. *Ruellia albiflora* Fernald, Proc. Amer. Acad. **33**: 92. 1897.

Colima to Oaxaca; type from Acapulco, Guerrero.

Shrub, about 1 meter high, the branches glabrous; leaves oblong-lanceolate to narrowly ovate, 4 to 16 cm. long, acuminate, acute to attenuate at base, entire; flowers white, sessile or nearly so in the axils; calyx 10 to 12 mm. long, the lobes linear-subulate; corolla 3 to 3.5 cm. long, puberulent, the throat 5 to 6 mm. broad. "Tronador" (Guerrero).

6. *Ruellia albicaulis* Bert.; Spreng. Syst. Veg. **2**: 822. 1825.

Sinaloa to Oaxaca, Yucatán, and Veracruz. Central America and northern South America; type from Cartagena, Colombia.

Plants suffrutescent, about a meter high, the branches glandular-pilose, the older ones whitish; leaves long-petiolate, lance-oblong to ovate, 13 cm. long or less, acuminate, acute or short-decurrent at base, usually denticulate or serrulate, hispidulous; flowers in loose axillary cymes, slender-pedicellate; calyx glandular-pilose, the lobes linear, 1 to 1.5 cm. long; corolla purplish, 2 to 2.5 cm. long, the throat 4 to 5 mm. thick. "Hierba del cabro," "chancho del monte" (El Salvador).

The plant exhales a very strong and offensive goatlike odor.

7. *Ruellia speciosa* (Nees) Lindau in Engl. & Prantl, Pflanzenfam. **4**^{3b}: 310. 1895.

Ophthalmacanthus speciosus Nees in DC. Prodr. **11**: 220. 1847.

Ruellia pulcherrima T. Anderson; Hemsl. Biol. Centr. Amer. Bot. **2**: 507. 1882.

Hidalgo, Mexico, Puebla, and Oaxaca; type from Baños de Atoto el Grande.

Shrub, 1 to 2 meters high, the young branches glandular-pilosulous; leaves ovate or oblong-ovate, 4 to 7.5 cm. long, acute or short-acuminate, rounded or obtuse at base, entire, short-pilose and viscid, densely so beneath; peduncles elongate, 1 to 3-flowered; calyx 2.5 to 3 cm. long, the lobes lance-linear; corolla pale yellow, about 6 cm. long.

8. *Ruellia bourgaei* Hemsl. Diag. Pl. Mex. **35**. 1879.

Jalisco to Veracruz and Mexico; type from mountains near Guadalupe, Mexico.

Plants large and coarse, herbaceous or perhaps suffrutescent, the stems densely glandular-pubescent; leaves 8 to 21 cm. long, acuminate, rounded to truncate at base and abruptly long-decurrent, sinuate-dentate, densely pubescent or sometimes glabrate; flowers pink, cymose-paniculate; calyx 2.5 to 3 cm. long; corolla 9 to 11 cm. long, the throat about 4 cm. broad.

9. *Ruellia palmeri* Greenm. Field Mus. Bot. **2**: 343. 1912.

Ruellia montezumae Lindau, Repert. Sp. Nov. Fedde **12**: 424. 1913.

Guerrero and Oaxaca; type from Acapulco, Guerrero.

Shrub, 1 to 2.5 meters high, the branches viscid-puberulent; leaves 5 to 15 cm. long, acuminate, acute to rounded at base, entire, gland-dotted, puberulent or glabrate; peduncles few-flowered; calyx 2 to 2.5 cm. long; corolla 7 to 8.5 cm. long, creamy white, the throat about 3 cm. broad.

10. *Ruellia jaliscana* Standl., sp. nov.

Type collected between Mascota and San Sebastián, Jalisco (Nelson 4051; U. S. Nat. Herb. no. 327151).

Branches obtusely quadrangular, tomentulose, glandular-pilosulous above; leaves petiolate, broadly ovate or elliptic-ovate, 9 to 18 cm. long, abruptly short-acuminate, rounded at base and abruptly decurrent, shallowly sinuate-dentate, villous-hirsutulous with whitish hairs; flowers cymose-paniculate, the peduncles

many-flowered, the flowers short-pedicellate; calyx about 5 cm. long, the lobes narrowly linear, foliaceous, densely glandular-pilose; corolla about 7 cm. long, sparsely pilosulous outside, the tube 3 cm. long, 2 to 3 mm. thick, the throat 3 cm. long, nearly 2 cm. broad, the lobes 1 cm. long, obtuse or acutish; anthers 7 mm. long, equaling the corolla lobes.

11. *Ruellia leucantha* T. S. Brandeg. *Zoe* 5: 109. 1901.

Southern Baja California.

Shrub, about 80 cm. high, the branches densely pubescent with eglandular hairs; leaves broadly ovate or oblong-ovate, 3 to 6.5 cm. long, acute or short-acuminate, entire, densely pubescent; calyx 1.5 to 2 cm. long; corolla about 6 cm. long.

12. *Ruellia hirsuto-glandulosa* (Oerst.) Hemsl. *Biol. Centr. Amer. Bot.* 2: 505. 1882.

Dipteracanthus hirsuto-glandulosus Oerst. *Nat. For. Kjöbenhavn Vid. Medd.* 1854: 123. 1854.

Querétaro, Hidalgo, and Puebla, and perhaps elsewhere; type material from Hacienda Buena Vista, Veracruz, and Tehuacán, Puebla.

Shrub; leaves broadly ovate or oblong-ovate, 1 to 3.5 cm. long, obtuse or acute, entire, densely stellate-pubescent and glandular-puberulent; calyx 2 to 2.5 cm. long; corolla 5 to 7 cm. long.

13. *Ruellia californica* (Rose) I. M. Johnston, *Proc. Calif. Acad.* IV. 12: 1171. 1924.

Calophanes californica Rose, *Contr. U. S. Nat. Herb.* 1: 85. 1890.

Baja California and Sonora; type from Santa Rosalía, Baja California.

Shrub, 1 meter high or less, densely glandular-puberulent or glandular-hirtellous; leaves broadly ovate or oblong-ovate, 1 to 3 cm. long, acute or acuminate, entire; calyx 1 to 1.5 cm. long; corolla 4.5 to 5.5 cm. long.

4. **BRAVAISIA** DC. *Bibl. Univ. Genève* 17: 124. 1838.

Shrubs or trees; leaves petiolate, entire or sinuate-dentate; flowers in paniculate cymes or thyrses; calyx 5-cleft, the lobes subcoriaceous, rounded at apex; corolla tube short, the throat ampliate, campanulate, the lobes subequal, rounded, spreading; stamens 4; ovules 2 to 4 in each cell of the ovary.

Bractlets shorter than the calyx; bracts mostly small and inconspicuous.

1. **B. integerrima.**

Bractlets longer than the calyx; bracts large and leaflike-----2. **B. tubiflora.**

1. **Bravaisia integerrima** (Spreng.) Standl.

Amazonia integerrima Spreng. *Syst. Veg.* 3: 765. 1826.

Bravaisia floribunda DC. *Prodr.* 9: 240. 1845.

Onychacanthus berlandierianus Nees in DC. *Prodr.* 11: 217. 1847.

Tamaulipas to Guerrero and Oaxaca. Central and South America.

Shrub or tree, 3.5 to 15 meters high, the young branches finely puberulent; leaves elliptic-oblong to elliptic, mostly 8 to 19 cm. long, acute or acuminate, acute or sometimes obtuse at base, glabrous or nearly so; corolla white, about 2 cm. long. "Palo blanco" (Guerrero); "palo de agua" (Costa Rica).

The genus *Androcentrum* Lem.¹ was based upon a single species, *A. multiflorum*, described from Mexico. The specimens referred to that species, which have been seen by the writer, do not appear to differ from *Bravaisia integerrima*.

¹ Fl. Serr. Jard. 3: 242. 1847.

2. Bravaisia tubiflora Hemsl. in Hook. Icon. Pl. **16**: pl. 1516. 1886.

Yucatán; type from Cozumel Island.

Shrub or tree, sometimes 7.5 meters high, the branchlets hirtellous; leaves elliptic or oblong-elliptic, 4 to 7 cm. long, acute at base, glabrate; corolla purplish, 2 to 2.5 cm. long, the lobes usually emarginate.

5. APHELANDRA R. Br. Prodr. Fl. Nov. Holl. 475. 1810.

Shrubs or large herbs; leaves large; flowers red or yellow, sessile in the axes of large imbricate opposite bracts, forming large terminal spikes; calyx 5-parted, the segments narrow, subequal or the posterior one larger; corolla tube straight or incurved, sometimes ampliate above, the limb bilabiate, the posterior lip erect, the anterior reflexed-spreading, 3-lobate; stamens 4; ovules 2 in each cell.

Leaves quaternate-----1. **A. verticillata**.

Leaves opposite.

Bracts entire.

Bracts acuminate.

Lateral lobes of the lower lip of the corolla nearly as long as the central one-----2. **A. madreensis**.

Lateral lobes much shorter than the central one----3. **A. pulcherrima**.

Bracts very obtuse.

Corolla pilose outside; bracts about 2 cm. long-----4. **A. schiedeana**.

Corolla glabrous; bracts 3 to 4 cm. long-----5. **A. speciosa**.

Bracts serrate.

Lateral lobes of the lower lip one-third as long as the central one or longer.

6. **A. aurantiaca**.

Lateral lobes of the lower lip less than one-fourth as long as the central one.

7. **A. deppeana**.

1. Aphelandra verticillata Nees (in DC. Prodr. **11**: 281, as synonym. 1849); Hemsl. Biol. Centr. Amer. Bot. **2**: 513. 1882.

Crossandra haenkeana Nees in DC. Prodr. **11**: 281. 1847.

Type from somewhere in Mexico.

Plants herbaceous, 60 to 90 cm. high, villous; leaves ovate, 9 cm. long or less, acuminate, attenuate at base, pilose above, pubescent beneath; bracts elliptic, cuspidate, glabrous but ciliate; corolla glabrous, 3.5 cm. long.

Known to the writer only from the original description.

2. Aphelandra madreensis Lindau, Bull. Herb. Boiss. II. **4**: 326. 1904.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,600 meters.

Shrub 3 to 4 meters high, the branches glabrous; leaves oblong or ovate, 10 to 15 cm. long, obtusely acuminate, glabrous above, pubescent beneath along the nerves; bracts about 17 mm. long; corolla red, puberulent, the tube 28 mm. long, the posterior lip 7 mm. long.

3. Aphelandra pulcherrima (Jacq.) H. B. K. Nov. Gen. & Sp. **2**: 236. 1817.

Justicia pulcherrima Jacq. Enum. Pl. Carib. **11**. 1760.

Reported from Guerrero. Martinique and northern South America.

Shrub, the branches villous above; leaves elliptic or ovate, decurrent at base into a short petiole, villous beneath; bracts half as long as the calyx, ovate, pubescent and ciliate; corolla red, villous.

Probably not distinct from *A. tetragona* (Vahl) Nees, which occurs in Panama and Costa Rica.

4. Aphelandra schiedeana Schlecht. & Cham. Linnaea **5**: 95. 1830.

Veracruz and Oaxaca; type from Hacienda de la Laguna and Barranca de Tioselo, Veracruz.

Shrub; leaves oblong-lanceolate, 8 to 15 cm. long, long-acuminate, long-attenuate to the slender petiole, entire, glabrous above, sparsely appressed-pilose beneath or nearly glabrous; spikes 9 cm. long or less; bracts oval, thin, glabrous or nearly so, longer than the calyx; corolla red, about 6 cm. long, pilose,

5. *Aphelandra speciosa* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 196. 1915.

Type from Finca Mexiquito, Chiapas.

Plants suffrutescent, glabrous throughout; leaves elliptic-oblong, long-petiolate, 10 to 32 cm. long, long-acuminate, attenuate at base, thin, entire; spikes 12 to 16 cm. long, the bracts reddish, ciliolate, longer than the calyx; corolla red, glabrous, the tube 2 cm. long.

6. *Aphelandra aurantiaca* (Scheidw.) Lindl. Bot. Reg. 31: pl. 12. 1845.

Hemisandra aurantiaca Scheidw. Bull. Acad. Brux. 9¹: 22. 1842.

Aphelandra acutifolia Nees in DC. Prodr. 11: 299. 1847.

?*Hydromestus maculatus* Scheidw. in Otto & Dietr. Allgem. Gartenz. 1842: 285. 1842.

?*Strobilorachis glabra* Klotzsch; Link, Klotzsch & Otto, Icon. Pl. Rar. 117. pl. 48. 1842.

?*Aphelandra hydromestus* Hemsl. Biol. Centr. Amer. Bot. 2: 512. 1882.

Oaxaca, Chiapas, and Tabasco. Central and South America.

Plants herbaceous or suffrutescent; leaves lance-oblong to elliptic, 8 to 30 cm. long, acuminate, acute or attenuate at base, entire, glabrous or nearly so; spikes 6 to 16 cm. long, the bracts pilose or puberulent; corolla orange, about 6 cm. long.

7. *Aphelandra deppeana* Schlecht. & Cham. Linnaea 5: 96. 1830.

Aphelandra cristata H. B. K. Nov. Gen. & Sp. 2: 236. 1817. Not *A. cristata* R. Br. 1810.

Aphelandra pectinata Willd.; Nees in DC. Prodr. 11: 297. 1847.

Aphelandra haenkeana Nees in DC. Prodr. 11: 298. 1847.

Guerrero to Chiapas, Tabasco, Yucatán, and Veracruz; type from Hacienda de la Laguna, Veracruz. Central and South America; West Indies.

Shrub, 1 to 4.5 meters high; leaves ovate-elliptic to lance-oblong, 7 to 20 cm. long, acuminate, decurrent below, often to the base of the petiole, entire, usually scabrous above and pubescent beneath; spikes often clustered, the bracts with glandular spots on each side; corolla red, about 4 cm. long. "Añilillo," "añil cimarrón" (Tabasco); "chamoltaco" (Nicaragua); "oreja de coyote," "cordoncillo," "palo del golpe" (El Salvador).

6. **BERGINIA** Harv.; Benth. & Hook. Gen. Pl. 2: 1096. 1873.

Low shrubs with whitish branches; leaves sessile or nearly so, entire; flowers small, sessile in the axils of small bracts, forming terminal, more or less interrupted spikes; bractlets narrow, rigid, resembling the calyx lobes; calyx 5-parted, the segments linear-lanceolate, acute, rigid; corolla tube short, ampliate above, the limb bilabiate; stamens 4, the anthers glabrous; ovules 2 in each cell.

The following species are the only ones known.

Leaves oblong-lanceolate to linear-lanceolate, minutely scaberulo-puberulent.

1. **B. virgata.**

Leaves broadly ovate to oval or rounded, hirtellous-----2. **B. palmeri.**

1. **Berginia virgata** Harv.; Benth. & Hook. Gen. Pl. 2: 1097. 1873.

Pringleophytum lanceolatum A. Gray, Proc. Amer. Acad. 20: 293. 1885.

Baja California and Sonora; type probably from Sonora.

Branches scaberulous; leaves 1 to 4 cm. long, obtuse or acute; spikes 13 cm. long or less; calyx 5 to 6 mm. long, minutely puberulent; corolla about 12 mm. long, puberulent, pink.

2. *Berginia palmeri* Rose, Contr. U. S. Nat. Herb. 1: 86. 1890.

Type from Santa Rosalia, Baja California.

Shrub, 50 cm. high; leaves 7 to 15 mm. long, obtuse or rounded at apex; spikes 6 mm. long or less; calyx densely glandular-pubescent; corolla pink, 1 cm. long.

7. *LOUTERIDIUM* S. Wats. Proc. Amer. Acad. 23: 283. 1888.

Shrubs; leaves petiolate, crenate or entire; flowers large, in narrow, nearly naked, terminal racemes or panicles; calyx cleft nearly to the base, the lobes broad, the 3 upper ones wholly united, the 2 upper ones distinct; corolla tube very short, abruptly expanded into a broad hoodlike throat, the lobes short; stamens 2, exserted; capsule sessile, the cells 6 to 8-seeded.

Two other species are known, natives of Guatemala and Costa Rica.

Leaves oblanceolate-oblong, long-attenuate to the base-----1. *L. mexicanum*.

Leaves rounded-ovate, cordate or subcordate at base-----2. *L. konzattii*.

1. *Louteridium mexicanum* (Baill.) Standl.

Neolindenia mexicana Baill. Bull. Soc. Linn. Paris 2: 851. 1889.

Louteridium purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 68. 1914.

Chiapas; type from Zacualpan.

Plants suffrutescent, glabrous except in the inflorescence, there minutely puberulent; leaves 15 to 28 cm. long, short-acuminate, short-petiolate, nearly entire; flowers yellowish and purplish, long-pedicellate; calyx 2 to 3.5 cm. long.

2. *Louteridium konzattii* Standl., sp. nov.

Type collected along the banks of the Río Grande, between Jalapa de Díaz and La Raya, Distrito de Tuxtepec, Oaxaca, altitude 450 meters (*Konzatti* 3788; U. S. Nat. Herb. no. 1,014,038).

Plants glabrous throughout; petioles 4.5 to 6 cm. long; leaves rounded-ovate, 11 to 22 cm. long, 10 to 17 cm. wide, cuspidate-acuminate, shallowly or deeply cordate at base, entire or nearly so; flowers in a terminal elongate leafy-bracted panicle; calyx about 2 cm. long, the upper lobe abruptly short-acuminate, the lower ones falcate, obtuse.

All the flowers are still in bud and the corollas not yet fully developed. The plant is closely related to *L. donnell-smithii* S. Wats., but in that all parts are densely pubescent.

8. *CHILERANTHEMUM* Oerst. Dansk. Vid. Medd. 1854: 166. 1854.

A single species is known.

1. *Chileranthemum trifidum* Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 166. 1854.

Veracruz; type from Mecapalco.

Glabrous shrub; leaves lance-oblong, about 6 cm. long, obtusely acuminate, acute at base, petiolate, entire; peduncles axillary, trichotomous, few-flowered; calyx 5-parted, the segments equal, linear, 6 mm. long; corolla tube 5 mm. long, the limb bilabiate, 8 mm. long; fertile stamens 2, the anther cells equal and inserted at the same height, 2 small staminodia also present; ovules 2 in each cell.

Known to the writer only from the original description and from Hemsley's illustration.¹

9. *ODONTONEMA* Nees, Linnaea 16: 300. 1842.

Plants herbaceous or suffrutescent, large; leaves large, entire; flowers red, pedicellate, fasciculate in the axils of small bracts, arranged in terminal, simple or paniculate racemes; calyx small, 5-parted, the segments narrow, acuminate;

¹ Biol. Centr. Amer. Bot. pl. 67, f. 1-5.

corolla tube elongate, straight or slightly curved, slightly ampliate above, the limb nearly regular or bilabiate, the posterior lip entire or bilobate, the anterior one 3-parted; stamens 2; ovules 2 in each cell.

Corolla limb conspicuously bilabiate, the lobes 5 to 8 mm. long.

1. *O. callistachyum*.

Corolla limb nearly regular, the lobes usually shorter.

Leaves pubescent on both surfaces; inflorescence leafy-bracted.

2. *O. foliaceo-bracteatum*.

Leaves glabrous or nearly so; inflorescence not leafy-bracted.

Inflorescence racemose, puberulent; leaves puberulent beneath along the costa-----

3. *O. cuspidatum*.

Inflorescence thyrsoid-paniculate, glabrous; leaves glabrous.

4. *O. glabrum*.

1. *Odontonema callistachyum* (Schlecht. & Cham.) Kuntze, Rev. Gen. Pl. 2: 494. 1891.

Justicia callistachya Schlecht. & Cham. Linnaea 6: 370. 1831.

Thyrsacanthus callistachyus Nees in DC. Prodr. 11: 326. 1847.

Thyrsacanthus lilacinus Lindl. Journ. Hort. Soc. Lond. 6: 159. 1851.

Veracruz, Puebla, Oaxaca, and Chiapas; type from Misantla, Veracruz. Central America.

Plants suffrutescent, 2 to 4.5 meters high; leaves lance-oblong to elliptic-ovate, 10 to 30 cm. long, acuminate, glabrous or nearly so, the upper ones usually sessile but the lower petiolate; flowers red or pink, in dense or interrupted, racemiform, often paniculate thyrses, the branches pubescent or glabrous; corolla 2.5 to 3 cm. long, the throat 5 mm. broad.

2. *Odontonema foliaceo-bracteatum* (Oerst.) Kuntze. Rev. Gen. Pl. 2: 494. 1891.

Thyrsacanthus foliaceo-bracteatus Oerst. Nat. For. Kjöbenhavn. Vid. Medd. 1854: 146. 1855.

Type from Mirador, Veracruz.

Stems villous; leaves oblong or ovate-oblong, about 13 cm. long, short-acuminate, attenuate at base to a short petiole; flowers sessile; calyx lobes linear.

Known to the writer only from the original description. The plant was referred doubtfully to *Thyrsacanthus* by Oersted and may belong to some other genus.

3. *Odontonema cuspidatum* (Nees) Kuntze, Rev. Gen. Pl. 2: 494. 1891.

Thyrsacanthus cuspidatus Nees in DC. Prodr. 11: 323. 1847.

Chiapas and Tabasco; reported from Oaxaca; type from Teapa, Tabasco.

Leaves oval to elliptic-oblong, about 25 cm. long, acuminate, acute at base, petiolate, glabrous above; corolla 2.5 cm. long.

Thyrsacanthus strictus Nees,¹ of Guatemala and El Salvador, is scarcely distinct.

4. *Odontonema glabrum* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 195. 1915.

Chiapas; type from Finca Irlanda.

Plants suffrutescent, glabrous throughout; leaves short-petiolate, lance-oblong to oblong-elliptic, 10 to 20 cm. long, long-acuminate, acute at base; corolla 2.5 cm. long.

10. *CARLOWRIGHTIA* A. Gray, Proc. Amer. Acad. 13: 364. 1877.

Plants suffrutescent or herbaceous; leaves entire; flowers small, loosely spicate or racemose, often paniculate; calyx 5-parted or 5-cleft; corolla tube slender, the throat not dilated, the limb nearly equally 4-cleft; stamens 2, the anther cells equal, inserted at the same height; capsule stipitate, 4-seeded.

¹In DC. Prodr. 11: 324. 1847.

Leaves linear or nearly so.

Branches of the inflorescence glabrous.....1. *C. pectinata*.

Branches of the inflorescence puberulent.

Pubescence glandular.....2. *C. lindauiana*.

Pubescence eglandular.....3. *C. linearifolia*.

Leaves lanceolate to broadly ovate.

Flowers axillary or in short racemes.

Stems very minutely puberulent, the hairs scarcely perceptible.

4. *C. parvifolia*.

Stems pilose or pubescent, the hairs conspicuous.

Pubescence all or chiefly eglandular.....5. *C. pubens*.

Pubescence chiefly of gland-tipped hairs.

Leaves cordate or subcordate at base.....6. *C. glandulosa*.

Leaves obtuse or acute at base.....7. *C. serpyllifolia*.

Flowers chiefly in long naked spikes.

Branches bisulcate and angulate.

Stems scaberulous; capsule glabrous.....8. *C. ovata*.

Stems sparsely hirsute; capsule puberulent.....9. *C. haplocarpa*.

Branches terete.

Leaves nearly sessile, 6 mm. wide or less.....10. *C. arizonica*.

Leaves conspicuously petiolate, 1 to 4 cm. wide or larger.

Leaves rounded or obtuse at base.....11. *C. glabrata*.

Leaves cordate or subcordate at base.

Stems very minutely puberulent.....12. *C. cordifolia*.

Stems short-pilose or pubescent.....13. *C. californica*.

1. *Carlowrightia pectinata* T. S. Brandeg. Proc. Calif. Acad. II. 3: 160. 1891.

Baja California, Sonora, and Sinaloa; type from San José del Cabo, Baja California.

Plants slender, herbaceous or suffrutescent, erect or decurrent, glabrous; leaves sessile, 2 to 10 cm. long, 2 to 7 mm. wide; flowers in interrupted paniced few-flowered spikes; corolla 6 to 7 mm. long, the tube much shorter than the lobes.

Carlowrightia fimbriata T. S. Brandeg.,¹ described from San Pedro, Baja California, is scarcely distinct.

2. *Carlowrightia lindauiana* Standl.

Carlowrightia linearifolia Lindau, Bull. Herb. Boiss. 5: 661. 1897. Not

C. linearifolia A. Gray, 1877.

Querétaro and Hidalgo; type from some unknown Mexican locality.

Plants slender, woody below, the stems striate, glabrate; leaves 2 to 5 cm. long, 5 mm. wide or less, sessile or nearly so, glabrous or scaberulous; flowers in slender interrupted naked spikes; corolla purplish, 8 to 10 mm. long, the tube 2 mm. long; capsule puberulent or glabrous.

3. *Carlowrightia linearifolia* (Torr.) A. Gray, Proc. Amer. Acad. 13: 364. 1877.

Schaueria linearifolia Torr. U. S. & Mex. Bound. Bot. 123. 1859.

No Mexican specimens seen by the writer, but the plant doubtless occurs in Chihuahua. Western Texas to southern Arizona.

Plants herbaceous or often fruticose below, the branches minutely scaberulous; leaves narrowly linear, 1 to 3.5 cm. long, scaberulous; flowers pedicellate, racemose-paniculate; corolla purplish, 1 cm. long.

4. *Carlowrightia parvifolia* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 190. 1911.

¹ Proc. Calif. Acad. II. 3: 161. 1891.

Coahuila and Nuevo León; type from Sierra de la Paila, Coahuila.

Plants chiefly herbaceous, 20 cm. high or less, much branched; leaves linear-lanceolate to lance-ovate, less than 1 cm. long, acute at base; corolla 7 mm. long.

5. **Carlowrightia pubens** A. Gray, Proc. Amer. Acad. 21: 406. 1886.

Shaueria parvifolia Torr. U. S. & Mex. Bound. Bot. 122. 1859. Not *Carlowrightia parvifolia* T. S. Brandeg. 1911.

Dianthera parvifolia A. Gray, Syn. Fl. 2¹: 330. 1878.

Chihuahua to Nuevo León. Western Texas; type collected along Cibolo Creek.

Plants chiefly herbaceous, 25 cm. high or less, much branched; leaves petiolate, ovate or broadly ovate, 1.5 cm. long or less, obtuse or acute, densely pubescent; corolla about 7 mm. long; stipe shorter than the body of the capsule.

6. **Carlowrightia glandulosa** Robins. & Greenm. Proc. Amer. Acad. 32: 40. 1896.

San Luis Potosí to Puebla and Oaxaca; type from Monte Alban, Oaxaca, altitude 1,650 meters.

Plants chiefly herbaceous, densely glandular-pubescent or pilose throughout; leaves petiolate, ovate or broadly ovate, 1 to 6 cm. long, acute or obtuse; corolla purplish, about 1.5 cm. long; stipe fully as long as the body of the capsule.

7. **Carlowrightia serpyllifolia** A. Gray, Proc. Amer. Acad. 21: 405. 1886.

Coahuila; type from mountains near Jimulco.

Plants suffrutescent, loosely branched, with whitish branches; leaves petiolate, lance-oblong to ovate, 6 to 15 mm. long, acute or obtuse, glandular-puberulent; corolla purplish; stipe equaling the body of the capsule.

8. **Carlowrightia ovata** A. Gray, Proc. Amer. Acad. 21: 406. 1886.

Type collected near the city of Chihuahua.

Plants woody below, procumbent; leaves short-petiolate, ovate or broadly ovate, 1 to 1.5 cm. long, acuminate, rounded at base, glabrate; corolla purple; stipe equaling the body of the capsule.

9. **Carlowrightia haplocarpa** Robins. & Greenm. Proc. Amer. Acad. 29: 30. 1894.

San Luis Potosí; type from Villar.

Plants slender, suffrutescent, 40 cm. high or less; leaves subsessile, broadly ovate, 2 to 4 cm. long, subcordate at base, sparsely hirsute or glabrate beneath; corolla purple, 10 to 12 mm. long; capsule pubescent, the stipe equaling the body.

10. **Carlowrightia arizonica** A. Gray, Proc. Amer. Acad. 13: 364. 1877.

Sonora and Sinaloa. Southern Arizona; type from Camp Grant.

Plants woody below, 50 cm. high or less, the branches minutely puberulent; leaves oblong to linear-lanceolate, 1.5 to 3 cm. long, acuminate, short-petiolate; corolla about 13 mm. long, cream-colored; stipe usually longer than the body of the capsule.

11. **Carlowrightia glabrata** Fernald, Bot. Gaz. 20: 536. 1895.

Sinaloa to Guerrero; type from Manzanillo, Colima.

Plants large, slender, hirtellous or glabrous; leaves short-petiolate, lance-oblong to oblong-ovate, 4 to 7.5 cm. long, acute, pubescent or glabrate beneath; stipe longer than the body of the capsule.

12. **Carlowrightia cordifolia** A. Gray, Proc. Amer. Acad. 21: 406. 1886.

Chihuahua and Baja California; type from mountains above Batopilas, Chihuahua.

Plants chiefly herbaceous; leaves petiolate, ovate, 1 to 4 cm. long, acute or acuminate, finely puberulent; corolla white, 1 cm. long; stipe equaling the body of the capsule.

13. *Carlowrightia californica* T. S. Brandeg. Zoe 5: 172. 1903.

Baja California and Sinaloa; type from southern Baja California.

Plants chiefly herbaceous; leaves petiolate, ovate or broadly ovate, 3 to 6 cm. long, pubescent, acuminate; corolla cream-colored, 8 mm. long; stipe equaling the body of the capsule.

Probably only a form of *C. cordifolia*.

11. *ANISACANTHUS* Nees, Linnaea 16: 307. 1842.

Shrubs; leaves petiolate, entire; flowers red, mostly in terminal, simple or branched, secund, interrupted, terminal spikes, the bracts usually small; calyx 5-cleft, the segments narrow, subequal; corolla tube slender, elongate, straight or slightly incurved, the limb bilabiate, the posterior lip usually entire, the anterior 3-parted; stamens 2, the anther cells equal and inserted at the same height; ovules 2 in each cell.

Bractlets much longer than the calyx.....1. ***A. abditus***.

Bractlets much shorter than the calyx.

Calyx lobes longer than the stipe of the capsule and often equaling the body of the capsule.....2. ***A. thurberi***.

Calyx lobes equaling or shorter than the stipe of the capsule.

Calyx without glandular pubescence.

Calyx lobes glabrous but ciliate; lips of the corolla shorter than the tube.
3. ***A. gonzalezii***.

Calyx lobes pubescent on the back; lips about as long as the tube.

4. ***A. pumilus***.

Calyx glandular-puberulent.

Corolla 4 to 5.5 cm. long.....5. ***A. insignis***.

Corolla 3 to 3.5 cm. long.

Calyx in anthesis about 3 mm. long.....6. ***A. wrightii***.

Calyx in anthesis 5 to 6 mm. long.....7. ***A. quadrifidus***.

1. *Anisacanthus abditus* T. S. Brandeg. Zoe. 3: 348. 1893.

Sonora; type from Sierra Matapán.

Shrub, 1 meter high or less, with whitish branches; leaves long-petiolate, lanceolate or ovate-lanceolate, 2 to 3 cm. long, acuminate, densely glandular-puberulent; inflorescence short and dense, leafy-bracted, few-flowered; bractlets 8 to 12 mm. long, obtuse glandular-pilosulous; corolla rose-colored, 3 to 4 cm. long, glabrous.

2. *Anisacanthus thurberi* (Torr.) A. Gray, Syn. Fl. 2¹: 328. 1878.

Drejera thurberi Torr. U. S. & Mex. Bound. Bot. 124. 1859.

Chihuahua and Sonora; type from Las Animas, Sonora. Arizona and New Mexico.

Shrub, 1.5 meters high or less; leaves lanceolate or oblong, short-petiolate, 1.5 to 5 cm. long, hirtellous or puberulent; flowers pedicellate, the calyx glandular-puberulent; corolla red, 2.5 to 3.5 cm. long, pilose, the lobes equaling or shorter than the tube. "Chuparosa" (Sonora, Arizona).

3. *Anisacanthus gonzalezii* Greenm. Proc. Amer. Acad. 39: 89. 1903.

Oaxaca; type from Cuesta de Quiotepec, altitude 1,200 meters.

Shrub, the branchlets appressed-pubescent or glabrate; leaves short-petiolate, lance-ovate to linear-lanceolate, 2 to 4.5 cm. long, acuminate, glabrous or pubescent beneath along the costa; calyx 6 to 8 mm. long; corolla red, 3 to 4 cm. long, pilosulous, the lips shorter than the tube.

4. *Anisacanthus pumilus* (Dietr.) Nees in DC. Prodr. 11: 445. 1847.

Justicia pumila Dietr. Vollst. Lex. Gärt. Nachtr. 4: 197. 1815-21.

Drejera greggii Torr. U. S. & Mex. Bound. Bot. 124. 1859.

Anisacanthus greggii A. Gray, Syn. Fl. 2¹: 328. 1878.

San Luis Potosí to Michoacán.

Low shrub with exfoliating bark; leaves lanceolate or lanceovate, short-petiolate, 4 cm. long or less, cinereous-pilose beneath or finally glabrate; calyx about 6 mm. long; corolla 4 to 4.5 cm. long, puberulent.

5. *Anisacanthus insignis* A. Gray, Syn. Fl. ed. 2. 2¹: 457. 1886.

Chihuahua, Coahuila, and Durango. Western Texas.

Shrub; leaves short-petiolate, linear to narrowly lanceolate (on young sterile shoots sometimes lance-ovate and long-petiolate), 2 to 3 cm. long, puberulent or glabrate; flowers pedicellate; calyx 6 to 7 mm. long; corolla rose-red or salmon-colored, pilosulous.

The writer has seen no material of *A. tulensis* Greenm.¹, which was described from Santa María del Tule, Oaxaca. Its description agrees well with specimens of *A. insignis*, but it may be a distinct species.

6. *Anisacanthus wrightii* (Torr.) A. Gray, Syn. Fl. 2¹: 328. 1878.

Drejera wrightii Torr. U. S. & Mex. Bound. Bot. 123. 1859.

Coahuila and Zacatecas to Tamaulipas. Western Texas; type collected between the Guadalupe River and the Rio Grande.

Shrub, about 1 meter high, the branches puberulent in lines; leaves short-petiolate, linear to ovate-lanceolate, 2 to 4.5 cm. long, acuminate, glabrous or nearly so; flowers sessile; corolla puberulent or pilosulous. "Muicle" (Tamaulipas).

The plant is employed in Tamaulipas as a remedy for colic.

7. *Anisacanthus quadrifidus* (Vahl) Standl.

Justicia coccinea Cav. Icon. Pl. 2: pl. 199. 1793. Not *J. coccinea* Aubl. 1775.

Justicia quadrifida Vahl, Enum. Pl. 1: 124. 1804.

Justicia virgularis Salisb. Parad. Lond. pl. 50. 1806-07.

Anisacanthus virgularis Nees in DC. Prodr. 11: 445. 1847.

Drejera puberula Torr. U. S. & Mex. Bound. Bot. 123. 1859.

Drejera juncea Torr. U. S. & Mex. Bound. Bot. 124. 1859.

Anisacanthus junceus Hemsl. Biol. Centr. Amer. Bot. 2: 522. 1882.

San Luis Potosí to Puebla and Oaxaca.

Shrub, about 1 meter high; leaves short-petiolate or subsessile, linear to lanceolate, 2 to 5 cm. long, long-acuminate, glabrous or nearly so; corolla red, pilosulous or puberulent.

12. *NEOHALLIA* Hemsl. Biol. Centr. Amer. Bot. 2: 519. 1882.

A single species is known.

1. *Neohallia borrerae* Hemsl. Biol. Centr. Amer. Bot. 2: 519. 1882.

Veracruz and Chiapas; type from Chiapas.

Plants large, probably shrubby, glabrous; leaves oblong-ob lanceolate, 20 to 35 cm. long, acuminate, attenuate to the base, short-petiolate, entire; flowers in pedunculate clusters of 2 or 3, the large bracts about 6 cm. long, cuplike; calyx tubular, subequally 5-dentate; corolla about 7 cm. long, the tube slender, slightly incurved, the limb bilabiate, the posterior lip erect, narrow, subemarginate, the lower short and 3-dentate; stamens 2, the anther cells unequal.

13. *TABASCINA* Baill. Hist. Pl. 10: 445. 1891.

The single species of the genus is known to the writer only from description.

1. *Tabascina lindeni* Baill. Hist. Pl. 10: 445. 1891.

Mexico, the locality not indicated, but (judging from the generic name) probably in Tabasco.

¹ Field Mus. Bot. 2: 343. 1912.

Shrub; leaves elliptic-acuminate, long-attenuate to the petiole, large, nearly glabrous; flowers in terminal cymes, the bracts and bractlets small; calyx lobes broad, foliaceous, the posterior one larger; corolla tube campanulate, pubescent, the limb with 5 short subequal lobes; stamens 2, the cells unequal.

14. JACOBINIA Moric. Pl. Nouv. Amer. 156. 1846.

Shrubs or herbs; leaves entire; flowers usually red or yellow, sessile in the axils of bracts or short-pedicellate, solitary, cymose, spicate, or paniculate; calyx 5-cleft or 5-parted, the lobes narrow; corolla tube usually slender and elongate, straight or incurved, the limb bilabiate, the posterior lip narrow, erect, entire or shallowly bilobate, the anterior lip 3-lobate; stamens 2, the anther cells more or less unequal, not appendaged at base; ovules 2 in each cell.

Flowers in a large dense terminal thyrses; leaves not auriculate at base of petiole.

1. J. umbrosa.

Flowers not in a dense terminal thyrses or, if so, the leaves auriculate at base of petiole.

Leaves stellate-pubescent.....**2. J. stellata.**

Leaves glabrous or with pubescence of simple hairs.

Calyx lobes mostly 2 to 3 mm. wide, large and herbaceous, sometimes obtuse.

Calyx lobes obtuse.....**3. J. purpusii.**

Calyx lobes acuminate.

Calyx parted nearly to the base.....**4. J. paniculata.**

Calyx with a tube nearly as long as the lobes.....**5. J. albicaulis.**

Calyx lobes 1.5 mm. wide or less, small, linear or lance-subulate, never obtuse.

Leaves auriculate at base of petiole.....**6. J. auriculata.**

Leaves not auriculate at base.

Corolla glabrous.

Leaves densely velutinous-pubescent beneath.....**7. J. incana.**

Leaves glabrous beneath except along the veins.....**8. J. spicigera.**

Corolla pilose or puberulent.

Calyx glandular-pubescent.

Stems pubescent-tomentose.....**9. J. aschenborniana.**

Stems hirsute.....**10. J. heterophylla.**

Calyx without glandular pubescence.

Bracts equaling or longer than the calyx.....**11. J. candicans.**

Bracts much shorter than the calyx.

Leaves glabrate beneath.....**12. J. mexicana.**

Leaves subtomentose beneath.....**13. J. mollis.**

1. Jacobinia umbrosa (Benth.) Blake, Contr. Gray Herb. n. ser. 52: 103. 1917.

Justicia aurea Schlecht. Linnaea 7: 393. 1832.

Justicia umbrosa Benth. Pl. Hartw. 79. 1841.

Cyrtanthera catalpaefolia Nees in Curtis's Bot. Mag. pl. 4444. 1849.

?*Cyrtanthera chrysostephana* Hook. f. in Curtis's Bot. Mag. pl. 5887. 1871.

Jacobinia aurea Hemsl. Diag. Pl. Mex. 35. 1879. Not *J. aurea* Hiern, 1877-78.

Veracruz, Oaxaca, and Chiapas; type from Tioselo, Veracruz. Central America.

Shrub or small tree, 1 to 4 meters high or larger, the branches puberulent or glabrous; leaves petiolate, lance-oblong to broadly ovate, 10 to 45 cm. long, usually acute or acuminate, abruptly decurrent at base, puberulent or nearly glabrous beneath; thyrses 7 to 30 cm. long, many-flowered; corolla yellow, about 5 cm. long, puberulent or pilosulous. "Monte de oro," "pluma de oro" (Veracruz, Oaxaca); "cola de ardilla" (El Salvador).

2. **Jacobinia stellata** Robins. & Greenm. Proc. Amer. Acad. 29: 390. 1894.

Type from barranca of Tequila, Jalisco.

Plants finely stellate-pubescent throughout; leaves short-petiolate, lanceolate or ovate-lanceolate, 5 to 13.5 cm. long, acuminate; flowers in few-flowered cymes in the upper axils; calyx glandular-pubescent, the lobes linear-oblong, acute; corolla reddish purple, 4 cm. long.

3. **Jacobinia purpusii** T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 195. 1915.

Chiapas; type from Finca Irlanda.

Plants chiefly herbaceous, the stems villosulous; leaves slender-petiolate, ovate-oblong to broadly ovate, 5 to 9 cm. long, acuminate, acute to rounded at base, villosulous or sometimes hirsute beneath; flowers in small sessile terminal clusters; corolla yellow (?), about 7 cm. long, glandular-villous.

4. **Jacobinia paniculata** Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 153. 1855.

Veracruz; cultivated at Guanajuato; type material from Mirador and Colipa, Veracruz. Central America.

Plants suffrutescent, glabrous or nearly so; leaves petiolate, lance-oblong or elliptic-oblong, acuminate, acute at base; flowers in lax terminal panicles; calyx 16 mm. long or less; corolla red and yellow, 3 to 3.5 cm. long, pubescent.

5. **Jacobinia albicaulis** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 386. 1913.

Type from Baños del Carrizal, Veracruz.

Shrub, the branches glabrous; leaves nearly sessile, oblong-obovate, 6 to 12.5 cm. long, short-acuminate, cuneate-attenuate at base, scaberulous above, sparsely puberulent or glabrate beneath; flowers cymose-paniculate; calyx 7 mm. long, glabrate; corolla red, 18 mm. long, glabrous.

6. **Jacobinia auriculata** Rose, Contr. U. S. Nat. Herb. 1: 349. 1895.

Type from Colima.

Shrub, 1 meter high, the branchlets quadrangular; leaves sessile and clasping, lance-oblong or ovate-oblong, 8 to 15 cm. long, acuminate, rather abruptly attenuate, glabrate; flowers in a dense terminal panicle; corolla crimson, 2.5 cm. long.

7. **Jacobinia incana** (Nees) Hemsl. Biol. Centr. Amer. Bot. 2: 521. 1882.

Sericographis incana Nees in DC. Prodr. 11: 361. 1847.

Nuevo León, Tamaulipas, and San Luis Potosí; reported from Veracruz; type from Toluca (Querétaro?).

Shrub, about 1 meter high, the branches densely pubescent; leaves petiolate, oblong to ovate, 6 to 14 cm. long, usually obtuse, acute or decurrent at base; flowers in few-flowered axillary and terminal cymes; corolla red, 4 cm. long. "Muicle" (Nuevo León, Tamaulipas).

Used in Tamaulipas as a remedy for colic.

8. **Jacobinia spicigera** (Schlecht.) L. H. Bailey, Stand. Cycl. Hort. 1715. 1915.

Justicia spicigera Schlecht. Linnaea 7: 395. 1832.

Justicia atramentaria Benth. Pl. Hartw. 69. 1840.

Drejera willdenowiana Nees in DC. Prodr. 11: 334. 1847.

Sericographis mohintli Nees in DC. Prodr. 11: 361. 1847.

Jacobinia mohintli Hemsl. Biol. Centr. Amer. Bot. 2: 521. 1882.

Tepic to San Luis Potosí, Veracruz, and Chiapas; often cultivated; type from Jalapa, Veracruz. Central America.

Shrub, 1 to 1.5 meters high, the branches puberulent or glabrate; leaves short-petiolate, lance-oblong to ovate, 6 to 17 cm. long, usually acute, glabrate; flowers in few-flowered, axillary or terminal cymes; corolla red or orange, 3 to 3.5 cm. long. "Micle" (Guerrero, Durango); "mohuitli," "muicle," "moictle," "muclic," "moytli," "mohitli," "mohintli," "mohintle" (Oaxaca, Guanajuato, Querétaro, Mexico, etc.; derivatives of the Nahuatl *mohuitli*, "blue"); "hierba del

añil" (Chiapas); "hierba azul" (Veracruz); "trompetilla" (Veracruz); "charait-zicua" (Tarascan, *Ramírez*); "hierba añil" (*Ramírez*); "mozote" (*Nueva Farm. Mex.*); "mirto del cerro" (Querétaro); "tinta," "sacatinta," "hierba de la Santísima Trinidad" (El Salvador).

This plant is well known in Mexico and nearly throughout Central America. The leaves are placed in hot water, which at first assumes a dingy blackish color but later becomes dark blue. This solution is employed by laundresses for whitening clothes, in the same manner as indigo. The plant was employed formerly in Mexico also as a dye. It is used as a remedy for dysentery, fevers, gonorrhoea, and other affections.

9. **Jacobinia aschenborniana** (Nees) Hemsl. Biol. Centr. Amer. Bot. 2: 520. 1882.

Sericographis aschenborniana Nees in DC. Prodr. 11: 362. 1847.

?*Sericographis haplostachya* Nees in DC. Prodr. 11: 362. 1847.

Described from somewhere in Mexico.

Leaves long-petiolate, broadly ovate, obtusely cuspidulate, hirsute above, hirsute-tomentose beneath; corolla 2.5 cm. long.

Known to the writer only from the original description.

10. **Jacobinia heterophylla** (Schlecht. & Cham.) Hemsl. Biol. Centr. Amer. Bot. 2: 520. 1882.

Justicia heterophylla Schlecht. & Cham. Linnaea 5: 95. 1830.

Type from Cerro Colorado, Veracruz.

Stems fruticose; leaves petiolate, ovate, obtusely acuminate, acute at base, hirsute along the costa; corolla 2.5 cm. long.

Known to the writer only from description.

11. **Jacobinia candicans** (Nees) Benth. & Hook.: Hook. & Jacks. Ind. Kew 1: 1246. 1893.

Adhatoda candicans Nees in DC. Prodr. 11: 396. 1847.

Dianthera candicans Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 517. 1882.

Jacobinia ovata A. Gray, Proc. Amer. Acad. 21: 405. 1886.

Jacobinia ovata subglabra S. Wats. Proc. Amer. Acad. 24: 67. 1889.

Sonora to Oaxaca and Puebla; type from mountains of Oaxaca.

Shrub, 1 to 1.5 meters high; leaves petiolate, ovate or broadly ovate, 3 to 7 cm. long, acute or acuminate, pubescent or glabrate; flowers in small, dense, few-flowered, sessile or subsessile clusters; corolla red, 3.5 to 4 cm. long. "Espuela de caballero" (Sinaloa).

12. **Jacobinia mexicana** Seem. Bot. Voy. Herald 325. pl. 66. 1857.

?*Jacobinia uhdei* Lindau, Bull. Herb. Boiss. 3: 488. 1895.

Sinaloa; Querétaro (?); type from the Sierra Madre.

Shrub, the branchlets puberulent or glabrate; leaves petiolate, ovate or lanceolate, 3 to 12 cm. long, acuminate, abruptly decurrent at base; corolla red, about 3.5 cm. long.

13. **Jacobinia mollis** Greenm. Proc. Amer. Acad. 39: 91. 1903.

Type from Oaxaca.

Branchlets hirsute-pubescent; leaves petiolate, ovate or ovate-lanceolate, 2 to 9 cm. long, short-acuminate; flowers in short axillary racemes; corolla purplish, 3.5 cm. long.

DOUBTFUL SPECIES.

JACOBINIA GHIESBREGHTIANA (Lem.) Hemsl. Biol. Centr. Amer. Bot. 2: 520. 1882. *Cyrtanthera ghiesbreghtiana* Lem. Fl. Serr. Jard. 1847: Misc. No. 7. 1847; *Sericographis ghiesbreghtiana* Nees in DC. Prodr. 11: 730. 1847. Described from cultivated plants of Mexican origin.

JACOBINIA LONGIFLORA (Nees) Hemsl. Biol. Centr. Amer. Bot. **2**: 521. 1882. *Heinzelia longiflora* Nees in DC. Prodr. **11**: 314. 1847. Type from "Las Ajuntas."

JACOBINIA MACROPHYLLA (Oerst.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 521. 1882. *Sericographis macrophylla* Oerst. Nat. For. Kjöbenhavn Vid. Medd. **1854**: 149. 1855. Type from Veracruz.

JACOBINIA OAXACANA Greenm. Proc. Amer. Acad. **39**: 91. 1903. Type from Oaxaca.

JACOBINIA VIRGATA (Oerst.) Hemsl. Biol. Centr. Amer. Bot. **2**: 522. 1882. *Sericographis virgata* Oerst. Nat. For. Kjöbenhavn Vid. Medd. **1854**: 154. 1855. Type from Acatlán and Ejutla. Oaxaca.

15. **JUSTICIA** L. Sp. Pl. 15. 1753.

Shrubs or herbs; leaves entire; flowers small or large, white, purplish, or red, variously arranged; calyx 4 or 5-parted, the segments narrow; corolla tube usually shorter than the limb, ampliate above, the limb bilabiate; stamens 2, the anther cells unequal, the lower one appendaged at base; ovules 2 in each cell.

Several herbaceous species occur in Mexico.

Leaves linear.....1. **J. linearis.**

Leaves much broader than linear.

Calyx glandular-pubescent.

Calyx covered with sessile glands.....2. **J. hians.**

Calyx glandular-pilose.....3. **J. salviaeflora.**

Calyx without glandular pubescence.

Bractlets spatulate, obtuse.....4. **J. palmeri.**

Bractlets linear-subulate.....5. **J. mexicana.**

1. **Justicia linearis** Robins. & Greenm. Amer. Journ. Sci. **50**: 161. 1895.

Type from Las Tablas, San Luis Potosí.

Plants tomentulose, fruticose; leaves 1-nerved, sessile, 2.5 cm. long, 2 mm. wide; flowers axillary, sessile; calyx 8 mm. long; corolla 18 mm. long, pubescent.

2. **Justicia hians** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 194. 1915.

Beloperone hians T. S. Brandeg. Proc. Calif. Acad. II. **2**: 194. 1889.

Justicia insolita T. S. Brandeg. Proc. Calif. Acad. II. **2**: 195. 1889.

Baja California; type from Comondú.

Shrub, 1 to 2 meters high, the branches minutely whitish-puberulent; leaves short-petiolate, oblong to oval or lance-oblong, 1 to 3.5 cm. long, obtuse or acute, sparsely pubescent or glabrate; flowers in few-flowered interrupted spikes; corolla 2 to 2.5 cm. long.

Brandegee has referred *J. palmeri* Rose to synonymy under *J. hians*. A specimen of the latter species, presumably of the type collection, seen by the writer is identical with *J. insolita*.

3. **Justicia salviaeflora** H. B. K. Nov. Gen. & Sp. **2**: 233. 1817.

Justicia paniculata Rose, Contr. U. S. Nat. Herb. **1**: 348. 1895.

Jalisco to Oaxaca and Morelos; described from cultivated plants.

Plants suffrutescent, the branches glandular-pilose; leaves petiolate, lance-oblong or oblong-ovate, 5 to 8 cm. long, acuminate, acute at base, pubescent; flowers mostly in few-flowered secund spikes, sometimes cymose; corolla 1.5 to 2 cm. long, red.

4. **Justicia palmeri** Rose, Contr. U. S. Nat. Herb. **1**: 75. 1890.

Baja California; type from La Paz.

Shrub, 1 to 2 meters high, the branches minutely cinereous-tomentulose; leaves short-petiolate, ovate to lanceolate, 4 to 7 cm. long, obtusely acuminate, obtuse or acute at base, glabrous or nearly so; flowers fasciculate in the axils or in short leafy-bracted spikes; corolla red, 3 to 3.5 cm. long.

5. *Justicia mexicana* Rose, Contr. U. S. Nat. Herb. 1: 348. 1895.

Sonora and Sinaloa; type from Agiabampo, Sonora.

Slender shrub, 1 to 2 meters high, the branches pubescent or glabrate; leaves slender-petiolate, lanceolate or ovate, 4 to 10 cm. long, acuminate, acute or obtuse at base, sparsely pubescent or glabrate; flowers in terminal and axillary clusters; corolla red, 3 to 3.5 cm. long. "*Mitle cimarrón*" (Sinaloa).

This species and *J. palmeri* should probably be referred to the genus *Beloperone*.

16. *SIPHONOGLOSSA* Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 159. 1855.

Several herbaceous species occur in Mexico.

1. *Siphonoglossa pringlei* (Robins. & Greenm.) Lindau, Bull. Herb. Boiss. 5: 662. 1897.

Carlowrightia pringlei Robns. & Greenm. Proc. Amer. Acad. 32: 50. 1896.

Oaxaca; type from Tomellín Canyon, altitude 1,050 meters.

Slender shrub, 1 to 1.5 meters high; leaves lanceolate or linear-lanceolate, 1.5 to 3 cm. long, acuminate, obtuse or rounded at base, petiolate, entire, glabrous or nearly so; flowers in slender interrupted spikes, the bracts small, subulate; calyx 5-cleft, the lobes linear-subulate, glandular-pubescent; corolla purplish, about 2 cm. long, the tube slender, equaling the 4 subequal lobes; stamens 2, the anther cells slightly unequal.

17. *BELOPERONE* Nees in Wall. Pl. Asiat. Rar. 3: 76. 1832.

Shrubs or herbs; leaves usually entire; flowers usually red, fasciculate in the axils of bracts or cymose, sometimes in terminal thyrses, the bracts small or large; calyx 5-parted, the segments narrow; corolla tube slender, elongate, scarcely ampliate above, the limb deeply bilabiate, the posterior lobes narrow, erect, entire or shallowly bilobate, the anterior one 3-lobate; stamens 2, the anther cells unequal, the lower one mucronate at base; ovules 2 in each cell.

Several herbaceous species occur in Mexico.

Branches glabrous or obscurely and sparsely puberulent.

Bracts much shorter than the calyx; leaves acute or acuminate. 1. ***B. fragilis***.

Bracts longer than the calyx; leaves obtuse.----- 2. ***B. macrantha***.

Branches densely pilose or whitish-tomentulose.

Flowers borne in the axils of reduced leaves; seeds rugose.---- 3. ***B. purpusii***.

Flowers in naked racemes; seeds smooth.----- 4. ***B. californica***.

1. *Beloperone fragilis* Robinson, Proc. Amer. Acad. 27: 183. 1892.

Type from Las Canoas, San Luis Potosí.

Shrub, 1 to 1.5 meters high, the branches nearly glabrous; leaves petiolate, ovate, 4 to 7 cm. long, obtuse or rounded at base, barbate beneath along the costa, elsewhere glabrate; flowers in axillary or terminal, naked, secund spikes; calyx 4 mm. long; corolla reddish, 2.5 cm. long, pubescent.

2. *Beloperone macrantha* (Oerst.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 516. 1882.

Beloperonoides macrantha Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1854: 162. pl. 4, f. 36. 1855.

Type from Trapiche de la Concepción, Oaxaca.

Shrub, the branches puberulent in lines; leaves petiolate, lance-elliptic, about 7 cm. long, attenuate at base, crenulate toward the apex, glabrous; flowers terminal, fasciculate, sessile; calyx 8 mm. long; bracts spatulate; corolla puberulent, 5.5 cm. long.

Known to the writer only from description.

3. *Beloperone purpusii* T. S. Brandeg. Zoe 5: 172. 1903.

Southern Baja California; type from San Felipe.

Plants suffrutescent, the branches densely velutinous-pubescent; leaves short-petiolate or the upper sessile, ovate or broadly ovate, 3 to 10 cm. long, obtuse to acuminate, truncate or cordate at base, densely pubescent; inflorescence viscid-villous; corolla about 3 cm. long.

4. *Beloperone californica* Benth. Bot. Voy. Sulph. 38. 1844.

?*Beloperone californica conferta* T. S. Brandeg. Proc. Calif. Acad. II. 2: 194. 1889.

Baja California, Sonora, and Sinaloa; type from Cape San Lucas, Baja California. Southern California.

Shrub, 2 meters high or less, often leafless, the branches whitish-tomentulose; leaves long-petiolate, oblong-ovate to rounded-ovate, 1 to 6.5 cm. long, obtuse or acute, rounded to cordate at base, pubescent, sometimes dentate; inflorescence viscid-puberulent or villous; corolla red, 3 to 3.5 cm. long. "Chuparosa" (Sonora).

The flowers are said to be eaten by the Papago Indians.

153. RUBIACEAE. Madder Family.

Shrubs or trees, or often herbs, sometimes armed with spines; leaves opposite or verticillate, entire, stipulate; flowers perfect or unisexual, large or small, usually regular; calyx inferior, the limb entire or lobate, rarely obsolete; corolla gamopetalous, the lobes valvate, imbricate, or contorted; stamens usually as many as the corolla lobes and alternate with them, inserted on the tube or throat of the corolla; style simple or 2 to 10-cleft; fruit capsular, baccate, or drupaceous, or of dehiscent or indehiscent cocci.

Numerous genera of the family are represented in Mexico only by herbaceous species. Among the most important members of the family are the species of *Cinchona*, a South American genus, which yield the Cinchona bark of commerce, from which quinine is extracted. Two or more species of *Cinchona* are cultivated in Veracruz, and perhaps elsewhere, having been introduced first at Córdoba.

A. Ovules more than one in each cell.

Fruit dry.

Seeds not winged or, if winged, horizontal.

Corolla lobes valvate.

Seeds horizontal, usually very numerous; large shrubs with large flowers.

1. **PORTLANDIA.**

Seeds vertical, few; small shrubs with small flowers.

2. **HOUSTONIA.**

Corolla lobes imbricate or contorted.

Corolla lobes imbricate.

Capsule half superior.....3. **RACHICALLIS.**

Capsule wholly inferior.....4. **BONDELETIA.**

Corolla lobes contorted.

Corolla tube short, shorter than the lobes.....5. **DEPPEA.**

Corolla tube elongate, usually much exceeding the lobes.

Corolla tubular; filaments elongate.....6. **OMILTEMIA.**

Corolla salverform or funnelform; filaments short.

Anthers exserted; corolla tube several times as long as the lobes.

7. **LINDENIA.**

Anthers included; corolla tube less than twice as long as the lobes.....8. **STYLOSIPHONIA.**

Seeds winged or appendaged, vertically imbricate.

Corolla open in bud, the lobes not touching.....9. **EXANDRA.**

Corolla closed in bud, the lobes valvate, imbricate, or contorted.

Corolla lobes valvate.

Flowers spicate.....10. **ALSEIS**.

Flowers not spicate.....11. **BOUVARDIA**.

Corolla lobes imbricate or contorted.

Calyx lobes dissimilar, one of them often expanded into a large white petiolate blade.....12. **CALYCOPHYLLUM**.

Calyx lobes all alike or nearly so, never expanded into a petiolate blade.

Corolla symmetric, the tube slender, the limb 4 or 5-lobate.

13. **EXOSTEMA**.

Corolla often asymmetric, the tube broad, often gibbous, the limb 6 to 8-lobate.....14. **COUTAREA**.

Fruit fleshy.

Corolla lobes valvate.

Inflorescence terminal.

Inflorescence spikelike; leaves thin.....16. **DUGGENA**.

Inflorescence not spikelike; leaves coriaceous.....17. **ISERTIA**.

Inflorescence axillary.

Leaves finely lineolate between the nerves.

Flowers in secund racemes.....18. **PLOCANIOPHYLLUM**.

Flowers not in secund racemes.....19. **SOMMERA**.

Leaves not lineolate.....20. **SABICEA**.

Corolla lobes imbricate or contorted.

Corolla lobes contorted.

Flowers perfect.

Corolla somewhat irregular, curved in bud.....21. **POSOQUERIA**.

Corolla regular, not curved in bud.

Corolla tube villous within in both throat and base...22. **GENIPA**.

Corolla tube villous in either the throat or base but not in both.

24. **RANDIA**.

Flowers dioecious.

Staminate flowers terminal.....23. **ALIBERTIA**.

Staminate flowers lateral.....24. **RANDIA**.

Corolla lobes imbricate.

Calyx lobes unequal, one of them foliaceous.....25. **OTOCALYX**.

Calyx lobes equal or nearly so, none of them foliaceous.

Ovary 4 or 5-celled.....26. **HAMELIA**.

Ovary 2-celled.....27. **HOFFMANNIA**.

AA. Ovule one in each cell.

Seeds pendulous, the radicle superior.

Flowers in spherical compact heads; fruit dry.....15. **CEPHALANTHUS**.

Flowers not in spherical heads; fruit often fleshy.

Stamens inserted in the throat of the corolla.

Fruit separating into 2 cocci at maturity.....28. **MACHAONIA**.

Fruit not separating into cocci at maturity.

Corolla lobes valvate.....29. **CHOMELIA**.

Corolla lobes imbricate.....30. **GUETTARDA**.

Stamens inserted at the base of the corolla tube.

Corolla lobes valvate.

Inflorescence terminal.....31. **ERITHALIS**.

Inflorescence axillary.

Flowers 5-parted; calyx lobes very short; flowers in racemes or panicles.....32. **CHIOCOCCA**.

- Flowers 4-parted; calyx lobes elongate; flowers fasciculate in the axils.....33. **ASEMNANTHE**.
 Corolla lobes imbricate.....34. **PLACOCARPA**.
 Seeds ascending, the radicle inferior.
 Corolla lobes contorted or imbricate.
 Corolla lobes contorted.....35. **COFFEA**.
 Corolla lobes imbricate.....36. **STRUMPFIA**.
 Corolla lobes valvate.
 Ovary 1-celled.....42. **FARAMEA**.
 Ovary with 2 or more cells.
 Fruit a syncarp, the flowers borne in a dense head, the calyces confluent.
 43. **MORINDA**.
 Fruit not a syncarp, the flowers only rarely capitate.
 Plants scandent; fruit of 2 thin flat cocci.....41. **PAEDERIA**.
 Plants not scandent; fruit never of 2 flat cocci.
 Stipules not setiferous, never leaflike.
 Stipules, at least the upper ones, pectinately lobed.
 37. **RUDGEA**.
 Stipules entire.
 Flowers in loose or dense heads surrounded by large, usually colored, foliaceous bracts.....39. **EVEA**.
 Flowers never in leafy-bracted heads.
 Corolla tube straight, not gibbous; branches of the inflorescence not yellow or reddish.....38. **PSYCHOTRIA**.
 Corolla tube usually somewhat curved or gibbous; branches of the inflorescence commonly yellowish or reddish.
 40. **PALICOUREA**.
 Stipules setiferous, or sometimes leaflike.
 Stipules setiferous.
 Fruit of 2 united indehiscent cocci.....44. **ERNODEA**.
 Fruit of 2 dehiscent cocci.....45. **TRIODON**.
 Stipules similar to the leaves, the leaves thus appearing verticillate.....46. **GALIUM**.

1. PORTLANDIA P. Br.; L. Syst. Nat. ed. 10. 928. 1759.

REFERENCE: Standley, N. Amer. Fl. 32: 8-13. 1918.

Shrubs; leaves short-petiolate, coriaceous, persistent; flowers large, axillary or terminal, solitary or fasciculate; corolla funnelform, the lobes short, reduplicate-valvate; fruit capsular, 2-celled, loculicidally bivalvate; seeds numerous, compressed, angulate.

- Corolla about 2.5 cm. long, 4-lobate.....1. **P. ghiesbreghtiana**.
 Corolla 6 to 8 cm. long, 5-lobate.....2. **P. mexicana**.

1. Portlandia ghiesbreghtiana Baill. Adansonia 12: 300. 1879.

Courtaportia ghiesbreghtiana Urban, Symb. Antill. 9: 147. 1923.

Hidalgo, Puebla, and Oaxaca; type from Hacienda de Huijastla.

Glabrous shrub with resinous branches; leaves oblong-elliptic to oval-elliptic, 2 to 4.5 cm. long, acute or obtuse, acute at base; flowers numerous, short-pedicellate; corolla white; capsule 7 to 11 mm. long.

2. Portlandia mexicana (Zucc. & Mart.) Hemsl. Diag. Pl. Mex. 31. 1879.

Coutarea mexicana Zucc. & Mart.; DC. Prodr. 4: 350. 1830.

Nernstia mexicana Urban, Symb. Antill. 9: 146. 1923.

San Luis Potosí, Querétaro, and Hidalgo.

Glabrous shrub; leaves elliptic or elliptic-oblong, 3 to 7.5 cm. long, acute or obtuse, the margins revolute; capsule 1.3 to 2 cm. long.

2. HOUSTONIA L. Sp. Pl. 101. 1753.REFERENCE: Standley, N. Amer. Fl. **32**: 24-38. 1918.

Small shrubs or usually herbs; leaves small; flowers small, axillary or in dichotomous cymes; calyx lobes 4; corolla funnelform or salverform, the limb 4-lobate, the lobes valvate; fruit a small 2-celled capsule, loculicidally dehiscent; seeds not winged.

Several herbaceous species occur in Mexico.

Capsule less than half inferior.....1. **H. fasciculata**.

Capsule more than half inferior.

Branches glabrous.....2. **H. mucronata**.

Branches hirtellous or scabrous.

Flowers in cymes; leaves not acerose; corolla tube minutely hirtellous outside.....3. **H. peninsularis**.

Flowers mostly solitary; leaves acerose; corolla tube glabrous.

Leaves mostly verticillate; flowers sessile or nearly so.....4. **H. acerosa**.

Leaves opposite; flowers mostly pedicellate.....5. **H. polypremoides**.

1. **Houstonia fasciculata** A. Gray, Proc. Amer. Acad. **17**: 203. 1882.

Chihuahua and Coahuila. Western Texas and southern New Mexico; type from Presidio, Texas.

Shrub, 40 cm. high or less, the branches scaberulous or hirtellous; leaves opposite or verticillate, linear, 3 to 10 mm. long, scaberulous or glabrate; flowers in small cymes; corolla white, 3 to 4 mm. long.

2. **Houstonia mucronata** (Benth.) Robinson, Proc. Amer. Acad. **45**: 401. 1910.

Hedyotis mucronata Benth. Bot. Voy. Sulph. 19. 1844.

Houstonia fruticosa Rose, Contr. U. S. Nat. Herb. **1**: 132. 1892.

Southern Baja California; type from Magdalena Bay.

Glabrous shrub, 60 cm. high or less; leaves linear, 3 to 18 mm. long; flowers in small terminal cymes; corolla 10 to 12 mm. long, white.

3. **Houstonia peninsularis** T. S. Brandeg. Zoe **5**: 160. 1903.

Baja California; type from Sierra de la Trinidad.

Shrub, 30 cm. high or less; leaves linear, 1 to 4 cm. long, hirtellous; corolla purple, 15 mm. long.

4. **Houstonia acerosa** A. Gray; Benth. & Hook. Gen. Pl. **2**: 60. 1873.

Hedyotis acerosa A. Gray, Pl. Wright. **1**: 81. 1852.

Mallostoma acerosum Hemsl. Biol. Centr. Amer. Bot. **2**: 31. 1881.

Coahuila, Nuevo León, and San Luis Potosí. Western Texas.

Plants fruticose or suffrutescent, 30 cm. high or less; leaves 5 to 12 mm. long, rigid, scaberulous or hirtellous; corolla 12 to 16 mm. long.

5. **Houstonia polypremoides** A. Gray, Proc. Acad. Amer. **21**: 379. 1886.

Chihuahua; type from Santa Eulalia Mountains. Western Texas and southern New Mexico.

Shrub, 20 cm. high or less; leaves rigid, 5 to 12 mm. long, scaberulous or hirtellous; corolla white, 8 to 11 mm. long.

3. RACHICALLIS DC. Prodr. **4**: 433. 1830.

A single species is known.

1. **Rachicallis americana** (Jacq.) Hitchc. Rep. Mo. Bot. Gard. **4**: 92. 1893.

Hedyotis americana Jacq. Enum. Pl. Carib. 12. 1760.

Yucatán, on coastal rocks. West Indies; type from Cuba.

Erect or procumbent shrub, 2 meters high or less; leaves linear-oblong to obovate, 2 to 8 mm. long, obtuse or acute, coriaceous; flowers yellow, solitary, sessile in the leaf axils; corolla salverform, 8 to 10 mm. long, sericeous, the limb 4-lobate; capsule 3 mm. long, septicidally bivalvate, many-seeded.

4. RONDELETIA L. Sp. Pl. 172. 1753.REFERENCE: Standley, N. Amer. Fl. **32**: 44–86. 1918.

Shrubs or small trees; flowers in terminal or axillary cymes, corymbs, or panicles; calyx 4 or 5-lobate; corolla funnelform or salverform, the tube slender, the limb 4 or 5-lobate, the lobes imbricate; fruit capsular, 2-celled, loculicidally or septicidally bivalvate, many-seeded; seeds often winged or appendaged.

Inflorescence wholly axillary.....**1. R. scabra.**

Inflorescence terminal, sometimes also axillary.

Corolla densely yellow-barbate in the throat.

Corolla glabrous outside.

Calyx lobes foliaceous, several times as long as the tube; leaves setose-pilose beneath.....**2. R. suffrutescens.**

Calyx lobes minute, shorter than the tube; leaves glabrous beneath except for tufts of hairs in the axils of the nerves.....**3. R. ligustroides.**

Corolla pubescent outside.

Branches acutely quadrangular; petioles 5 to 13 mm. long; leaves usually acute at base.....**4. R. stenosiphon.**

Branches terete or subangulate; petioles very short; leaves obtuse to cordate at base.

Stipules triangular-subulate, 4 to 6 mm. long.....**5. R. gratissima.**

Stipules mostly oblong, foliaceous, 10 mm. long or longer, usually obtuse.

Leaves sparsely strigose beneath.....**6. R. intermedia.**

Leaves densely soft-pilose beneath.

Leaves broadly ovate or ovate-oval, usually subcordate at base; corolla tube 12 mm. long or less.....**7. R. amoena.**

Leaves elliptic or lance-elliptic, obtuse at base; corolla tube 15 mm. long.....**8. R. langlassei.**

Corolla usually naked in the throat, never yellow-barbate.

Inflorescence an elongate spikelike panicle.

Corolla variously pubescent outside but never tomentose.

Panicles shorter than the leaves, partly axillary; leaves glabrous.

.....**9. R. heteranthera.**

Panicles longer than the leaves, all terminal; leaves pilose-strigose beneath.....**10. R. capitellata.**

Corolla arachnoid-tomentose outside.

Leaves somewhat tomentose beneath when young but soon glabrate.

.....**11. R. septicidalis.**

Leaves densely tomentose beneath even in age.

Corolla tube 12 to 15 mm. long.

Secondary veins of the leaves obsolete; tomentum of the lower surface of the leaves white, very closely appressed.

.....**12. R. laniflora.**

Secondary veins prominent; tomentum loose, fulvous.

.....**13. R. bourgaei.**

Corolla tube 4 to 10 mm. long.

Leaves long-pilose beneath along the nerves; corolla tube 8 to 10 mm. long.....**14. R. villosa.**

Leaves not pilose beneath; corolla tube 4 to 8 mm. long.

.....**15. R. buddleoides.**

Inflorescence various but never an elongate spikelike panicle.

Corolla not arachnoid-tomentose outside.

Corolla pubescent outside.....**16. R. deamii.**

Corolla glabrous.

Stipules reniform, foliaceous, persistent; corolla tube 11 to 12 mm. long-----17. *R. galeottii*.

Stipules small, not foliaceous, deciduous; corolla tube 12 to 16 mm. long-----18. *R. jurgenseni*.

Corolla arachnoid-tomentose outside.

Inflorescence of numerous once bifid cymes arranged in a raceme, the flowers sessile, secund; stipules bidentate at apex---19. *R. rekoi*.

Inflorescence capitate or cymose-paniculate, the flowers often pedicellate, not secund; stipules entire.

Inflorescence capitate-----20. *R. leptodictya*.

Inflorescence cymose-paniculate.

Calyx lobes linear or oblanceolate, 3 to 6 mm. long.

21. *R. leucophylla*.

Calyx lobes orbicular-oblong, 0.5 to 1.5 mm. long--22. *R. nitida*.

1. *Rondeletia scabra* Hemsl. Diag. Pl. Mex. 29. 1879.

Type from Sierra San Pedro Nolasco, Oaxaca.

Leaves ovate-oblong, 7.5 to 10 cm. long, acute, attenuate at base, hispid-pilose beneath; cymes usually 3-flowered; corolla strigillose-pilose, the tube 12 mm. long.

2. *Rondeletia suffrutescens* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 70. 1914.

Type from Cerro del Boquerón, Chiapas.

Shrub; leaves short-petiolate, ovate to lance-oblong, 4.5 to 10 cm. long, long-acuminate or attenuate, rounded or abruptly short-acuminate at base; cymes mostly 3-flowered; corolla tube 17 mm. long.

3. *Rondeletia ligustroides* Hemsl. Diag. Pl. Mex. 26. 1879.

Veracruz; type from Orizaba.

Shrub, 2 to 2.5 meters high, the branches glabrous; leaves short-petiolate, broadly ovate to ovate-lanceolate, 4 to 8 cm. long, abruptly acuminate or attenuate, rounded to acute at base; inflorescence cymose-corymbose, few or many-flowered; corolla yellowish red, the tube 5 to 6 mm. long.

4. *Rondeletia stenosiphon* Hemsl. Diag. Pl. Mex. 26. 1879.

Type from Yucatán or Tabasco. Guatemala.

Shrub; leaves short-petiolate, obovate to oval-oblong or elliptic-oval, 7 to 14 cm. long, abruptly short-acuminate, obtuse to acuminate at base, glabrous above, strigillose or glabrate beneath; inflorescence cymose-corymbose, many-flowered; corolla sericeous-strigillose, the tube 8 to 11 mm. long.

5. *Rondeletia gratissima* (Linden) Hemsl. Diag. Pl. Mex. 25. 1879.

Rogiera gratissima Linden; Planch. Fl. Serr. Jard. 15: 133. 1864.

Rogiera elegantissima Regel, Gartenflora pl. 490. 1865.

Chiapas.

Shrub; leaves oblong-elliptic, 5 to 6 cm. long, short-acuminate, rounded at base, glabrous; inflorescence cymose-corymbose, dense; corolla rosy white, sparsely puberulent, the tube 12 mm. long.

6. *Rondeletia intermedia* Hemsl. Diag. Pl. Mex. 26. 1879.

Oaxaca and Chiapas; type from Chiapas.

Shrub; leaves ovate or ovate-oval, 6 to 12 cm. long, acutish or obtuse, rounded or subcordate at base; inflorescence cymose-corymbose, the cymes few-flowered; corolla pinkish white, strigillose, the tube 8 to 10 mm. long.

7. **Rondeletia amoena** (Planch.) Hemsl. Diag. Pl. Mex. 26. 1879.

Rogiera amoena Planch. Fl. Serr. Jard. 5: 442. 1849.

Chiapas. Guatemala to Panama.

Shrub or small tree, the branchlets villous-pilose; leaves 6 to 15 cm. long, usually abruptly short-acuminate; inflorescence cymose-corymbose, 5 to 18 cm. broad; corolla pink or pinkish, densely appressed-pilose.

8. **Rondeletia langlassei** Standl. N. Amer. Fl. 32: 53. 1918.

Type from the Sierra Madre of Michoacán or Guerrero, altitude 1,750 meters.

Shrub or small tree, 3 to 4 meters high, the branchlets appressed-pilose; leaves 9 to 12.5 cm. long, acute or attenuate; inflorescence cymose-corymbose, 10 cm. broad; corolla pink, strigillose.

9. **Rondeletia heteranthera** T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 387. 1913.

Type from Baños del Carrizal, Veracruz.

Shrub; leaves short-petiolate, ovate or broadly ovate, 6 to 10 cm. long, acuminate; panicles 2 to 4 cm. long; corolla minutely strigillose, the tube 2.5 to 3 mm. long.

10. **Rondeletia capitellata** Hemsl. Diag. Pl. Mex. 28. 1879.

Veracruz and Oaxaca.

Shrub or tree, 6 meters high or less; leaves short-petiolate, ovate to narrowly elliptic-oblong, 7.5 to 12 cm. long, acute or acuminate; corolla red, strigillose, the tube 6 to 8 mm. long.

11. **Rondeletia septicidalis** Robinson, Proc. Amer. Acad. 45: 403. 1910.

Type from Chicharras, Chiapas.

Shrub; leaves petiolate, broadly ovate to lanceolate, 5 to 16 cm. long, abruptly acuminate or attenuate, acute at base, glabrous above; panicles 6 to 10 cm. long; corolla red, the tube 6 to 8 mm. long.

12. **Rondeletia laniflora** Benth. Pl. Hartw. 85. 1841.

Mountains of Chiapas. Guatemala; type from Sierra de las Nubes.

Shrub, 2 to 3 meters high; leaves petiolate, obovate to narrowly lance-elliptic, 5.5 to 13 cm. long, attenuate or abruptly acuminate, acute or attenuate at base, glabrate above; panicles 4 to 7 cm. long; corolla white-tomentose, the tube 12 to 15 mm. long.

13. **Rondeletia bourgaei** Standl. N. Amer. Fl. 32: 56. 1918.

Type from San Cristóbal, region of Orizaba, Veracruz.

Shrub; leaves petiolate, obovate to oblong-elliptic, 6.5 to 11.5 cm. long, acute or acuminate at base and apex; panicles 6 to 10 cm. long.

14. **Rondeletia villosa** Hemsl. Diag. Pl. Mex. 27. 1879.

Oaxaca, Chiapas, and Tabasco; type from San Pedro Nolasco, Oaxaca.

Shrub; leaves petiolate, oblong-elliptic or ovate, 10 to 25 cm. long, acuminate, acute at base, sparsely pilose above; panicles 15 to 24 cm. long; corolla white, lanate.

15. **Rondeletia buddleoides** Benth. Pl. Hartw. 69. 1840.

Rondeletia affinis Hemsl. Diag. Pl. Mex. 28. 1879.

Veracruz and Oaxaca; type from Llano Verde, Oaxaca. Guatemala to Panama.

Shrub, 1 to 1.5 meters high; leaves short-petiolate, oval-elliptic to lanceolate, 5 to 12 cm. long, acute or long-acuminate, obtuse to long-acuminate at base, glabrate above; panicles 10 to 15 cm. long; corolla white-tomentose.

- 16. *Rondeletia deamii*** (Donn. Smith) Standl. N. Amer. Fl. **32**: 60. 1918.

Bouvardia deamii Donn. Smith, Bot. Gaz. **49**: 455. 1910.

Oaxaca. Guatemala; type from Fiscal.

Shrub; leaves nearly sessile, ovate-orbicular to ovate, 2.5 to 6.5 cm. long, abruptly acuminate, rounded to acute at base, minutely pilose beneath; flowers mostly in 3-flowered cymes; corolla tube 7 to 12 mm. long.

- 17. *Rondeletia galeottii*** Standl. N. Amer. Fl. **32**: 59. 1918.

Type from somewhere in southern Mexico.

Glabrous shrub; leaves short-petiolate, oval-obovate or oblong-obovate, 8 to 17 cm. long, acuminate, acute at base; inflorescence cymose-corymbose, 4 to 8 cm. broad.

- 18. *Rondeletia jurgenseni*** Hemsl. Diag. Pl. Mex. 29. 1879.

Type from Sierra San Pedro Nolasco, Oaxaca.

Glabrous shrub; leaves short-petiolate, ovate-lanceolate, 5 to 7.5 cm. long, acuminate, cuneate at base; inflorescence cymose, 3.5 to 5 cm. broad.

- 19. *Rondeletia rekoi*** Standl. Proc. Biol. Soc. Washington **8**: 126. 1918.

Type from Hacienda Las Pilas, Cerro Espino, Oaxaca, altitude 400 meters.

Leaves petiolate, ovate or elliptic-ovate, 8.5 to 19 cm. long, acute, rounded and short-decurrent at base, green above and scabrous, white-tomentose beneath; corolla tube 5.5 to 7 mm. long.

- 20. *Rondeletia leptodictya*** Robinson, Proc. Amer. Acad. **45**: 402. 1910.

Type from banks of the Río Petatlán, near the boundary between Michoacán and Guerrero, altitude 500 meters.

Shrub, 2 meters high; leaves petiolate, broadly obovate to elliptic-oblong, 4 to 11 cm. long, abruptly acute or attenuate, acute or obtuse at base, white-tomentose beneath when young but glabrate in age; corolla red, the tube 12 to 14 mm. long.

- 21. *Rondeletia leucophylla*** H. B. K. Nov. Gen. & Sp. **3**: 395. 1819.

Rondeletia elongata Bartl.; DC. Prodr. **4**: 409. 1830.

Bouvardia discolor Hook. & Arn. Bot. Beechey Voy. 428. 1840.

Rondeletia dubia Hemsl. Diag. Pl. Mex. 28. 1879.

Rondeletia leucophylla calycosa Greenm. Proc. Amer. Acad. **39**: 92. 1903.

Sinaloa to Oaxaca; type collected between Alto del Peregrino and Río Papagallo, Guerrero.

Shrub, 1 to 3 meters high; leaves petiolate, ovate to narrowly lanceolate, 4 to 14 cm. long, acute, acute to rounded at base, white-tomentose beneath; flowers fragrant; corolla red. "Hierba de la muchachita" (Oaxaca); "huele de noche" (Sinaloa).

- 22. *Rondeletia nitida*** Hemsl. Diag. Pl. Mex. 39. 1879.

Chiapas.

Leaves short-petiolate, narrowly lanceolate or lance-elliptic, 5 to 10 cm. long, long-acuminate at each end, white-tomentose beneath; panicles few-flowered; corolla pink.

DOUBTFUL SPECIES.

RONDELETIA SPINOSA Schum. Bull. Herb. Boiss **3**: 620. 1895. Type from Hidalgo. Probably not of this genus.

- 5. *DEPPEA*** Schlecht. & Cham. Linnaea **5**: 167. 1830.

REFERENCE: Standley, N. Amer. Fl. **32**: 88-90. 1921.

Slender shrubs; leaves thin, petiolate; flowers small, yellow, in terminal or axillary cymes or umbels, sometimes solitary, pedicellate; calyx 4-lobate; corolla rotate or short-funnelform, the lobes contorted; fruit a small capsule, turbinate or obovoid, costate, 2-celled, loculicidal; seeds numerous, not winged.

Inflorescences 1 or 2-flowered.

Leaves 1 cm. long or less; calyx lobes obtuse.....1. *D. microphylla*.

Leaves 2.5 to 4.5 cm. long; calyx lobes acute.....2. *D. purpusii*.

Inflorescences few or many-flowered.

Inflorescence umbellate or subumbellate.

Capsule 2 mm. long, about as broad as long.....3. *D. umbellata*.

Capsule 3 to 4 mm. long, much longer than broad.....4. *D. excelsa*.

Inflorescence cymose-corymbose.

Corolla 2.5 mm. long.....5. *D. erythrorhiza*.

Corolla 4 to 10 mm. long.

Capsule oval, obscurely costate, puberulent; corolla 5 mm. long or less.

6. *D. pubescens*.

Capsule turbinate, conspicuously costate, glabrous; corolla 6 to 10 mm. long.

Buds and corolla lobes very acute or acuminate.....7. *D. cornifolia*.

Buds and corolla lobes obtuse or rounded.

Leaves 1.5 to 3.5 cm. long; lobes of the calyx about equaling the tube.....8. *D. obtusiflora*.

Leaves 5 to 15 cm. long; lobes of the calyx shorter than the tube.

9. *D. grandiflora*.

1. *Deppea microphylla* Greenm. Proc. Amer. Acad. 41: 249. 1905.

Type from Trinidad Iron Works, Hidalgo, altitude 1,710 meters.

Shrub; leaves petiolate, rhombic-ovate or oval-elliptic, 4 to 10 mm. long, obtuse, sparsely puberulent or glabrate beneath; corolla 5 mm. long, the lobes obtuse; capsule 3 mm. long.

2. *Deppea purpusii* Standl. N. Amer. Fl. 32: 88. 1921.

Type collected in the Sierra Madre between Misantla and Naolinco, Veracruz.

Shrub; leaves petiolate, ovate or oblong-ovate, acute, puberulent or villosulous beneath; capsule 3 to 4 mm. long, villosulous at first.

3. *Deppea umbellata* Hemsl. Diag. Pl. Mex. 31. 1879.

Veracruz; type from Orizaba.

Shrub; leaves long-petiolate, ovate or lance-ovate, 4 to 11.5 cm. long, acuminate, sparsely puberulent or glabrate beneath; corolla 2 to 3 mm. long.

4. *Deppea excelsa* (H. B. K.) Standl. N. Amer. Fl. 32: 89. 1921.

Psychotria excelsa H. B. K. Nov. Gen. & Sp. 3: 355. 1819.

Deppea tenuiflora Benth. Pl. Hartw. 349. 1857.

Veracruz and Chiapas; type from Jalapa, Veracruz.

Shrub; leaves petiolate, ovate to lance-oblong, 4 to 7.5 cm. long, acuminate, puberulent or sparsely pilose beneath, finally glabrate; corolla lobes obtuse.

5. *Deppea erythrorhiza* Schlecht. & Cham. Linnaea 5: 168. 1830.

Deppea hedyotideia DC. Prodr. 4: 618. 1830.

Veracruz and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Slender shrub with pink wood; leaves long-petiolate, elliptic or ovate, 4 to 7 cm. long, acute or short-acuminate, glabrous or puberulent; capsule 2.5 to 3 mm. long.

6. *Deppea pubescens* Hemsl. Diag. Pl. Mex. 31. 1879.

Type from Santa Gertrudis.

Leaves long-petiolate, ovate or lance-oblong, 3.5 to 7.5 cm. long, acute or acuminate, villosulous or tomentose beneath; capsule 3 mm. long.

7. *Deppea cornifolia* Benth. Pl. Hartw. 349. 1857.

Rondeletia cornifolia Benth. Pl. Hartw. 39. 1840.

Michoacán and Mexico to Oaxaca; type from Morelia, Michoacán.

Shrub, about 1 meter high; leaves short-petiolate, ovate or lance-ovate, 1.5 to 4.5 cm. long, acute or acuminate, sparsely puberulent or glabrate beneath; corolla 8 to 11 mm. long; capsule 3.5 mm. long.

8. *Deppea obtusiflora* Benth. Pl. Hartw. 349. 1857.

Choristes obtusiflora Benth. Pl. Hartw. 63. 1840.

Oaxaca; type from Llano Verde.

Leaves short-petiolate, elliptic or elliptic-ovate, obtuse, acute at base, villosulous beneath along the nerves; corolla 8 to 9 mm. long.

9. *Deppea grandiflora* Schlecht. Linnaea 19: 748. 1847.

Deppea floribunda Hemsl. Diag. Pl. Mex. 31. 1879.

Veracruz, Oaxaca, and Chiapas. Costa Rica and Panama.

Shrub, 1 to 2.5 meters high; leaves slender-petiolate, oblanceolate to obovate or obovate-ovate, acuminate, puberulent or villosulous beneath; corolla 6 to 8 mm. long; capsule 3 to 5 mm. long.

6. *OMILTEMIA* Standl. Journ. Washington Acad. Sci. 8: 427. 1918.

A single species is known.

1. *Omiltemia longipes* Standl. Journ. Washington Acad. Sci. 8: 427. 1918.

Type from Omilteme, Guerrero.

Shrub, about 3 meters high; leaves mostly ternate, short-petiolate, oblanceolate or oblanceolate-oblong, 3 to 7 cm. long, acute to long-attenuate, villosulous beneath along the nerves or glabrate; flowers red, axillary, solitary, long-pedicellate; calyx 4-lobate; corolla tubular, 4 cm. long, glabrous, the 4 lobes short, acuminate, contorted; capsule 2-celled, 14 mm. long, cylindric, the seeds numerous, angulate.

7. *LINDENIA* Benth. Pl. Hartw. 84. 1841.

A single species is known.

1. *Lindenia rivalis* Benth. Pl. Hartw. 84. 1841.

Lindenia acutiflora Hook. Icon. Pl. pl. 475. 1842.

Along streams, Michoacán to Veracruz, Tabasco, and Oaxaca. Guatemala to Panama; type from Alta Verapaz, Guatemala.

Shrub, 1 meter high or less; leaves crowded at the ends of the branches, short-petiolate, oblanceolate to linear-oblong, 3.5 to 16.5 cm. long, acute or attenuate, puberulent or pilosulous beneath, rarely glabrous; flowers short-pedicellate, in few-flowered terminal cymes; calyx tube elongate, 5-angulate, the limb 4-lobate; corolla white, salverform, the tube 10 to 16 cm. long, pilosulous, the lobes elliptic or oblong-oval, 2.5 to 3 cm. long, acute or obtuse; capsule 2-celled, pyriform, 1.2 to 2 cm. long; seeds numerous, small, angulate. "Pimienta de agua" (Oaxaca, Reko); "flor de María" (Guatemala); "lirio" (Costa Rica).

8. *STYLOSIPHONIA* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 70. 1914.

A single species is known.

1. *Stylosiphonia glabra* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 70. 1914.

Type from Chiapas.

Shrub; leaves slender-petiolate, lanceolate, oblong-lanceolate, or oblanceolate, 6.5 to 14 cm. long, abruptly long-acuminate, acute or attenuate at base, sparsely short-pilose beneath along the nerves or glabrate; inflorescences axillary and terminal, cymose, few-flowered, pedunculate; calyx 5-lobate, the lobes narrow, glabrous; corolla salverform, glabrous, the tube slender, 18 mm. long, the 5 lobes lance-linear, contorted, more than half as long as the tube; capsule ovoid, 2-celled, 9 mm. long, the seeds numerous, angulate.

9. EXANDRA Standl. Journ. Washington Acad. Sci. **13**: 292. 1923.

The genus consists of a single species.

1. Exandra rhodoclada Standl. Journ. Washington Acad. Sci. **13**: 292. 1923.

Type collected between La Venta and Niltépec, Oaxaca. Also in El Salvador.

Large shrub or tree; leaves slender-petiolate, rounded-ovate or rounded-oval, 20 to 30 cm. long, 16 to 25 cm. wide, short-acute or acuminate, cordate at base, minutely puberulent beneath upon the nerves; flowers in terminal paniced cymes, mostly sessile; corolla broadly funnelform, 4 to 5 mm. long; filaments long-exserted. "Brasil," "limpia-dientes" (El Salvador).

The exact position of the genus within the family is somewhat doubtful because of the lack of mature fruit. The wood turns red upon exposure to the air.

10. ALSEIS Schott; Spreng. Syst. Veg. **4**: Cur. Post. 404. 1827.

Trees or shrubs; leaves petiolate; flowers small, white or yellow, spicate, the spikes simple or branched, axillary and terminal; calyx tube obconic, the limb 5-lobate, the lobes deciduous; corolla cylindric, short, pilose within, the limb 5-lobate, the lobes valvate; capsule oblong-turbinate, 2-celled, septicidally bivalvate; seeds linear-fusiform, appendaged at each end.

The writer has seen a single specimen of this genus, collected at Buena Vista Xbac, Yucatán, where the plant is said to be known as "cacaoché." The material consists only of leafless fruiting branches and consequently can not be determined specifically. It may represent an undescribed species or it may be *Alseis blackiana* Hemsl.¹, which occurs in Panama and Colombia.

11. BOUVARDIA Salisb. Parad. Lond. *pl.* 88. 1808.

REFERENCE: Standley, N. Amer. Fl. **32**: 100-111. 1921.

Shrubs or herbs; leaves opposite or verticillate, usually short-petiolate; flowers commonly large, white, red, or yellow, cymose or cymose-corymbose, rarely solitary; calyx limb 4-lobate; corolla tubular or salverform, the limb 4-lobate; capsule didymous-globose, 2-celled, loculicidally bivalvate; seeds numerous, compressed, winged.

Nearly all the species are shrubby or suffrutescent, and for convenience there are included the few Mexican species which are, so far as known, always herbaceous.

Leaves all or mostly in verticels of 3 to 5. Corolla red.

Corolla glabrous outside.

Corolla lobes erect or ascending, 2 to 5 mm. long.

Upper leaves sessile or nearly so, short-villous or tomentulose beneath; corolla lobes 2 to 3 mm. long-----**1. B. leiantha.**

Upper leaves petiolate, puberulent, scaberulous, or glabrate beneath; corolla lobes 3 to 5 mm. long-----**2. B. bouvardioides.**

Corolla lobes widely spreading, 5 to 8 mm. long.

Stems and leaves villosulous or tomentulose with slender whitish hairs; calyx lobes 2.5 to 4.5 mm. long-----**3. B. viminalis.**

Stems and lower surface of the leaves villous with very coarse yellowish hairs; calyx lobes 8 to 12 mm. long-----**4. B. scabra.**

Corolla pubescent outside.

Leaves obovate, often 5-verticillate-----**5. B. obovata.**

Leaves not obovate, 3 or 4-verticillate.

Corolla tube glabrous within or sparsely villous, the hairs not collected in a dense ring-----**6. B. glaberrima.**

Corolla tube with a densely villous ring within near the base.

Leaves densely whitish-tomentose beneath-----**7. B. scabrida.**

¹ Diag. Pl. Mex. 30. 1879.

Leaves not tomentose beneath.

Leaves elongate-linear, 3 to 9 cm. long and 0.6 to 3.5 mm. wide, often glabrous.....8. **B. tenuifolia.**

Leaves not elongate-linear, if very narrow the blades usually less than 3 cm. long, usually lanceolate to ovate...9. **B. ternifolia.**

Leaves opposite.

Corolla lobes usually 3 to 5 mm. long, of an ovate or triangular-oblong type, mostly erect or ascending; corolla yellow, red, white, or greenish white, the tube 1 to 3.3 cm. long.

Inflorescences usually 3 or 5-flowered, simply cymose, sometimes 1-flowered; leaves pinnately nerved.

Corolla red or yellow.

Corolla lobes villous outside with coarse hairs; leaves mostly rounded-ovate and cordate or subcordate at base.....10. **B. subcordata.**

Corolla lobes glabrous outside; leaves not cordate at base.

Corolla tube glabrous within; leaves 2 to 3.5 mm. wide.

11. **B. macilenta.**

Corolla tube more or less villous within; leaves 5 mm. wide or wider.

Calyx tube densely puberulent or short-hirtellous, the lobes 2 to 4.5 mm. long; inflorescences mostly 3-flowered...12. **B. versicolor.**

Calyx tube glabrous or very sparsely villous or puberulent, the lobes 4 to 11 mm. long; inflorescences mostly with 5 or more flowers.

Corolla 1.3 to 1.5 cm. long.....13. **B. conzattii.**

Corolla 2.5 to 4 cm. long.

Pedicels 3 mm. long or shorter; leaves pale beneath, the lateral nerves mostly obsolete.....14. **B. chrysantha.**

Pedicels 6 to 28 mm. long; leaves subconcolorous, the lateral nerves evident.....15. **B. laevis.**

Corolla white or greenish white.

Corolla densely villous outside.....16. **B. villosa.**

Corolla glabrous outside.

Corolla tube 2.4 to 3.3 cm. long.....17. **B. macrantha.**

Corolla tube 1 to 2 cm. long.

Leaves, at least part of them, suborbicular, abruptly long or short-acuminate; pedicels 2 to 8 mm. long; corolla tube 1.8 to 2 cm. long.....18. **B. heterophylla.**

Leaves mostly ovate or lanceolate, not abruptly acuminate; pedicels 3 mm. long or shorter; corolla tube 1 to 1.5 cm. long.....19. **B. multiflora.**

Inflorescences many-flowered, compound; corolla tube usually 6 to 11 mm. long; leaves sometimes palmately nerved.

Leaves 3 or 5-nerved from the base.

Corolla hirtellous.....20. **B. quinquenervata.**

Corolla glabrous.

Calyx hirtellous.....21. **B. oaxacana.**

Calyx glabrous.....22. **B. rekoii.**

Leaves pinnately nerved; corolla (so far as known) glabrous.

Leaves puberulent beneath along the veins; calyx lobes 1 to 1.5 mm. long.....23. **B. gracilipes.**

Leaves glabrous; calyx lobes 2.5 to 3.5 mm. long...24. **B. dictyoneura.**

Corolla lobes mostly 7 to 25 mm. long, of an oblong or elliptic type, spreading, narrowed at base; corolla white, the tube often 4 cm. long or longer.

Leaves sessile, broadly ovate; calyx tube prolonged beyond the ovary.

25. **B. rosei.**

Leaves petiolate; calyx tube not prolonged beyond the ovary.

Corolla more or less villous outside.

Corolla densely villous outside.....26. **B. induta**.

Corolla villous only on the upper part of the tube....27. **B. langlassei**.

Corolla glabrous outside or pruinose-puberulent.

Leaves linear or lanceolate, 1.5 to 4 mm. wide; corolla pruinose-puberulent.....28. **B. erecta**.

Leaves mostly ovate or broadly ovate, more than 5 mm. wide; corolla glabrous.

Corolla tube 3 to 3.5 cm. long.....29. **B. latifolia**.

Corolla tube 4 to 8.5 cm. long.....30. **B. longiflora**.

1. Bouvardia leiantha Benth. Pl. Hartw. 85. 1841.

Chiapas. Guatemala to Costa Rica; type collected near Tejar and Chimaltenango, Guatemala.

Shrub; leaves nearly sessile, broadly ovate to ovate-oblong, 3 to 7 cm. long, acute or acuminate, short-villous or whitish-tomentose beneath; corolla deep red, the tube 12 to 16 mm. long.

2. Bouvardia bouvardioides (Seem.) Standl. N. Amer. Fl. 32: 102. 1921.

Hedyotis bouvardioides Seem. Bot. Voy. Herald 296. pl. 64. 1856.

Houstonia bouvardioides Benth. & Hook. Gen. Pl. 2: 60. 1873.

Mountains of Sinaloa, Durango, and Jalisco; type from the Sierra Madre.

Slender shrub, clambering to a height of 3 to 4.5 meters; leaves short-petiolate, ovate to lanceolate, 6 to 10 cm. long, long-acuminate; inflorescence many-flowered, 6 to 10 cm. broad; corolla red, the tube 10 to 15 mm. long. "Siguapatl" (Sinaloa).

3. Bouvardia viminalis Schlecht. Linnaea 26: 120. 1853.

Puebla and Oaxaca.

Shrub, 1 meter high or less; leaves subsessile, broadly ovate to lance-oblong, 3 to 5.5 cm. long, acuminate; inflorescence dense, many-flowered; corolla red, the tube 15 to 17 mm. long.

4. Bouvardia scabra Hook. & Arn. Bot. Beechey Voy. 427. 1841.

Tepic and Jalisco; type from Tepic.

Plants chiefly or wholly herbaceous, 60 cm. high or less; leaves short-petiolate or sessile, elliptic-oval to ovate, 3.5 to 7.5 cm. long, rounded to acute at apex; inflorescence dense, 5 to 14 cm. broad; corolla red, the tube 17 to 21 mm. long. "Doncellita" (*Loesener*).

5. Bouvardia obovata H. B. K. Nov. Gen. & Sp. 3: 385. 1818.

Morelos and Mexico; type collected between Chapultepec and Texcoco, Mexico.

Plants herbaceous, 1 meter high or less, glabrous or nearly so; leaves short-petiolate, 5.5 to 12.5 cm. long, obtuse or acute; inflorescence many-flowered, dense; corolla red, the tube 25 to 33 mm. long.

6. Bouvardia glaberrima Engelm. in Wisliz. Mem. North. Mex. 106. 1849.

Bouvardia ovata A. Gray, Pl. Wright. 2: 67. 1853.

Sonora, Chihuahua, and Durango; type from Cosihuiriachic, Chihuahua. Southern Arizona and New Mexico.

Shrub, 1 meter high or less, or often chiefly herbaceous; leaves short-petiolate, ovate or lanceolate, 2.5 to 10 cm. long, acute or acuminate, scaberulous or glabrous; cymes usually few-flowered; corolla red, the tube 20 to 32 mm. long.

7. Bouvardia scabrida Mart. & Gal. Bull. Acad. Brux. 11¹: 237. 1844.

Bouvardia hypoleuca Benth. Pl. Hartw. 288. 1848.

Jalisco to San Luis Potosí, Veracruz, and Oaxaca; type from ravine of Yavezia, Oaxaca.

Shrub, 60 cm. high or less, or sometimes herbaceous; leaves nearly sessile, lanceolate to linear, 1.5 to 6.5 cm. long, scabrous above; cymes usually few-flowered; corolla red, the tube 14 to 20 mm. long.

8. *Bouvardia tenuifolia* Standl. N. Amer. Fl. 32: 104. 1921.

Bouvardia endlichii Loesener, Repert. Sp. Nov. Fedde 18: 357. 1922.

Sinaloa to Jalisco; type from Guadalajara, Jalisco.

Stems usually simple and herbaceous, glabrous or rarely hirtellous; leaves subsessile, usually glabrous; cymes few or many-flowered; corolla red, the tube 20 to 25 mm. long. "Trompetilla" (Durango).

9. *Bouvardia ternifolia* (Cav.) Schlecht. Linnaea 26: 98. 1853.

Ixora ternifolia Cav. Icon Pl. 4: 3. pl. 305. 1797.

Ixora americana Jacq. Pl. Hort. Schönbr. 3: 4. pl. 257. 1798.

Houstonia coccinea Andr. Bot. Repos. pl. 106. 1800.

Bouvardia triphylla Salisb. Parad. Lond. pl. 88. 1808.

Bouvardia linearis H. B. K. Nov. Gen. & Sp. 3: 383. 1818.

Bouvardia angustifolia H. B. K. Nov. Gen. & Sp. 3: 384. 1818.

Bouvardia hirtella H. B. K. Nov. Gen. & Sp. 3: 384. 1818.

Bouvardia jacquini H. B. K. Nov. Gen. & Sp. 3: 385. 1818.

Bouvardia quaternifolia DC. Prodr. 4: 365. 1830.

Bouvardia splendens Graham in Curtis's Bot. Mag. pl. 3781. 1840.

Bouvardia toluca Hook. & Arn. Bot. Beechey Voy. 427. 1841.

Bouvardia tenuiflora Schlecht. Linnaea 26: 97. 1853.

Bouvardia microphylla Schlecht. Linnaea 26: 112. 1853.

Bouvardia viperalis Schlecht. Linnaea 26: 114. 1853.

Bouvardia houtteana Schlecht.; Planch. Fl. Serr. Jard. 10: 149. 1855.

Hedyotis mexicana Sessé & Moc. Pl. Nov. Hisp. 15. 1887.

Hedyotis fruticosa Sessé & Moc. Fl. Mex. 22. 1893.

Sonora to Coahuila, Veracruz, and Oaxaca. Western Texas.

Shrub, 1 meter high or less, or sometimes herbaceous; leaves sessile or short-petiolate, acute to long-attenuate, hirtellous, scabrous, or glabrate; cymes usually few-flowered; corolla red, the tube 15 to 32 mm. long. "Trompetilla" (Hidalgo, Mexico, Veracruz, Oaxaca); "tlacoxochitl," "tlacosuchil" (Nahuatl; "trumpet-flower"); "mirto" (Coahuila, Durango); "mirto del campo" (Durango); "hierba del pasmo" (Sinaloa); "contrayerba" (Mexico); "doncellita" (Oaxaca, Reko); "hierba del indio" (Sinaloa).

A handsome plant and, like some of the other species, often cultivated. It is employed locally as a remedy for dysentery and hydrophobia and other affections.

Dr. Reko states that the ancient Mexicans were accustomed to begin the treatment of a disease by bleeding, which was induced by provoking hemorrhage from the nose with powder of "cebadilla" (*Stenanthium frigidum*); and to restrain excessive hemorrhage they used the powdered roots of the tlacoxochitl.

The plant is described and figured by Hernández.¹ It is probably also the one mentioned by Sahagún under the name tlacoxochitl. The latter author says: "The flavor of the roots is both bitter and sweetish. They are good for heat and exhaustion of the heart. Ground with about 15 grains of maize and as much cacao, and mixed with water, they should be taken several times on an empty stomach or after meals."

10. *Bouvardia subcordata* Standl. N. Amer. Fl. 32: 105. 1921.

Type collected between Rosario and Colomas, Sinaloa.

Shrub; leaves nearly sessile, broadly ovate or rounded-ovate, 2.5 to 4 cm. long, acute or obtuse, villous beneath; corolla red (?), sparsely villous, the tube 3 cm. long.

¹Thesaurus 231. 1651.

11. **Bouvardia macilenta** Blake, Contr. Gray Herb. n. ser. 53: 65. 1918.

Type from Cerro El Zopilote, Miahuatlán, Oaxaca, altitude 2,100 meters.

Leaves subsessile, lanceolate or ovate-lanceolate, 8 to 11 mm. long, glabrous beneath except at base of costa; corolla red, 2 cm. long, glabrous throughout.

12. **Bouvardia versicolor** Ker in Lindl. Bot. Reg. 3: pl. 245. 1817.

Bouvardia bicolor Kunze, Linnaea 20: 24. 1847.

Guanajuato and Michoacán to Oaxaca; described from cultivated plants.

Shrub, 1 to 2.5 meters high; leaves short-petiolate, mostly ovate, 2 to 8 cm long, acute or acuminate, obtuse or rounded at base, scaberulous or hirsutulous; corolla red or yellow, glabrous outside, the tube 22 to 34 mm. long.

13. **Bouvardia konzattii** Greenm. Proc. Amer. Acad. 39: 92. 1903.

Michoacán to Oaxaca; type from Oaxaca.

Shrub; leaves subsessile, ovate or ovate-lanceolate, 1.5 to 4 cm. long, acute or attenuate, puberulent beneath along the nerves; corolla red or yellowish red, glabrous outside.

14. **Bouvardia chrysantha** Mart. Del. Sem. Hort. Monac. 4. 1848.

?*Bouvardia quinqueflora* Dehnh.; Schlecht. Linnaea 26: 92. 1853.

Bouvardia myrtifolia Schlecht. Linnaea 26: 121. 1853.

Jalisco and Colima to Morelos; type from Santiaguillo, Mexico.

Shrub, 1 meter high or less; leaves sessile or subsessile, lance-oblong to broadly ovate, 1 to 4 cm. long, acute or obtuse, glabrous or sparsely villosulous beneath; corolla yellow, glabrous outside, the tube 2.5 cm. long.

15. **Bouvardia laevis** Mart. & Gal. Bull. Acad. Brux. 11¹: 236. 1844.

Bouvardia flava Decaisne, Fl. Serr. Jard. 1: 215. 1845.

Bouvardia mollis Linden; Schlecht. Linnaea 26: 55. 1853.

Mountains of Hidalgo and Veracruz; type collected near Zacuapan, Veracruz, altitude 900 meters.

Shrub, about 1 meter high; leaves short-petiolate, ovate or lance-ovate, 4 to 10.5 cm. long, acute or long-acuminate, glabrous or nearly so; corolla red or yellow, glabrous outside, the tube 25 to 32 mm. long.

16. **Bouvardia villosa** Standl. N. Amer. Fl. 32: 107. 1921.

Type from Alturas de Matatlán, Oaxaca, altitude 1,800 meters.

Shrub; leaves short-petiolate, oval to elliptic-oblong, 2 to 2.5 cm. long, obtuse or short-acuminate, whitish-villous beneath; corolla tube 17 to 20 mm. long.

17. **Bouvardia macrantha** Standl. N. Amer. Fl. 32: 107. 1921.

Jalisco to Puebla and Oaxaca; type from Tlacuilotepec, Puebla, altitude 2,100 meters.

Erect shrub; leaves short-petiolate, ovate or broadly ovate, 1 to 3 cm. long, obtuse to acuminate, rounded to acutish at base, sparsely scaberulous or villosulous beneath.

18. **Bouvardia heterophylla** Standl. N. Amer. Fl. 32: 107. 1921.

Jalisco. Guatemala; type from Santa Rosa.

Shrub; leaves short-petiolate, 2 to 4 cm. long, acuminate, obtuse to truncate at base, glabrous above, glabrous beneath, or sparsely puberulent along the nerves.

19. **Bouvardia multiflora** (Cav.) Schult. in Roem. & Schult. Syst. Veg. 3: 118. 1818.

Aeginetia multiflora Cav. Anal. Hist. Nat. (Madrid) 3: 130. 1801.

Bouvardia triflora H. B. K. Nov. Gen. & Sp. 3: 386. 1818.

Bouvardia cavanillesii DC. Prodr. 4: 366. 1830.

Anotis longiflora Benth. Pl. Hartw. 23. 1839.

?*Bouvardia schiedeana* Schlecht. Linnaea 26: 123. 1853.

Houstonia triflora A. Gray, Proc. Amer. Acad. 4: 314. 1860.

Bouvardia gracilis A. Gray, Proc. Amer. Acad. 22: 306. 1887.

Bouvardia versicolor graciliflora A. Gray in S. Wats. Proc. Amer. Acad. 22: 416. 1887.

Chihuahua to Jalisco, Guerrero, and Puebla.

Shrub, 1 to 1.5 meters high; leaves petiolate, 1.5 to 5 cm. long, obtuse or acute at base, finely puberulent or scaberulous; capsule 4 to 6 mm. broad.

20. *Bouvardia quinquenervata* Standl. N. Amer. Fl. 32: 108. 1921.

Chiapas; type from San Bartolomé.

Shrub; leaves short-petiolate, rounded-deltoid to ovate or lanceolate, 3.5 to 5.5 cm. long, acute or acuminate, obscurely puberulent along the nerves; corolla tube 6 to 8 mm. long.

21. *Bouvardia oaxacana* Standl. Journ. Washington Acad. Sci. 13: 7. 1923.

Type collected between Santa Cruz and El Aguacate, Distrito de Juquilla, Oaxaca.

Leaves short-petiolate, ovate or broadly ovate, 4 to 6 cm. long, acuminate, broadly rounded at base, sparsely puberulent or glabrate, conspicuously 5-nerved; corolla red, the tube about 17 mm. long, the oblong lobes 5 mm. long.

22. *Bouvardia rekoii* Standl. N. Amer. Fl. 32: 108. 1921.

Type from Cafetal Montecristo, Cerro Espino, Oaxaca, altitude 1,000 meters.

Slender shrub; leaves subsessile, lanceolate or ovate, 3 to 6.5 cm. long, acuminate, glabrous; corolla tube 14 mm. long.

23. *Bouvardia gracilipes* Robinson, Proc. Amer. Acad. 45: 404. 1910.

Type from Tepic.

Slender shrub; leaves short-petiolate, ovate or lance-oblong, 3.5 to 6.5 cm. long, acuminate, rounded at base; capsule 4 to 6 mm. broad.

24. *Bouvardia dictyoneura* Standl. N. Amer. Fl. 32: 109. 1921.

Chiapas; type from Chicharras.

Slender shrub; leaves sessile or subsessile, lanceolate or lance-ovate, 3 to 9 cm. long, long-acuminate, rounded at base; corolla tube 11 mm. long.

25. *Bouvardia rosei* Standl. N. Amer. Fl. 32: 109. 1921.

Type from the Sierra Madre of Durango.

Shrub; leaves 2 to 3.5 cm. long, obtuse to short-acuminate, glabrous beneath; cymes mostly 3 or 5-flowered; corolla white, glabrous, the tube 4.5 to 6 cm. long.

26. *Bouvardia induta* (Robinson) Standl. N. Amer. Fl. 32: 109. 1921.

Bouvardia longiflora induta Robinson, Proc. Amer. Acad. 45: 404. 1910.

Chiapas.

Shrub, about 40 cm. high; leaves ovate or lance-ovate, 2 to 3 cm. long, acute or acuminate, villous-tomentose beneath; cymes mostly 3-flowered; corolla tube 4 to 5 cm. long.

27. *Bouvardia langlassei* Standl. N. Amer. Fl. 32: 110. 1921.

Guerrero and Puebla; type from Testla (Guerrero ?), altitude 1,500 meters.

Shrub, about 1 meter high; leaves ovate or lanceolate, 2 to 4 cm. long, obtuse to acuminate, hirtellous or villosulous beneath; flowers terminal, solitary; corolla white, the tube 4.5 to 5.5 cm. long.

28. *Bouvardia erecta* (DC.) Standl. N. Amer. Fl. 32: 110. 1921.

Catesbaea erecta DC. Prodr. 4: 401. 1830.

Hedyotis spinescens Sessé & Moc. Fl. Mex. 22. 1893.

Bouvardia flos-johannis Schum. Bull. Herb. Boiss. 3: 621. 1895.

Bouvardia flos-johannis latifolia Loesener, Repert, Sp. Nov. Fedde. 18: 358. 1922.

Puebla; type from Tehuacán.

Low shrub with stout spreading branches; leaves 5 to 16 mm. long, acute, scaberulous or glabrate; cymes mostly 3-flowered; corolla white, the tube 2 to 5.5 cm. long. "Hierba de San Juan."

29. *Bouvardia latifolia* Standl. N. Amer. Fl. **32**: 111. 1921.

Type from Monte de la Piedra, near Aguila, Guerrero, altitude 450 meters.

Shrub, 1.5 meters high; leaves broadly ovate, 2.5 to 4 cm. long, acute or acutish, finely puberulent beneath along the nerves or glabrous; corolla white.

30. *Bouvardia longiflora* (Cav.) H. B. K. Nov. Gen. & Sp. **3**: 386. 1820.

Aeginetia longiflora Cav. Anal. Hist. Nat. (Madrid) **3**: 130. 1801.

Houstonia longiflora A. Gray, Proc. Amer. Acad. **4**: 314. 1860.

Bouvardia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 415. 1924.

San Luis Potosí to Michoacán and Oaxaca; type material from Querétaro and Guanajuato.

Shrub, 1 to 1.5 meters high; leaves ovate or lanceolate, 2 to 4.5 cm. long, acute or acuminate, glabrous; flowers solitary, terminal and axillary; corolla white; capsule 8 mm. in diameter. "Flor de San Juan" (Querétaro, Hidalgo, Oaxaca); "rosa de San Juan" (Mexico).

The flowers are very fragrant. They are used for scenting ointments and similar preparations.

DOUBTFUL SPECIES.

BOUVARDIA CORDIFOLIA DC. Prodr. **4**: 366. 1830. Type from somewhere in Mexico.

BOUVARDIA ROSEA Schlecht. Linnaea **26**: 116. 1853. Type from San José de Oro.

BOUVARDIA XYLOSTEOIDES Hook. & Arn. Bot. Beechey Voy. **428**. 1841. Type from Oaxaca. Probably not of this genus.

12. CALYCOPHYLLUM DC. Prodr. **4**: 367. 1830.

1. *Calycophyllum candidissimum* (Vahl) DC. Prodr. **4**: 367. 1830.

Macrocnemum candidissimum Vahl, Symb. Bot. **2**: 38. 1791.

Guerrero to Chiapas and Campeche. Guatemala to Colombia; Cuba; type from Santa Marta, Colombia.

Tree, 5 to 20 meters high, the trunk sometimes 60 cm. in diameter; bark reddish gray, scaly or furrowed; leaves petiolate, rounded-oval to ovate, 4 to 13 cm. long, abruptly acuminate, acute or obtuse at base, glabrous or nearly so; flowers in terminal corymbs; calyx cylindric, the limb truncate, or often expanded into a large white slender-petiolate blade 1 to 3.5 cm. wide; corolla white, short-funnelform, the tube 3 mm. long, the 6 to 8 lobes slightly longer; capsule oblong-cylindric, 6 to 10 mm. long; seeds numerous, winged at each end; wood hard, heavy, very strong, fine-grained, durable, taking a good polish. "Camarón," "palo camarón" (Oaxaca); "dagame" (Cuba); "salamo" (Costa Rica, Guatemala, El Salvador); "alazano," "guayabo alazano," "harino" (Panama); "madroño" (Guatemala, Honduras, Costa Rica); "solano" (Honduras).

The wood is useful for carpentry and cabinet work. It is reported to have a specific gravity of about 1.02. It is very fine-grained, and for that reason is employed in Central America for making fine-toothed combs. When in flower the tree is a very handsome one, being almost completely covered with the showy white bracts, which persist for a long time.

13. EXOSTEMA L. Rich.; Humb. & Bonpl. Pl. Aequin. **1**: 131. 1808.

REFERENCE: Standley, N. Amer. Fl. **32**: 117-126. 1921.

Shrubs or trees; flowers small or large, axillary and solitary or in terminal corymbs or panicles; calyx tube cylindric or obovoid, the limb 5-lobate; corolla tube usually long and slender, the limb 5-lobate; capsule 2-celled, septicidally bivalvate; seeds numerous, winged.

Stamens included; corolla lobes short, rounded.....1. *E. coulteri*.

Stamens exserted; corolla lobes linear or oblong.

Flowers solitary in the leaf axils; corolla tube 3 to 5 cm. long...2. *E. caribaeum*.

Flowers in terminal many-flowered cymes; corolla tube 6 to 10 mm. long.

Corolla tube 8 to 10 mm. long; calyx sparsely puberulent.

3. *E. mexicanum*.

Corolla tube 6 mm. long; calyx densely puberulent.....4. *E. indutum*.

1. *Exostema coulteri* Hook. f.; Hemsl. Diag. Pl. Mex. 32. 1879.

Type from Zimapán, Hidalgo.

Glabrous shrub; leaves petiolate, ovate-oblong, 5 to 6 cm. long, acuminate, cuneate at base, coriaceous; flowers in terminal few-flowered corymbose cymes; corolla 12 to 16 mm. long; capsule 4 to 6 mm. long.

2. *Exostema caribaeum* (Jacq.) Roem. & Schult. Syst. Veg. 5: 19. 1819.

Cinchona caribaea Jacq. Enum. Pl. Carib. 16. 1760.

San Luis Potosí to Colima, Guerrero, and Yucatán. Southern Florida; West Indies and Central America.

Shrub or tree, sometimes 8 meters high; leaves petiolate, ovate to elliptic-oblong, 5 to 11 cm. long, acuminate, obtuse or acute at base, barbate beneath in the axils of the nerves, elsewhere glabrous; flowers pedicellate; corolla white, the lobes linear, recurved, about as long as the tube; capsule 1 to 1.5 cm. long; wood hard, strong, close-grained, brown with yellow streaks, its specific gravity about 0.93. "Sabac-ché" (Yucatán, Maya); "falsa quina" (Ramírez); "cuero de sapo," "lechesillo" (Porto Rico); "macagua de costa," "cerillo," "cera amarilla" (Cuba).

Known in the Bahamas as "princewood." The wood is reported to be useful for cabinet work and turning, and is sometimes employed for torches. In former times the bark was much used as a febrifuge in place of Cinchona bark. It is said also to have emetic properties.

3. *Exostema mexicanum* A. Gray, Proc. Amer. Acad. 5: 180. 1861.

San Luis Potosí and Veracruz; type collected near Tantoyuca, Veracruz.

Small tree; leaves short-petiolate, ovate or oval, 4.5 to 15 cm. long, abruptly acuminate, obtuse or rounded at base; barbate beneath along the costa, elsewhere glabrous; corolla sparsely villosulous, the lobes 1 cm. long.

4. *Exostema indutum* Standl. N. Amer. Fl. 32: 126. 1921.

Type from Oaxaca.

Leaves short-petiolate, ovate or elliptic-oblong, 5.5 to 9 cm. long, abruptly acuminate, obtuse or acute at base, appressed-pilose or glabrate beneath; corolla yellow, puberulent or pilosulous, the lobes 7 to 9 mm. long.

DOUBTFUL SPECIES.

EXOSTEMA CANESCENS Bartl.; DC. Prodr. 4: 359. 1830. Type from somewhere in Mexico. Probably not of this genus.

14. *COUTAREA* Aubl. Pl. Guian. 1: 314. 1775.

REFERENCE: Standley, N. Amer. Fl. 32: 126-128. 1921.

Trees or shrubs; leaves petiolate; flowers large, terminal or axillary, solitary or cymose; calyx tube obovoid-turbinate, the limb 5 to 8-lobate; corolla funnel-form-campanulate, more or less oblique, the tube often curved and ventricose, the limb 5 to 8-lobate, the lobes short, plicate-imbricate or contorted; capsule more or less obcompressed, 2-celled, loculicidally bivalvate; seeds numerous, broadly winged.

Corolla 8-lobate, symmetric; calyx lobes usually 8. Capsule only slightly compressed; pedicels ebracteolate.....1. *C. octomera*.

Corolla 6-lobate; calyx lobes 6.

Corolla symmetric or nearly so, the tube not gibbous; capsule only slightly compressed; flowers solitary; stamens equaling or usually shorter than the corolla.

Pedicels ebracteolate; calyx lobes 6 to 10 mm. long; corolla lobes 6 to 10 mm. long, often half as long as the tube-----2. *C. latiflora*.

Pedicels bracteolate; calyx lobes 10 to 20 mm. long; corolla lobes about one-fourth as long as the tube.

Capsule 2 to 3 cm. long; corolla 6 to 8 cm. long; leaves mostly ovate or oval-----3. *C. pterosperma*.

Capsule 1.2 to 1.4 cm. long; corolla about 10 cm. long; leaves narrowly lance-oblong-----4. *C. lumaeana*.

Corolla asymmetric, the tube gibbous; capsule strongly compressed; flowers mostly in 3-flowered cymes; stamens longer than the corolla.

5. *C. hexandra*.

1. *Coutarea octomera* Hemsl. Biol. Centr. Amer. Bot. 4: 101. 1886.

Coutarea acamptoclada Robins. & Millsp. Bot. Jahrb. Engler 36: Beibl. 80: 28. 1905.

Yucatán; type from Cozumel Island.

Shrub; leaves short-petiolate, oval, rhombic-ovate, or oval-oblong, 1.5 to 5 cm. long, obtuse, cuneate or obtuse at base, glabrous or nearly so; corolla greenish yellow, 2.5 to 5 cm. long, glabrous; capsule 1.5 cm. long.

2. *Coutarea latiflora* Moc. & Sessé; DC. Prodr. 4: 350. 1830.

Southwestern Chihuahua to Guerrero, Oaxaca, and Puebla. Guatemala.

Shrub or small tree, 5 meters high or less; leaves petiolate, ovate or oval to oblong, 4 to 12 cm. long, obtuse or acuminate, rounded to acute at base, tomentose or pilose beneath or finally glabrate; flowers fragrant; corolla white, 5 to 7 cm. long, glabrous or pilose outside; capsule 2 cm. long, brown. "Quina" (Oaxaca, Guerrero); "copalchi" (Oaxaca); "falsa quina" (Michoacán, Ramírez); "campanilla" (Jalisco, Oliva); "palo amargo" (Sinaloa).

The bark is employed as a febrifuge.

3. *Coutarea pterosperma* (S. Wats.) Standl. N. Amer. Fl. 32: 127. 1921.

Portlandia pterosperma S. Wats. Proc. Amer. Acad. 24: 52. 1889.

Sonora and Chihuahua to Colima; type from Guaymas, Sonora.

Shrub or tree 1 to 15 meters high, the trunk 50 cm. or less in diameter; leaves slender-petiolate, ovate to oval or ovate-oblong, 4 to 10 cm. long, obtuse to short-acuminate, rounded to subacute at base, short-pilose or glabrous beneath, often barbate along the costa; corolla white, green when dry; capsule brown, oval, 6-costate. "Copalchi" (Colima); "palo amargo," "copalquín," "capparche" (Sinaloa).

The bark is employed for fevers, especially for malaria, and also for affections of the lungs.

4. *Coutarea lumaeana* Baill. Adansonia 12: 301. 1879.

Veracruz. Guatemala; type from mountains of western Guatemala.

Glabrous shrub; leaves short-petiolate, narrowly lance-oblong, 8 to 11.5 cm. long, acuminate, obtuse to acuminate at base; corolla white; capsule oval-globose, 6-costate.

5. *Coutarea hexandra* (Jacq.) Schum. in Mart. Fl. Bras. 6^o 196. 1889.

Portlandia hexandra Jacq. Enum. Pl. Carib. 16. 1760.

Coutarea speciosa Aubl. Pl. Guian. 1: 314. pl. 122. 1775.

Coutarea flavescens Moc. & Sessé; DC. Prodr. 4: 350. 1830.

Oaxaca and Chiapas. Central and South America; type from Cartagena, Colombia.

Shrub or small tree, sometimes 5 meters high or more; leaves petiolate, ovate or elliptic-ovate, 5 to 12 cm. long, usually cuspidate-acuminate, rounded to acute at base, glabrous or short-pilose beneath; corolla white or yellowish, tinged below with purple; capsule 2 cm. long, dark brown. "Arbol de San Silvestre" (Nicaragua): "quina," "quinita," "quina blanca," "zalas" (El Salvador).

The bark is bitter and astringent, with properties similar to those of Cinchona bark, although less active. It was formerly much employed in medicine, being known as "quiquina de Cumaná" and "quiquina de Cartagena."

15. **CEPHALANTHUS** L. Sp. Pl. 95. 1753.

REFERENCE: Standley, N. Amer. Fl. 32: 129-130. 1921.

Shrubs or small trees; leaves opposite or verticillate, short-petiolate; flowers small, white or yellow, sessile in dense globose heads; calyx 4 or 5-dentate, often glanduliferous; corolla tubular-funnelform, the limb 4 or 5-lobate, often with glands in the sinuses; fruit turbinate, 2 to 4-celled, the cells indehiscent, 1-seeded; seeds with a white aril at apex.

Calyx glabrous outside, or the tube with a few long white hairs at base.

1. **C. occidentalis.**

Calyx densely appressed-pubescent.....2. **C. salicifolius.**

1. **Cephalanthus occidentalis** L. Sp. Pl. 95. 1753.

Cephalanthus berlandieri Wernham, Journ. Bot. Brit. & For. 55: 175. 1917.

Chihuahua to Veracruz and Guerrero; reported from Tabasco. United States; Cuba; southern Asia.

Shrub or small tree, sometimes 15 meters high; leaves opposite or ternate, ovate to narrowly lanceolate, 6 to 19 cm. long, acuminate, rounded to acute at base, glabrous or pilose beneath; heads 6 to 12 mm. in diameter, long-pedunculate, axillary and terminal; corolla 5 to 9 mm. long; capsule 4 to 8 mm. long; wood light, rather hard and close-grained, pinkish brown. "Jazmín" (Michoacán, Guerrero); "uvero" (Tabasco, *Rovirosa*).

Known in the United States as "buttonbush." The bark is bitter, with tonic and laxative properties, and has been employed for periodic fevers. A poisonous principle, cephalanthin, which destroys the blood corpuscles and causes violent vomiting, convulsions, and paralysis, has been separated from it. The bark has been used also for palsy, coughs, and venereal and cutaneous diseases. The plant is said to yield a yellow dye.

2. **Cephalanthus salicifolius** Humb. & Bonpl. Pl. Aequin. 2: 63. 1809.

Cephalanthus occidentalis salicifolius A. Gray, Syn. Fl. 1²: 29. 1878.

Cephalanthus peroblongus Wernham, Journ. Bot. Brit. & For. 55: 176. 1917.

Sonora to Guerrero, Morelos, and Tamaulipas; type from Acapulco, Guerrero. Honduras.

Shrub or small tree; leaves elliptic-oblong to linear-lanceolate, 5 to 12 cm. long, rounded to attenuate at apex, acute to subcordate at base, glabrous or nearly so; heads 6 to 8 mm. long, long-pedunculate; corolla 6 to 7 mm. long; capsule 4 to 5 mm. long. "Mimbre" (Sinaloa); "botoncillo" (Honduras); "jazmín blanco" (Nayarit).

16. **DUGGENA** Vahl; West, Bidr. Beskr. St. Croix 269. 1793.

REFERENCE: Standley, N. Amer. Fl. 32: 133-137. 1921.

1. **Duggena panamensis** (Cav.) Standl. Contr. U. S. Nat. Herb. 18: 126. 1916.

Buena panamensis Cav. Anal. Hist. Nat. (Madrid) 2: 279. 1800.

Gonzalea panamensis Spreng. Syst. Veg. 1: 417. 1825.

Gonzalagunia panamensis Schum. in Mart. Fl. Bras. 6⁶: 292. 1889.

Michoacán to Oaxaca and Veracruz. Cuba; Central America and Colombia; type from Ancón Hill, Panama.

Slender shrub, 3 meters high or less; leaves petiolate, ovate or lanceolate, 7 to 14 cm. long, acuminate, acute, or obtuse at base, pilose or glabrate beneath; inflorescence dense, spikelike, 8 to 24 cm. long; calyx 4-lobate; corolla white, salverform, 10 to 17 mm. long, the tube slender, glabrous or sparsely pilose; fruit globose, tetracoccus, 3 to 4 mm. broad, fleshy at maturity and black; seeds numerous, minute.

DOUBTFUL SPECIES.

DUGGENA NIVEA (Bartl.) Standl. Contr. U. S. Nat. Herb. **18**: 125. 1916. *Gonzalea nivea* Bartl.; DC. Prodr. **4**: 436. 1830. Described from Mexico. Probably a species of *Rondeletia*.

GONZALAGUNIA PARVIFLORA Schlecht. & Cham. Linnaea **6**: 414. 1831. Type from Cuesta Grande de Jalacingo, Veracruz.

GONZALEA SECUNDA Mart. & Gal. Bull. Acad. Brux. **11**¹: 235. 1844. Type from Jalapa, Veracruz. Probably a synonym of *Duggena panamensis*.

17. **ISERTIA** Schreb. Gen. Pl. **1**: 234. 1789.

1. **Isertia haenkeana** DC. Prodr. **4**: 437. 1830.

Described originally from Mexico, but the species has not been collected recently in Mexico, and the locality may have been given incorrectly. Guatemala to Colombia: Cuba.

Shrub, 2 to 3 meters high; leaves short-petiolate, obovate or oblong-obovate, 20 to 45 cm. long, acuminate, acute at base, densely short-pilose or glabrate beneath; inflorescence cymose-paniculate, 7 to 20 cm. long; calyx shallowly 4 to 6-dentate; corolla tubular-funnelform, yellow or orange-red, 2 to 3.5 cm. long, the lobes short; fruit baccate, purplish, depressed-globose, 5 to 6 mm. broad; seeds minute, numerous. "Canelito" (Panama).

18. **PLOCANIOPHYLLON**. T. S. Brandeg. Univ Calif. Publ. Bot. **6**: 69. 1914.

A single species is known.

1. **Plocaniophyllon flavum** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 69. 1914.

Type from Finca Mexiquito, Chiapas.

Slender glabrous shrub; leaves short-petiolate, elliptic to lance-oblong, 2.5 to 5 cm. long, acute to long-acuminate, acute at base, thin, conspicuously lineolate; flowers yellow, in simple secund racemes; calyx 4-lobate; corolla salverform, the tube 2.5 mm. long, the lobes 3 to 4 mm. long, narrowly oblong, acute; fruit fleshy (?), oblong-turbinate, 6 mm. long; seeds numerous, minute.

19. **SOMMERA** Schlecht. Linnaea **9**: 602. 1834.

REFERENCE: Standley, N. Amer. Fl. **32**: 143-145. 1921.

Shrubs or small trees; leaves petiolate, thin, with numerous fine parallel nerves between the veins; flowers white, in axillary pedunculate cymes, corymbs, or racemes; calyx 4 or 5-lobate, the lobes somewhat foliaceous; corolla funnelform or subcampanulate, sericeous outside, the 4 or 5 lobes valvate; fruit baccate, 2-celled; seeds numerous, minute.

Leaves quite glabrous on the upper surface; branchlets glabrous or nearly so.

Calyx lobes lanceolate or lance-oblong, acuminate; cymes mostly 3-flowered.

Leaves acute at base.....1. **S. arborescens.**

Calyx lobes oval or suborbicular, rounded at apex; inflorescence with more than 3 flowers.

Inflorescence racemose; leaves acute at base.....2. **S. chiapensis.**

Inflorescence cymose-corymbose; leaves obtuse to subcordate at base.

3. **S. subcordata.**

Leaves sparsely or densely pilose on the upper surface; branchlets pilose.

4. **S. grandis.**

1. **Sommeria arborescens** Schlecht. *Linnaea* 9: 602. 1834.

Veracruz; type from Hacienda de la Laguna.

Leaves obovate-oblong or elliptic-oblong, 10 to 25 cm. long, acuminate, sericeous beneath along the nerves; calyx lobes 5 to 9 mm. long; fruit oval, 12 to 14 mm. long.

2. **Sommeria chiapensis** T. S. Brandeg. *Univ. Calif. Publ. Bot.* 6: 196. 1915.

Type from Finca Irlanda, Chiapas.

Leaves obovate or obovate-oblong, 12 to 27 cm. long, abruptly acuminate, densely sericeous beneath when young, later glabrate.

3. **Sommeria subcordata** Standl. *N. Amer. Fl.* 32: 144. 1921.

Sinaloa; type from Colomas.

Shrub or small tree, 6 meters high or less; leaves oval-obovate or oval-elliptic, 12 to 30 cm. long, acute or short-acuminate, sparsely setose-pilose beneath.

4. **Sommeria grandis** (Bartl.) Standl. *N. Amer. Fl.* 32: 145. 1921.

Petesia grandis Bartl.; *DC. Prodr.* 4: 395. 1830.

Sommeria mesochora Standl. *Contr. U. S. Nat. Herb.* 17: 437. 1914.

Michoacán and Colima. Guatemala to Panama.

Shrub or small tree, sometimes 8 meters high; leaves obovate to oval, 10 to 22 cm. long, abruptly acuminate, rounded to attenuate at base, appressed-pilose beneath; inflorescence cymose-corymbose, usually many-flowered; corolla white, 5 to 8 mm. long.

20. **SABICEA** Aubl. *Pl. Guian.* 1: 192. 1775.

REFERENCES: Wernham, A monograph of the genus *Sabicea*, 1914; Standley, *N. Amer. Fl.* 32: 148-150. 1921.

Shrubs, usually scandent; flowers small, capitate or cymose, axillary; calyx tube subglobose, the limb 3 to 6-lobate, the lobes narrow, persistent; corolla funnelform or salverform, the throat villous, the limb 4 or 5-lobate, the lobes short, valvate; fruit baccate, 2 to 5-celled; seeds numerous, minute.

Inflorescence lax at maturity, the flowers pedicellate-----1. **S. mexicana.**

Inflorescence dense, the flowers sessile.

Stipules broadly ovate, 5 to 10 mm. long; leaves hirsute or strigose.

2. **S. hirsuta.**

Stipules setaceous, 2 to 3 mm. long; leaves puberulent or glabrate.

3. **S. flagenioides.**

1. **Sabicea mexicana** Wernham, *Monogr. Sabicea* 41. 1914.

Oaxaca.

Branches pilose with subappressed hairs; leaves petiolate, lance-oblong to ovate, 8 to 12 cm. long, acuminate, obtuse or acute at base, hirsute; calyx lobes 6 to 10 mm. long; corolla white, strigose, the tube 10 to 12 mm. long.

Reported by Hemsley as *S. glabrescens* Benth.

2. **Sabicea hirsuta** H. B. K. *Nov. Gen. & Sp.* 3: 417. 1820.

Veracruz and Chiapas. Central and South America; type from the Orinoco River.

Branches hirsute or pilose; leaves ovate to elliptic-oblong, 5 to 12 cm. long, acuminate, rounded or obtuse at base; calyx lobes 2 to 4 mm. long; corolla white, hirsute or strigose, the tube 6 mm. long; fruit 1 cm. in diameter.

Reported by Hemsley as *S. hirta* Swartz.

3. **Sabicea flagenioides** Wernham, *Monogr. Sabicea* 57. 1914.

Type from Chichankanab, Yucatán.

Branches tomentulose when young; leaves lanceolate, 5 cm. long, acuminate; calyx lobes 4.5 mm. long.

21. POSOQUERIA Aubl. Pl. Guian. 1: 133. 1775.

1. *Posoqueria latifolia* (Lam.) Roem. & Schult. Syst. Veg. 5: 227. 1819.

Tocoyena latifolia Lam. Tabl. Encycl. 2: 259. 1793.

Posoqueria coriacea Mart. & Gal. Bull. Acad. Brux. 11¹: 240. 1844.

Oaxaca; reported from Tabasco. Central and South America; Cuba (?).

Glabrous tree, sometimes 6 meters high; leaves short-petiolate, oval to oblong, 8 to 25 cm. long, acute or short-acuminate, obtuse or rounded at base, coriaceous; flowers white, in terminal corymbs; calyx with 5 short rounded lobes; corolla salverform, the slender tube 12 to 16.5 cm. long, the 5 lobes oblong, 1.5 to 2.5 cm. long, obtuse; fruit baccate, globose, 4 to 5 cm. in diameter, yellow; seeds numerous, irregularly angulate, black, about 1 cm. long. "Palo de peine blanco" (Tabasco?); "jasmín de árbol" (Nicaragua); "boca vieja" (Panama); "guayaba de mico" (Costa Rica); "fruta de murciélago," "fruta de mono," "huevo de mono" (Panama).

The fruit is sometimes eaten, but its flavor is poor.

22. GENIPA L. Syst. Nat. ed. 10. 931. 1759.

REFERENCE: Standley, N. Amer. Fl. 32: 155-157. 1921.

1. *Genipa americana* L. Syst. Nat. ed. 10. 931. 1759.

Genipa caruto H. B. K. Nov. Gen. & Sp. 3: 407. 1818.

Genipa americana caruto Schum. in Mart. Fl. Bras. 6⁶: 352. 1889.

Guerrero to Chiapas. West Indies; Central and South America.

Tree, sometimes 15 meters high; leaves short-petiolate, obovate to oblong, 14 to 35 cm. long, acute or obtuse, attenuate to base, pubescent or glabrous beneath; flowers in few-flowered, axillary or terminal cymes; calyx truncate or shallowly crenate; corolla salverform, yellowish white, 2 to 4.5 cm. long, the 5 or 6 lobes longer than the tube; fruit baccate, subglobose, 6 to 7 cm. in diameter; seeds numerous, compressed, 6 to 12 mm. long, dark brown. "Maluco" (Oaxaca); "jagua blanca," "jagua azul" (Tabasco); "jagua" (Oaxaca, Tabasco, Veracruz, Panama, Venezuela, Nicaragua, Cuba, Porto Rico); "caruto" (Venezuela); "irayol" (Guatemala, El Salvador); "tapaculo," "yigualtí," "gigualtí" (Nicaragua); "tife-dientes" (El Salvador).

The typical form of the species is glabrous. The form occurring in Mexico is *G. americana caruto*, which is distinguished by its copious pubescence.

The wood is said to be soft but strong and resistant, flexible, fibrous, whitish tinged with gray; its specific gravity is reported as ranging from 0.73 to 0.87. It is used for carts, gun-stocks, axe handles, and other articles. The bark is said to be rich in tannin and it has been employed for tanning. A gum is produced from incisions in the trunk. The leaves are eaten by cattle.

The fruit is brown or green tinged with brown, with a leathery skin and scant acid pulp. The copious juice colors everything it touches brownish or blackish violet. The pulp is eaten by domestic animals and also by human beings, and is used in the preparation of a refreshing drink, and has been fermented to produce an alcoholic beverage. The juice was much used by the early inhabitants of tropical America for coloring cloth and utensils and for painting the skin. A decoction of the roots was formerly employed in the West Indies as a remedy for gonorrhoea, and in El Salvador the fruit is considered a remedy for jaundice.

The earliest account of the tree is that of Oviedo (Lib. VIII, Cap V), who speaks of it as follows: "The *Xagua* is a handsome large tree, and I have seen made of it fine lance handles, as long and thick as were wanted; it is a heavier wood than ash, and very common in Hispaniola and other islands and in the Spanish Main. They are high straight trees like the ashes, beautiful to see, and the handles made from them are of pretty complexion, and in color pale brown

to tawny. In Hispaniola, although there are some of these trees, they are neither so numerous nor so well suited as in Tierra-Firme, in the Province of Cueva or of Castilla del Oro, for the making of lances. They produce a fruit as large as a poppy pod, and very similar except in the crown, which the *Xagua* does not have. It is good to eat when ripe and seasoned; from it is obtained a clear juice with which the Indians bathe their limbs and sometimes the whole body, when tired. And also for their pleasure they paint themselves with the juice, which, aside from being astringent, turns everything it touches as black as fine and polished jet, or even blacker; and this dye can not be removed for 15 or 20 days or more; and often the nails are black until they are renewed if they are wet in the juice; all of which I have seen many times. * * * They are accustomed to play a joke upon the women, wetting them carelessly with *Xagua* juice mixed with other scented ones; and after a little there come out spots over their bodies, and the women, not knowing the cause of the spots, are frightened into seeking a remedy for them; and the remedies are harmful, and likely to burn or blister the face and body where the spots are but not to remove them until the passage of the 20 days, as I have said above, when little by little the dye disappears. When the Indians of Tierra-Firme prepare for battle, they paint their bodies with *Xagua* and with *Bixa*, which is a red dye. And the Indian women also when they wish to appear well decorate themselves with one or both colors; but to my eyes they appear little better than devils when they are thus adorned."

23. ALIBERTIA A. Rich.; DC. Prodr. 4: 443. 1830.

1. Alibertia edulis (L. Rich.) A. Rich.; DC. Prodr. 4: 443. 1830.

Genipa edulis L. Rich. Act. Soc. Hist. Nat. Paris 1: 107. 1792.

Cordia edulis Kuntze, Rev. Gen. Pl. 1: 279. 1891.

Oaxaca and Chiapas; reported from Tabasco. Central and South America; Cuba and Martinique; type from French Guiana.

Shrub or small tree, 1 to 6 meters high; leaves short-petiolate, lance-oblong to oval-ovate, 6 to 20 cm. long, usually short-acuminate, acute to rounded at base, coriaceous, glabrous or nearly so; flowers white, dioecious, terminal, sessile; calyx denticulate; corolla salverform, 2 to 3 cm. long, sericeous, the 4 or 5 lobes acuminate; fruit baccate, globose, about 2.5 cm. in diameter, yellowish, containing 2 or more cells; seeds numerous, compressed, 5 mm. broad, brownish. "Costarica" (Tabasco, *Ramírez*); "madroño de comer" (Costa Rica); "perita" (Colombia); "pitajoni," "pitajoni hembra" (Cuba); "torolillo" (El Salvador); "trompo," "trompito," "madroño" (Panama); "guayaba del monte" (Guatemala).

The fruit is edible but not agreeable in flavor.

24. RANDIA L. Sp. Pl. 1192. 1753.

Trees or shrubs, usually armed with spines; flowers small or large, perfect or dioecious, solitary or fasciculate, axillary or terminal, usually white or yellowish; calyx lobate or truncate; corolla funnelform or salverform, the tube short or elongate; fruit baccate, 2-celled; seeds few or numerous, immersed in pulp, usually horizontal, compressed.

Flowers and fruit large; corolla 2.5 to 14 cm. long; fruit 3 to 9 cm. long, rarely only 2 cm. long (probably immature).

Fruit covered with long spinelike tubercles..... **1. R. echinocarpa.**

Fruit smooth.

Plants unarmed..... **2. R. laevigata.**

Plants armed with spines.

Corolla glabrous outside; leaves glabrous beneath or pubescent along the veins; flowers often pedicellate.

Tube of the corolla about as long as the lobes; leaves glabrous beneath.

3. R. longiloba.

- Tube of the corolla about twice as long as the lobes; leaves appressed-pilose beneath, at least along the costa.....4. *R. armata*.
 Corolla pubescent outside; leaves usually pubescent beneath over the whole surface; flowers sessile.
 Corolla lobes rhombic-obovate; leaves abruptly attenuate to the base.
 5. *R. tetracantha*.
 Corolla lobes never obovate; leaves not abruptly attenuate to the base.
 Lower surface of leaves not tomentose.....6. *R. albonervia*.
 Lower surface of leaves densely tomentose, at least when young.
 Corolla tube 5.5 to 6 cm. long.....7. *R. cinerea*.
 Corolla tube 1.5 to 2 cm. long.
 Spines in pairs; leaves 3.5 cm. long or less, rounded at apex.
 8. *R. nelsonii*.
 Spines mostly in 4's; leaves usually more than 3.5 cm. long, sometimes acute.
 Corolla tube 1.5 cm. long; leaves mostly acute or acutish, 0.8 to 2.3 cm. wide.....9. *R. purpusii*.
 Corolla tube 2 cm. long; leaves mostly rounded at apex, 1.5 to 7.5 cm. wide.....10. *R. watsoni*.
 Flowers and fruit small; corolla 0.4 to 2 cm. long; fruit usually 0.6 to 2 cm. long, rarely slightly larger.
 Plants unarmed.
 Corolla glabrous outside; leaves sessile.....11. *R. blepharophylla*.
 Corolla pubescent; leaves petiolate.....12. *R. pringlei*.
 Plants armed with spines.
 Throat of the corolla densely white-barbate.
 Pericarp thin, black, lustrous, succulent.....13. *R. rhagocarpa*.
 Pericarp thick and hard, never black or succulent.
 Fruit 1.6 to 2.5 cm. in diameter; leaves mostly orbicular-spatulate.
 26. *R. thurberi*.
 Fruit 0.6 to 1.3 cm. in diameter; leaves not orbicular-spatulate.
 Spines scattered in pairs along the branches. Fruit 6 to 8 mm. in diameter; seeds 2 to 4.....25. *R. obcordata*.
 Spines mostly in pairs at the ends of the branchlets...14. *R. mitis*.
 Throat of the corolla naked, sometimes sparsely pilosulous but never white-barbate.
 Calyx truncate.....15. *R. truncata*.
 Calyx lobate.
 Pericarp thin, black, lustrous, succulent.....13. *R. rhagocarpa*.
 Pericarp thick and hard, never black and lustrous.
 Spines all or mostly in pairs at the ends of the branchlets.
 Fruit and calyx tube densely pilose with spreading hairs.
 16. *R. malacocarpa*.
 Fruit and calyx tube glabrous or appressed-pilose.
 Leaves densely puberulent beneath.....17. *R. induta*.
 Leaves glabrous beneath or puberulent only along the costa.
 Corolla 14 to 20 mm. long; fruit 2 to 2.5 cm. long.
 18. *R. xalapensis*.
 Corolla 6 to 12 mm. long; fruit 0.7 to 2 cm. long.
 Corolla 6 to 7 mm. long; flowers solitary.
 19. *R. chiapensis*.
 Corolla 7 to 11 mm. long; flowers often clustered.
 20. *R. laetevirens*.

Spines scattered in pairs along the branches.

Leaves densely long-pilose; corolla pilose outside.

21. *R. canescens*.

Leaves glabrous or sparsely short-pilose; corolla (so far as known) glabrous outside.

Lateral nerves of the leaves 5 or 6 on each side, conspicuous.

Leaves pilose beneath along the costa; corolla 18 to 20 mm. long.

22. *R. rosei*.

Lateral nerves 2 to 4 on each side, inconspicuous.

Branches whitish; calyx 1 to 1.5 mm. long. Corolla 5 to 6 mm. long.

23. *R. gaumeri*.

Branches brown or grayish; calyx 2 to 3 mm. long.

Calyx lobes long-ciliate; flowers clustered.

24. *R. blepharodes*.

Calyx lobes obscurely ciliolate or naked; flowers solitary.

Fruit 6 to 8 mm. in diameter; seeds 2 to 4.

25. *R. obcordata*.

Fruit 16 to 25 mm. in diameter; seeds numerous.

26. *R. thurberi*.

1. *Randia echinocarpa* Moc. & Sessé; DC. Prodr. 4: 385. 1830.

Genipa echinocarpa A. Gray, Proc. Amer. Acad. 21: 380. 1886.

Chihuahua and Sonora to Guerrero and Veracruz.

Shrub or small tree, sometimes 6 meters high; spines in 4's at the ends of the branches; leaves sessile or subsessile, oval, oval-obovate, or rhombic-ovate, 3.5 to 8.5 cm. long, rounded or obtuse at apex, densely pilose beneath, at least along the veins; flowers dioecious, orange-yellow; staminate corolla appressed-pilose, the tube 3 cm. long; fruit subglobose, 4.5 to 9 cm. in diameter, green or yellow, pubescent, the tubercles 1 to 3 cm. long. "Papache," "papache picudo" (Sinaloa).

The fruit is edible and is considered (in Sinaloa) a remedy for malaria.

2. *Randia laevigata* Standl., sp. nov.

Sonora to Durango and Tepic; type from Sierra de Alamos, Sonora (*Rose, Standley & Russell* 13051; U. S. Nat. Herb. no. 635870).

Unarmed shrub, 2 meters high; leaves sessile or short-petiolate, obovate-oblong or rhombic-ovate, 14 to 23 cm. long, acute or acuminate, attenuate to base, pubescent beneath when young, glabrate in age; fruit subglobose, 6.5 cm. long, glabrous. "Crucecilla de la sierra" (Sinaloa).

In Sinaloa the fruit is employed as a remedy for bronchitis.

3. *Randia longiloba* Hemsl. Biol. Centr. Amer. Bot. 4: 101. 1886.

Yucatán; type from Cozumel Island.

Tree, 6 to 7.5 meters high; leaves petiolate, ovate to oblong-elliptic, 2 to 4.5 cm. long, acute or short-acuminate, rounded to acute at base; flowers terminal, usually clustered, subsessile; corolla white, the tube 17 to 22 mm. long. "Xcaax" (Maya).

4. *Randia armata* (Swartz) DC. Prodr. 4: 387. 1830.

Mussaenda spinosa Jacq. Stirp. Amer. 70. 1763.

Gardenia armata Swartz, Prodr. Veg. Ind. Occ. 51. 1788.

Randia spinosa Karst. Fl. Columb. 2: 128. 1869. Not *R. spinosa* Poir. 1811.

Southern Baja California and Sinaloa to Chiapas. Lesser Antilles; Central and South America; type from Cartagena, Colombia.

Shrub or small tree, 1 to 12 meters high, the trunk sometimes 70 cm. in diameter; spines in 4's at the ends of the branchlets; leaves slender-petiolate, ovate or obovate, 6 to 20 cm. long, acute or acuminate at base and apex, puberulent

or glabrate; flowers dioecious, white or yellowish white; corolla tube 2.5 cm. long; fruit oval or subglobose, 2.5 to 3.5 cm. long. "Huele de noche," "palo de la cruz," "zapotillo" (Oaxaca); "canastilla" (Chiapas); "rosetillo" (Honduras, Guatemala); "María Angola" (Colombia); "jicarillo," "crucito," "crucetilla," "caca de mico," "torolillo" (El Salvador).

The wood is said to be useful for various purposes. The fruit is reported to have emetic properties and to be used in Martinique for stupefying fish. The flowers are sweet-scented.

5. *Randia tetracantha* (Cav.) DC. Prodr. 4: 387. 1830.

Mussaenda tetracantha Cav. Icon. Pl. 4: 20. pl. 435. 1799.

Sinaloa to Guerrero; type from Acapulco, Guerrero.

Shrub, 2 to 3 meters high; spines in 4's at the ends of the branchlets; leaves slender-petiolate, ovate or rhombic-ovate, 5 to 11 cm. long, acute or acuminate, puberulent or glabrate beneath; flowers terminal, dioecious (?), solitary or clustered; corolla tube 5 cm. long or longer; fruit oval, 2.5 to 4.5 cm. long, yellowish. "Arbol de las cruces" (Guerrero).

6. *Randia albonervia* T. S. Brandeg. Zoe 5: 257. 1908.

Veracruz; type from Corral de las Piedras, near Zacuapan.

Shrub; branchlets with 2 or 4 spines at apex; leaves petiolate, obovate or ovate, 2 to 5.5 cm. long, acute or short-acuminate, cuneate at base, appressed-pilose beneath; flowers terminal, solitary; corolla densely white-pilose, the tube 3 to 4 cm. long.

7. *Randia cinerea* (Fernald) Standl.

Genipa cinerea Fernald, Proc. Amer. Acad. 33: 93. 1897.

Guerrero and Oaxaca; type from Acapulco, Guerrero.

Sarmentose shrub; spines in 2's or 4's at the ends of the branchlets; leaves petiolate, oval, 5 to 15 cm. long, acute to rounded at apex, rounded or obtuse at base; flowers dioecious, yellowish white; corolla sericeous; fruit obovoid, 7 cm. long, pilose.

8. *Randia nelsonii* Greenm. Proc. Amer. Acad. 34: 574. 1899.

Puebla and Oaxaca; type collected between Juchitán and Chivela, Oaxaca.

Shrub; leaves short-petiolate, obovate or obovate-orbicular, obtuse to subretuse, acute at base; flowers perfect, terminal, solitary, sessile; corolla sparsely hirtellous; fruit subglobose, 2.5 to 3 cm. long, densely short-pilose.

9. *Randia purpusii* Greenm. & Thompson, Ann. Mo. Bot. Gard. 1: 410. 1915.

Type from Minas de San Rafael, San Luis Potosí.

Leaves short-petiolate, obovate or obovate-oblong, 1.5 to 5.5 cm. long, long-attenuate at base; flowers terminal, sessile; corolla sparsely pilose.

10. *Randia watsoni* Robinson, Proc. Amer. Acad. 29: 317. 1894.

Randia tomentosa S. Wats. Proc. Amer. Acad. 25: 152. 1890. Not *R. tomentosa* Wight & Arn. 1834.

Randia megacarpa T. S. Brandeg. Zoe 5: 257. 1908.

Southern Baja California to Nuevo León, Morelos, and Michoacán; Chiapas (?); type from Sierra de la Silla, near Monterrey, Nuevo León.

Shrub or tree, 3 to 5 meters high; leaves short-petiolate, oval or obovate, 2.5 to 8.5 cm. long, acute to truncate at base; flowers perfect, white, few at the ends of the branches, sessile; corolla sparsely or densely pilose; fruit globose or oval, 6 cm. long or less, short-pilose or glabrate. "Papache" (Sinaloa).

11. *Randia blepharophylla* Standl., sp. nov.

Sinaloa and Tepic; type collected between Aguacate and Dolores, Tepic (Rose 2028; U. S. Nat. Herb. no. 300921).

Unarmed shrub; leaves sessile, oval or rounded-ovate, 8 to 11 cm. long, rounded at apex, subcordate at base, densely ciliate, in age glabrate but when young copiously pilose beneath; flowers dioecious, the staminate in few-flowered axillary short-pedunculate cymes; calyx and hypanthium 4 mm. long, glabrous, the limb irregularly undulate; corolla tube glabrous, 8 mm. long, the lobes oval, 5 to 6 mm. long, ciliate; fruit subglobose, glabrous, 13 mm. in diameter or larger.

12. *Randia pringlei* A. Gray. Proc. Amer. Acad. **21**: 379. 1886.

Basanacantha reticulata S. Wats. Proc. Amer. Acad. **18**: 98. 1883. Not *Randia reticulata* Benth. 1849.

Coahuila and Durango; type from mountains near Jimulco, Coahuila.

Shrub or small tree; leaves mostly obovate or oval, 3 to 8 cm. long, acute to rounded at apex, cuneate-attenuate to truncate and decurrent at base, densely tomentose or pubescent beneath; flowers dioecious, terminal, clustered; corolla white, the tube 10 to 12 mm. long; fruit globose, 2 cm. in diameter, densely pubescent. "Chapote" (Coahuila).

13. *Randia rhagocarpa* Standl., sp. nov.

Type from Victoria, Tamaulipas (*Palmer* 38; U. S. Nat. Herb. no. 572266).

Shrub about 4.5 meters high, the branches armed with numerous pairs of stout divaricate spines; leaves petiolate, the blades cuneate-orbicular or rounded-obovate, 1.5 to 4 cm. long, cuneate or acuminate at base, rounded or truncate at apex, ciliolate, glabrous beneath; flowers terminal, sessile; fruit globose, about 12 mm. in diameter, smooth, black, very lustrous, the pericarp thin, succulent, soft when dry; seeds about 8, 5 to 7 mm. long.

14. *Randia mitis* L. Sp. Pl. 1192. 1753.

Randia aculeata L. Sp. Pl. 1192. 1753.

Randia latifolia Lam. Encycl. **3**: 24. 1789.

Mussaenda rotundifolia Sessé & Moc. Fl. Mex. ed. 2. 59. 1894.

Veracruz and Oaxaca; Sinaloa (?); Tamaulipas (?). West Indies; Panama and Colombia; type from Jamaica.

Shrub, 1 to 3 meters high; leaves sessile or short-petiolate, very variable in shape, 1 to 10 cm. long, acute to rounded at apex, glabrous beneath or sparsely pilose along the costa; flowers perfect, usually clustered, sessile; corolla white, 6 to 8 mm. long, glabrous; fruit globose, 6 to 13 mm. in diameter. "Crucilla" (Tamaulipas); "crucecilla de la costa" (Sinaloa); "cruceto" (Tamaulipas, *Escontria*; Colombia); "tintillo," "escambrón," "palo de cotorra," "cambrón" (Porto Rico); "maíz tostado" (Colombia); "agalla de costa," "yamaguey," "yamaguey de costa," "pitajoni bravo," "pitajoni espinoso" (Cuba); "espino cruz," "crucete" (Veracruz); "papachilla" (Sinaloa).

The green fruit is astringent and in the West Indies has been employed as a remedy for dysentery. The ripe fruit is sometimes eaten, and it is reported to yield a blue dye.

15. *Randia truncata* Greenm. & Thompson, Ann. Mo. Bot. Gard. **1**: 411. 1915.

Randia tetramera Loesener, Verh. Bot. Ver. Brand. **56**: 109. 1923.

Yucatán; type from Izamal.

Shrub, 2 to 4 meters high, the spines in pairs at the ends of the branches; leaves nearly sessile, suborbicular or obovate, 1 to 3 cm. long, obtuse or rounded at apex, glabrous; flowers perfect; corolla glabrous, the tube 1 to 1.5 cm. long. "Mehenkax," "kax" (Maya).

This is perhaps the plant reported from Yucatán as *R. aculeata* L., which is said to bear the Maya name "xpech citam."

16. *Randia malacocarpa* Standl., sp. nov.

Sinaloa and Tepic; type from Acaponeta, Tepic (*Rose* 3298; U. S. Nat. Herb. no. 302274).

Shrub, about 1 meter high, the branches armed at the apex with two stout spines; leaves mostly clustered on short lateral spurs, short-petioled, the blades mostly ovate, ovate-oblong, or narrowly elliptic-oblong, rarely rounded-obovate, 2.5 to 5.5 cm. long, acute to long-attenuate at base, usually acute at apex, puberulent or scaberulous above, densely short-pilose beneath; flowers perfect, terminal, sessile; calyx densely short-pilose, the hypanthium 2 mm. long, the calyx lobes linear or oblong, 1 to 1.5 mm. long; corolla salverform, sparsely hirtellous outside, the tube 3 to 4 mm. long, the 5 lobes rounded, 2 to 3 mm. long, the throat naked; fruit globose, 12 mm. in diameter or larger, densely velvety-pilose, the pericarp very thick and hard; seeds numerous.

17. *Randia induta* Standl., sp. nov.

Type from Cayacol, Guerrero (*Nelson* 7018; U. S. Nat. Herb. no. 399362).

Branchlets armed at apex with two stout spines 7 to 13 mm. long; leaves slender-petiolate, the blades oblong-obovate or rhombic-obovate, 5 to 9 cm. long, 2.5 to 4.5 cm. wide, acute or acuminate at base, rounded or very obtuse at apex, glabrous above, beneath copiously puberulent; fruits terminal on short lateral spurs, solitary, sessile, globose, 7 to 10 mm. in diameter, smooth, glabrate, the pericarp very thin; seeds usually 4, about 5 mm. long.

18. *Randia xalapensis* Mart. & Gal. Bull. Acad. Brux. 11¹: 239. 1844.

?*Randia tomatillo* Loesener, Repert. Sp. Nov. Fedde 18: 360. 1922.

Tamaulipas, Veracruz, and Yucatán; type from Jalapa, Veracruz.

Shrub or small tree; leaves sessile or subsessile, obovate to elliptic-oblong, 1.5 to 4 cm. long, acute to rounded at apex, coriaceous; flowers perfect, white; corolla glabrous; fruit 2 to 2.5 cm. long, white, the pulp black. "Nanche" (Tamaulipas); "tomatillo" (Veracruz).

19. *Randia chiapensis* Standl., sp. nov.

Type from Canjob, Chiapas (*Goldman* 797; U. S. Nat. Herb. no. 470602).

Branchlets bearing at apex two slender or stout spines 7 to 12 mm. long; leaves mostly clustered on very short lateral spurs, the petioles 2 mm. long or less, the blades obovate to rhombic-orbicular, 1 to 3 cm. long, 6 to 15 mm. wide, at base attenuate or rounded and short-decurrent, rounded or very obtuse at apex, glabrous; flowers perfect, terminal, solitary, sessile, 5-parted; calyx and hypanthium glabrous, the calyx lobes linear to ovate-oblong, obtuse, shorter than the hypanthium; corolla 6 to 7 mm. long, glabrous outside, the tube nearly as thick as long, the throat naked, the lobes suborbicular, shortly cuspidate-acuminate, about equaling the tube.

20. *Randia laetevirens* Standl., sp. nov.

?*Randia latifolia micrantha* Schlecht. *Linnaea* 6: 723. 1831.

Sinaloa and Tepic; Tamaulipas, Nuevo León, and Veracruz; type from Cerro de la Silla near Monterrey, Nuevo León (*Nelson* 6683; U. S. Nat. Herb. no. 347312).

Shrub 1 to 3 meters high, the branchlets bearing at the apex two stout ascending spines; leaves crowded on very short lateral spurs, petiolate or subsessile, the blades mostly obovate-oblong, 1 to 6 cm. long, 0.5 to 2 cm. wide, acute to attenuate at base, acute to rounded at apex, glabrous; flowers perfect, terminal, sessile, usually clustered, 5-parted; calyx and hypanthium glabrous or obscurely scaberulous, the calyx lobes triangular-subulate, half as long as the tube or almost obsolete; corolla glabrous outside, the tube 4 to 6.5 mm. long, the throat naked, the lobes rounded-ovate, 2.5 to 4.5 mm. long, abruptly short-acuminate; fruit globose, 8 to 14 mm. in diameter, smooth or slightly rugose, glabrous, the pericarp thick and hard; seeds 5 to 7, 6 to 7 mm. long. "Capulín corona" (San Luis Potosí); "crucero blanco," "crucero" (Tamaulipas).

A decoction of the wood is used in San Luis Potosí for affections of the chest.

21. *Randia canescens* Greenm. Proc. Amer. Acad. **34**: 573. 1899.

Morelos; type from Cuernavaca.

Shrub or small tree, 3 to 5 meters high; leaves sessile or short-petiolate, 7 to 15 mm. long, rounded at apex, rounded to acute at base; flowers perfect, sessile; corolla short-pilose, the tube 6 to 7 mm. long.

22. *Randia rosei* Standl., sp. nov.

Sinaloa and Tepic; type from Rosario, Sinaloa (*Rose* 1551; U. S. Nat. Herb. no. 300395).

Branches armed with numerous pairs of stout divergent spines 1 to 2 cm. long; leaves mostly crowded on short lateral spurs, slender-petiolate, the blades suborbicular to rhombic-ovate, 1 to 2.5 cm. long, rounded or obtuse at base, rounded or very obtuse at apex, short-pilose beneath along the veins, elsewhere glabrous; flowers perfect, terminal, solitary, sessile; hypanthium 2 mm. long, pilose, the calyx lobes linear, 3 to 6 mm. long, ciliate; corolla salverform, glabrous outside, the tube 10 to 12 mm. long, the throat naked, the 5 lobes ovate-oval, 8 mm. long, obtuse or acutish; fruit subglobose, rather sparsely pilose.

23. *Randia gaumeri* Greenm. & Thompson, Ann. Mo. Bot. Gard. **1**: 410. 1915.

Yucatán; type from Izamal.

Shrub; leaves short-petiolate, cuneate-orbicular or obovate, 5 to 15 mm. long, broadly rounded at apex, glabrous or nearly so; flowers perfect; corolla glabrous.

24. *Randia blepharodes* Standl., sp. nov.

Guerrero and Oaxaca; type from Mexcala, Guerrero, altitude 500 meters (*Langlassé* 1033; U. S. Nat. Herb. no. 386343).

Shrub about 3 meters high, the branches bearing numerous pairs of stout divaricate spines 1 to 2 cm. long; leaves crowded on short lateral spurs, subsessile or short-petiolate, the blades cuneate-orbicular or rounded-obovate, 7 to 17 mm. long and broad, cuneate at base, broadly rounded at apex or subretuse, glabrous; flowers perfect, terminal, clustered, sessile, 5-parted; calyx and hypanthium more or less scaberulous, the calyx lobes lance-linear, much longer than the tube, long-ciliate; corolla white, glabrous outside, the tube slender, 1 cm. long, the throat naked, the lobes ovate or oblong-ovate, 4 to 5 mm. long; fruit globose, about 2 cm. in diameter, sparsely puberulent, the pericarp hard and thick; seeds numerous.

25. *Randia obcordata* S. Wats. Proc. Amer. Acad. **24**: 53. 1889.

Sonora to Colima; type from Guaymas, Sonora.

Shrub, 2 to 3 meters high; leaves flabellate or obcordate, 4 to 18 mm. long, truncate or retuse at apex, decurrent to a short petiole, glabrous; fruit black. "Papachillo" (Sinaloa).

26. *Randia thurberi* S. Wats. Proc. Amer. Acad. **24**: 53. 1889.

Sonora and Sinaloa; type collected between Rayón and Ures, Sonora.

Shrub 1.5 to 2.5 meters high; leaves petiolate, orbicular to cuneate-obovate, 0.6 to 4.5 cm. long, obtuse to subretuse at apex, cuneate to abruptly long-attenuate at base, glabrous or nearly so; flowers perfect, sessile; fruit greenish yellow, glabrous. "Papache" (Sonora, Sinaloa).

The fruit is edible. Birds are fond of it, and one seldom sees a fruit from which the birds have not extracted the pulpy interior, which has the appearance of blackberry jam.

DOUBTFUL SPECIES.

RANDIA CAPITATA DC. Prodr. **4**: 387. 1830. Type from "Anasteca."

25. *OTOCALYX* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 68. 1914.

A single species is known.

1. *Otocalyx chiapensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 69. 1914
Type from Cerro del Boquerón, Chiapas.

Shrub; leaves slender-petiolate, ovate, 4 to 6 cm. long, long-acuminate, rounded or obtuse at base, appressed-pilose beneath along the veins; flowers in axillary or terminal, few-flowered, long-pedunculate cymes; calyx 4-lobate, one of the lobes dilated into a foliaceous limb 9 to 12 mm. long; corolla sericeous, the tube 1 cm. long, the 4 lobes 5 to 6 mm. long; fruit baccate (?), subglobose, 5 to 6 mm. long; seeds minute, angulate.

26. **HAMELIA** Jacq. Enum. Pl. Carib. 2, 16. 1760.

Shrubs or small trees; leaves opposite or verticillate, petiolate; flowers yellow or red, in chiefly terminal scorpioid cymes; calyx 5-lobate or 5-dentate; corolla tubular or funnelform, the tube 5-costate, the lobes short, imbricate; fruit small, baccate, 5-celled; seeds numerous, minute, angulate.

Calyx lobes oblong to subulate, longer than broad.

Calyx lobes subulate; corolla 3.5 to 4 cm. long.-----1. **H. xorullensis.**

Calyx lobes mostly oblong, obtuse; corolla 1.8 to 2.3 cm. long.

Corolla villous outside; leaves villous beneath-----2. **H. rovirosae.**

Corolla glabrous or minutely puberulent; leaves puberulent beneath along the veins-----3. **H. calycosa.**

Calyx lobes deltoid, as broad as long.

Flowers not secund or obscurely so, pedicellate; fruit globose; corolla 8 to 13 mm. long-----4. **H. versicolor.**

Flowers secund, mostly sessile; fruit usually longer than broad; corolla 14 to 22 mm. long.

Mature leaves glabrous, or pubescent beneath along the costa and lateral nerves; leaves mostly quaternate-----5. **H. nodosa.**

Mature leaves copiously pubescent beneath, usually over the whole surface; leaves mostly ternate-----6. **H. erecta.**

1. **Hamelia xorullensis** H. B. K. Nov. Gen. & Sp. 3: 414. 1818.

Hamelia hypomalaca Robinson, Proc. Amer. Acad. 45: 406. 1910.

Sinaloa and Durango to Michoacán; type from Volcán de Jorullo, Michoacán, altitude 1,150 meters.

Shrub, about 3 meters high; leaves mostly ternate, oval to elliptic, 6 to 13 cm. long, acuminate, rounded or obtuse at base, densely short-pilose or villosulous beneath; corolla yellow, 3.5 to 4 cm. long, the throat 1 cm. broad or more. "Aguacatillo" (Michoacán).

2. **Hamelia rovirosae** Wernham, Journ. Bot. Brit. & For. 49: 211. 1911.

Hamelia patens coronata Donn. Smith, Bot. Gaz. 40: 4. 1905.

Type from Río San Sebastián, Tabasco. Central America.

Large shrub, sometimes scandent, the branches villous; leaves ternate, elliptic or elliptic-oblong, 5 to 11 cm. long, short-acuminate, acute at base; corolla red, 18 to 24 mm. long.

3. **Hamelia calycosa** Donn. Smith, Bot. Gaz. 12: 132. 1887.

Hamelia chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 71. 1914.

Chiapas. Guatemala; type from Pansamalá.

Shrub, about 4 meters high; leaves mostly ternate, elliptic or oblong-elliptic, 6 to 8.5 cm. long, acuminate, acute at base; corolla yellow, 18 to 22 mm. long.

4. **Hamelia versicolor** A. Gray; S. Wats. Proc. Amer. Acad. 21: 416. 1886.

Sinaloa to Oaxaca; type from barranca near Guadalajara, Jalisco.

Shrub, 1.5 to 3 meters high; leaves mostly ternate, ovate to elliptic-oblong, 3 to 12.5 cm. long, acute or acuminate, rounded to acute at base, puberulent or villosulous beneath; corolla orange, becoming red in age; fruit red, 5 to 7 mm. long. "Sangre de toro," "coralillo" (Sinaloa).

The fruit gives a lilac dye.

5. *Hamelia nodosa* Mart. & Gal. Bull. Acad. Brux. 11¹: 234. 1844.

Veracruz and Oaxaca; type from Mirador, Veracruz, altitude 900 meters. Costa Rica.

Shrub, 2.5 to 3 meters high; leaves ovate to elliptic-oblong, 4 to 9.5 cm. long, acute or short-acuminate, rounded to attenuate at base; corolla red, 18 to 22 mm. long; fruit 8 to 10 mm. long.

6. *Hamelia erecta* Jacq. (Enum. Pl. Carib. 16, hyponym. 1760) Stirp. Amer. 71. 1763.

Hamelia patens Jacq. (Enum. Pl. Carib. 16, hyponym, 1760) Stirp. Amer. 72. 1763.

Hamelia lanuginosa Mart. & Gal. Bull. Acad. Brux. 11¹: 233. 1844.

Tamaulipas, Veracruz, Oaxaca, Chiapas, and Yucatán. Southern Florida; West Indies; Central and South America; type from Cartagena, Colombia.

Shrub or small tree, 1 to 4 meters high; leaves lance-oblong to ovate or oval, 6 to 20 cm. long, usually short-acuminate, rounded to acuminate at base; corolla red, puberulent or villosulous; fruit 6 to 10 mm. long, red. "Kanan," "xkaná," "xkanan" (Yucatán, Maya); "chacloco" (Tamaulipas); "chichipín" (Guatemala, Honduras); "recadito" (Colombia); "zorrillo real," "palo camarón" (Costa Rica); "sisipinse," "flor de cangrejo" (Guatemala); "coralillo," "chichipince," "xuchit palimatía," "flor de baño" (El Salvador); "canilla de venado" (Nicaragua); "ponasí," "bonasí," "palo de coral" (Cuba); "bálsamo" (Porto Rico); "cacanapazue," "pañete" (Veracruz); "coral" (Honduras); "uvero" (Panama); "zorrillo" (Costa Rica).

The fruit is acid and edible, and a fermented drink is said to have been prepared from it. The leaves and stems have been used for tanning. The crushed leaves are sometimes applied to cuts and bruises, and a sirup prepared from the fruit has been employed in the West Indies as a remedy for dysentery.

DOUBTFUL SPECIES.

HAMELIA ROSTRATA Bartl.; DC. Prodr. 4: 442. 1830. Type from Acapulco, Guerrero. Probably identical with *H. versicolor*.

27. *HOFFMANNIA* Swartz, Prodr. Veg. Ind. Occ. 30. 1788.

Shrubs or rarely herbs; leaves opposite or verticillate; flowers small, cymose, axillary, the cymes sessile or pedunculate; calyx usually 4-lobate, the lobes short, persistent; corolla funnelform or nearly rotate, the lobes imbricate; fruit baccate, small, 2-celled; seeds numerous, minute.

Lobes of the corolla twice as long as the tube or longer.

Calyx truncate.....1. *H. lenticellata*.

Calyx lobate.

Cymes long-pedunculate, longer than the petioles, the peduncles equaling or longer than the cymes.

Corolla red.

Leaves glabrous beneath; corolla 12 to 13 mm. long....2. *H. discolor*.

Leaves villous or villosulous beneath along the veins; corolla 10 mm. long.....3. *H. refulgens*.

Corolla yellow.....4. *H. rosei*.

Cymes sessile or short-pedunculate, usually shorter than the petioles, the peduncles shorter than the cymes.

Leaves oval-elliptic, 6 to 7.5 cm. wide.....5. *H. rotundata*.

Leaves obovate or elliptic-oblong, 1 to 3 cm. wide.....6. *H. mexicana*.

Lobes of the corolla equaling or shorter than the tube, or but slightly exceeding it.

Corolla pubescent outside.

Cymes long-pedunculate.....7. *H. orizabensis*.

Cymes sessile or nearly so.....8. *H. cuneatissima*.

Corolla glabrous.

Leaves villosulous beneath, at least along the costa, mostly elliptic.

9. *H. chiapensis*.

Leaves glabrous or strigillose beneath, obovate-oblong or ovate-oblong.

Calyx lobes deltoid, minute; leaves caudate-acuminate. 10. *H. conzattii*.

Calyx lobes oblong, 1 mm. long; leaves attenuate at apex.

11. *H. strigillosa*.

1. *Hoffmannia lenticellata* Hemsl. Diag. Pl. Mex. 30. 1879.

Veracruz, the type from Orizaba. Guatemala.

Glabrous shrub; leaves petiolate, obovate or elliptic, 10 to 22 cm. long, obtusely acuminate; flowers 6 mm. long.

2. *Hoffmannia discolor* (Lemaire) Hemsl. Biol. Centr. Amer. Bot. 2: 36. 1881

Campylobotrys discolor Lemaire, Fl. Serr. Jard. 3: Misc. 37. 1847.

Described from cultivated plants which were believed to be of Mexican origin; reported from Chiapas.

Plants herbaceous or suffrutescent; leaves petiolate, obovate, 14 cm. long, obtuse or acutish, acute at base.

3. *Hoffmannia refulgens* (Hook.) Hemsl. Biol. Centr. Amer. Bot. 2: 37. 1881.

Higginsia refulgens Hook. in Curtis's Bot. Mag. pl. 5346. 1862.

Chiapas. Central America.

Plants suffrutescent; leaves short-petiolate, obovate, 9 to 25 cm. long, rounded or obtuse at apex, acute at base; peduncles 2.5 to 12 cm. long.

4. *Hoffmannia rosei* Robinson, Proc. Amer. Acad. 45: 407. 1910.

Type from Pedro Paulo, Tepic.

Shrub, 3 meters high; leaves petiolate, obovate or elliptic-oblong, 6 to 12 cm. long, acuminate, minutely puberulent beneath; corolla white, 7 mm. long.

5. *Hoffmannia rotundata* Standl. Contr. U. S. Nat. Herb. 20: 204. 1919.

Type from Cerro del Boquerón, Chiapas.

Leaves petiolate, obtuse to acute and short-acuminate, ferruginous-villous beneath, especially along the veins; corolla 6 to 8 mm. long.

6. *Hoffmannia mexicana* (Link, Klotzsch & Otto) Hemsl. Biol. Centr. Amer.

Bot. 2: 37. 1881.

Higginsia mexicana Link, Klotzsch & Otto, Icon. Pl. Rar. Hort. Berol. 1: 57. pl. 23. 1841.

Veracruz; Chiapas (?); described from cultivated plants.

Slender shrub, 0.6 to 1.2 meters high; leaves slender-petiolate, 2 to 9.5 cm. long, acute or acuminate, puberulent or villosulous beneath along the veins; corolla yellow, 7 mm. long; fruit red, 5 to 9 mm. long.

7. *Hoffmannia orizabensis* Standl. Contr. U. S. Nat. Herb. 20: 205. 1919.

Type from the region of Orizaba, Veracruz.

Low shrub; leaves slender-petiolate, elliptic or elliptic-oblong, 3 to 8 cm. long, acute, rufous-villosulous beneath along the veins; cymes about 4-flowered; corolla 12 to 13 mm. long.

8. *Hoffmannia cuneatissima* Robinson, Proc. Amer. Acad. 45: 407. 1910.

Morelos; type from Cuernavaca, altitude 1,950 meters.

Shrub; leaves slender-petiolate, oblanceolate or obovate, 6 to 16 cm. long, short-acuminate, puberulent beneath along the veins; cymes 4 to 8 flowered; corolla yellowish, 1 cm. long; fruit 5 mm. in diameter.

9. *Hoffmannia chiapensis* Standl. Contr. U. S. Nat. Herb. 20: 206. 1919.

Type from Cerro del Boquerón, Chiapas.

Leaves slender-petiolate, 10 to 19 cm. long, acuminate; cymes few or many-flowered; corolla yellow, 10 to 12 mm. long.

10. *Hoffmannia konzattii* Robinson, Proc. Amer. Acad. **45**: 406. 1910.

Type from Colonia Melchor Ocampo, Veracruz, altitude 1,200 meters.

Glabrous shrub; leaves petiolate, 11 to 16 cm. long, long-attenuate at base, paler beneath; cymes about 6-flowered; corolla 6 mm. long.

11. *Hoffmannia strigillosa* Hemsl. Diag. Pl. Mex. 31. 1879.

Described from Mexico, the locality not known.

Shrub; leaves short-petiolate, 15 to 20 cm. long, long-attenuate at base; cymes few-flowered.

28. *MACHAONIA* Humb. & Bonpl. Pl. Aequin. **1**: 701. 1808.

Shrubs or small trees; flowers small, white or whitish, the inflorescence terminal; calyx tube compressed, the limb 4 or 5-lobate, the lobes persistent; corolla short-funnelform, the throat villous, the 4 or 5 lobes rounded, imbricate; fruit oblong or obpyramidal, compressed, dicocous, the cells indehiscent, 1-seeded.

Leaves oblong-linear or linear-oblong, less than 4 mm. wide, mostly fasciculate-----

1. ***M. coulteri***.

Leaves broader than oblong-linear, 5 to 35 mm. broad, opposite or ternate.

Leaves copiously short-pilose or puberulent beneath.

Calyx lobes longer than broad, acute or acutish-----

2. ***M. velutina***.

Calyx lobes as broad as long, rounded-----

3. ***M. acuminata***.

Leaves glabrous beneath or nearly so.

Calyx lobes glabrous, not ciliolate, usually truncate; leaves linear-lanceolate.

4. ***M. pringlei***.

Calyx lobes puberulent or ciliolate, not truncate; leaves mostly ovate or elliptic.

Tube of the calyx densely covered with minute whitish appressed hairs, the lobes ovate, as long as the corolla tube-----

5. ***M. floribunda***.

Tube of the calyx sparsely pilose with short spreading hairs or glabrate, the lobes obovate, shorter than the corolla tube---

6. ***M. lindeniana***.

1. *Machaonia coulteri* (Hook. f.) Standl. Contr. U. S. Nat. Herb. **20**: 209. 1919.

Microsplenium coulteri Hook. f. in Benth. & Hook. Gen. Pl. **2**: 4. 1873.

Machaonia fasciculata A. Gray, Proc. Amer. Acad. **19**: 77. 1883.

Querétaro and Hidalgo; type from Zimapán, Hidalgo.

Unarmed shrub; leaves subsessile, 5 to 16 mm. long, rounded or obtuse at apex, sparsely short-pilose or glabrous; inflorescence few or many-flowered, 1 to 2.5 cm. broad; calyx lobes orbicular; corolla yellowish, 4 to 5 mm. long. "Huele de noche del campo" (Querétaro).

2. *Machaonia velutina* Mart. & Gal. Bull. Acad. Brux. **11**¹: 134. 1844.

Machaonia veracruzana Baill. Bull. Soc. Linn. Paris. **1**: 204. 1879.

Machaonia hahniana Baill. Bull. Soc. Linn. Paris. **1**: 204. 1879.

Veracruz; type from Puente Nacional.

Shrub, usually unarmed; leaves petiolate, broadly ovate to oblong-ovate, 2.5 to 3.5 cm. long, acute or short-acuminate; cymes 2.5 to 5 cm. broad; corolla ochroleucous; fruit 4 to 5 mm. long.

3. *Machaonia acuminata* Humb. & Bonpl. Pl. Aequin. **1**: 101. 1808.

Veracruz and Tabasco. Panama and South America; type from Ecuador.

Shrub or tree, sometimes 10 meters high; leaves short-petiolate, ovate or ovate-elliptic, 5 to 10 cm. long, acute or short-acuminate, tomentulose or short-pilose beneath; inflorescence much branched, 6 to 10 cm. broad; corolla 4 to 5 mm. long; fruit 5 mm. long.

4. *Machaonia pringlei* A. Gray, Proc. Amer. Acad. 21: 380. 1886.

Type from mountains near Jimulco, Coahuila.

Shrub, 1 to 2 meters high; leaves short-petiolate, 3 to 6 cm. long, long-attenuate at each end, glabrous; cymes 3 to 6.5 cm. broad; corolla 4 mm. long.

5. *Machaonia floribunda* Greenm. Proc. Amer. Acad. 33: 488. 1898.

Type collected near Tampico, Tamaulipas.

Shrub or small tree, 3 to 4.5 meters high; leaves short-petiolate, 3 to 5 cm. long, acute or acuminate, glabrous beneath or sparsely puberulent along the costa; inflorescence much branched, 5 to 7 cm. wide; corolla white, 2 mm. long.

6. *Machaonia lindeniana* Baill. Bull. Soc. Linn. Paris 1: 204. 1879.

Campeche and Yucatán; type from Campeche.

Shrub or tree, 4 to 9 meters high; leaves short-petiolate, 2 to 4 cm. long, obtuse to short-acuminate, short-barbate beneath in the axils of the nerves, elsewhere glabrous; inflorescence 4 to 7 cm. broad; corolla ochroleucous, 3 mm. long; fruit 2 to 2.5 mm. long.

DOUBTFUL SPECIES.

MACHAONIA GALEOTTIANA Baill. Bull. Soc. Linn. Paris 1: 204. 1879. Type from Veracruz.

29. *CHOMELIA* Jacq. Enum. Pl. Carib. 1. 1760.

Shrubs, often armed with spines; flowers small, white or yellow, usually in axillary pedunculate cymes; calyx limb 4-lobate, the lobes persistent; corolla salverform or funnelform, the tube slender, elongate, the 4 lobes valvate or subimbriate; fruit drupaceous, osseous, 2-celled, the cells 1-seeded.

Corolla lobes long, attenuate; plants usually armed with spines... 1. *C. spinosa*.

Corolla lobes short, obtuse; plants unarmed.

Corolla tube 15 mm. long..... 2. *C. barbata*.

Corolla tube 10 mm. long or less.

Calyx lobes oblong or linear, 1 to 1.5 mm. long; leaves pubescent beneath with spreading hairs..... 3. *C. pringlei*.

Calyx lobes minute, as broad as long; leaves sericeous beneath, at least along the veins..... 4. *C. protracta*.

1. *Chomelia spinosa* Jacq. Stirp. Amer. 18. 1760.

Guettarda armata Bartl.; DC. Prodr. 4: 457. 1830.

Chomelia filipes Benth.; Oerst. Nat. For. Kjöbenhavn Vid. Medd. 41. 1852.

Anisomeris purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 70. 1914.

Oaxaca and Chiapas. Central America and Colombia; type from Cartagena, Colombia.

Shrub, armed at the axils with long stout spines; leaves petiolate, rounded-ovate to oblong-ovate, 4 to 8 cm. long, rounded to short-acuminate at apex, pilose beneath, especially along the veins; cymes few-flowered; calyx lobes lanceolate; corolla sericeous, the tube 12 to 22 mm. long; fruit 9 to 12 mm. long.

2. *Chomelia barbata* Standl. Journ. Washington Acad. Sci. 13: 7. 1923.

Type from Chacahua, Distrito de Juquila, Oaxaca.

Leaves slender-petiolate, the blades elliptic, 3.5 to 5.5 cm. long, obtuse or acutish, rounded to acute at base, densely barbate beneath along the costa; cymes few-flowered, on very slender peduncles; calyx lobes minute; corolla appressed-pilosulous; fruit white, 2-celled, oblong, 1 to 1.5 cm. long.

3. *Chomelia pringlei* S. Wats. Proc. Amer. Acad. 26: 137. 1891.

Type from Tamasopo Canyon, San Luis Potosí.

Shrub or small tree, 4.5 meters high; leaves short-petiolate, elliptic or oval, 4.5 to 7.5 cm. long, acute or short-acuminate; cymes 3 to 6-flowered; corolla 8 to 9 mm. long, short-pilose; fruit 5 to 6 mm. long.

4. *Chomelia protracta* (Bartl.) Standl.*Guettarda protracta* Bartl.; DC. Prodr. 4: 457. 1830.*Antirrhea protracta* Hemsl. Biol. Centr. Amer. Bot. 2: 42. 1881.

Guerrero to Oaxaca. Guatemala and Honduras.

Shrub; leaves short-petiolate, oblong-lanceolate or oblong-elliptic, 7 to 15 cm. long, long-acuminate, acute at base; cymes few or many-flowered; corolla sericeous, the tube 7 to 10 mm. long; fruit oval, 4 to 5 mm. long.

30. GUETTARDA L. Sp. Pl. 991. 1753.

Shrubs or trees; flowers small, perfect, in axillary, bifurcate or congested cymes, sometimes solitary, usually secund; calyx truncate or dentate; corolla funnelform or salverform, the tube elongate, the lobes obtuse, imbricate; fruit drupaceous, the flesh very thin, the stone hard, 4 to 9-celled, the cells 1-seeded.

Leaves cordate or subcordate at base, mostly 10 to 14 cm. wide. 1. *G. seleriana*.

Leaves acute to rounded at base, less than 10 cm. wide.

Pubescence of the lower surface of the leaves of spreading hairs. 2. *G. filipes*.

Pubescence of the lower surface of the leaves of appressed hairs.

Leaves loosely tomentose on the upper surface when young. 3. *G. galeottii*.

Leaves glabrous or nearly so on the upper surface.

Stipules obtuse; corolla 6 to 8 mm. long. 4. *G. dichotoma*.

Stipules acuminate; corolla 9 to 12 mm. long. 5. *G. elliptica*.

1. *Guettarda seleriana* (Loesener) Standl.*Guettarda scabra seleriana* Loesener, Repert. Sp. Nov. Fedde 18: 361. 1922.

Type from Chichen Itzá, Yucatán.

Shrub; leaves short-petiolate, rounded or rounded-elliptic, 12 to 16 cm. long, obtuse or acutish, green and glabrate above, beneath paler, in age hirtellous-puberulent, when young sericeous-strigose; cymes many-flowered, on elongate peduncles; corolla tube about 2 cm. long, densely retrorse-sericeous.

2. *Guettarda filipes* Standl. Contr. U. S. Nat. Herb. 20: 210. 1919.

Sinaloa and Durango; type from Huasemote, Durango.

Shrub, 2 to 2.5 meters high; leaves short-petiolate, ovate to elliptic-oblong, 3 to 5.5 cm. long, obtuse or short-acuminate; cymes few-flowered, on long slender peduncles; corolla sericeous, the tube 6 to 7 mm. long. "Negrito" (Sinaloa).

3. *Guettarda galeottii* Standl., sp. nov.Type from Pinotepa, Oaxaca (*Galeotti* 2576; U. S. Nat. Herb. no. 572993).

Branchlets densely pilose-sericeous; stipules triangular-lanceolate, 5 to 7 mm. long, attenuate-acuminate; leaves opposite, the petioles 2 to 4 mm. long, the blades ovate or oval-ovate, 3 to 5 cm. long, 1.7 to 2.7 cm. wide, rounded at base, acutely acuminate at apex, loosely and thinly tomentose above when young, becoming glabrate, paler beneath, appressed-pilose, especially along the nerves; cymes dense, many-flowered, the peduncles 1 to 1.5 cm. long, densely pilose, the flowers sessile, the bractlets minute; hypanthium densely pilose, the calyx very sparsely short-pilose, 0.5 mm. long, truncate or obscurely lobate; corolla sericeous outside, the tube slender, 7 mm. long, the 4 lobes rounded, about 1 mm. long.

4. *Guettarda dichotoma* Mart. & Gal. Bull. Acad. Brux. 11¹: 233. 1844.

Type from Consoquitla, Veracruz.

Leaves short-petiolate, ovate, 5 cm. long, acutish, glabrous above; corolla sericeous.

5. *Guettarda elliptica* Swartz, Prodr. Veg. Ind. Occ. 59. 1788.? *Guettarda tetrandra* Sessé & Moc. Fl. Mex. ed. 2. 218. 1894.*Guettarda insularis* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 416. 1924.

Sinaloa to Colima; Socorro Island; Yucatán. Southern Florida; West Indies; type from Jamaica.

Shrub or tree, sometimes 8 meters high; leaves petiolate, usually oval, 1 to 7 cm. long, usually rounded or obtuse and apiculate at apex, truncate to acute at base, appressed-pilose or glabrate above; cymes 1 to 9-flowered; corolla white, sericeous; fruit subglobose, purplish, 4 to 8 mm. in diameter, 2 to 4-celled.

DOUBTFUL SPECIES.

GUETTARDA DEALBATA Mart. & Gal. Bull. Acad. Brux. 11¹: 232. 1844. Type from Oaxaca. Scarcely of this genus.

Hemsley reports *G. odorata* Lam., *G. parviflora* Vahl, and *G. scabra* Lam. from Mexico, but the writer has seen no Mexican specimens of these species. The specimens reported as *G. parviflora* are probably *G. elliptica*.

31. *ERITHALIS* P. Br.; L. Syst. Nat. ed. 10. 930. 1759.

1. *Erithalis fruticosa* L. Syst. Nat. ed. 10. 930. 1759.

Yucatán. Southern Florida; West Indies and Central America.

Shrub or small tree, 5 meters high or less; leaves petiolate, orbicular to oblong-obovate, 2 to 10 cm. long, rounded or obtuse at apex, acute to rounded at base, coriaceous, glabrous; flowers white, in axillary, usually many-flowered, pedunculate cymes; calyx obscurely denticulate; corolla 4 to 10 mm. long, glabrous, the lobes oblong-linear, obtuse; fruit drupaceous, globose, 2.5 to 4 mm. in diameter, black, composed of 5 to 10 carpels.

32. *CHIOCOCCA* P. Br.; L. Syst. Nat. ed. 10. 917. 1759.

Shrubs or small trees, often scandent or sarmentose; flowers small, usually white, in axillary, simple or paniculate, usually secund racemes; calyx 5-lobate, persistent; corolla funnelform, the 5 lobes spreading or reflexed, valvate; fruit small, drupaceous, compressed, orbicular, composed of 2 1-seeded carpels.

Antthers nearly or quite equaling the corolla lobes, sometimes longer, the filaments exerted.....1. *C. phaenostemon*.

Antthers only slightly exceeding the corolla tube or included, the filaments wholly included.

Leaves pubescent.....2. *C. pubescens*.

Leaves glabrous.

Limb of the corolla 8 to 10 mm. wide; calyx lobes semiorbicular or nearly obsolete; leaves mostly 3.5 to 6 cm. wide; fruit only slightly compressed.....3. *C. pachyphylla*.

Limb of the corolla 3 to 6 mm. wide; calyx lobes usually acute; leaves mostly narrower; fruit strongly compressed.....4. *C. alba*.

1. *Chiococca phaenostemon* Schlecht. Linnaea 9: 594. 1834.

Chiococca staminea Mart. & Gal. Bull. Acad. Brux. 11²: 231. 1844.

Veracruz, Puebla, and Chiapas; type from Jalapa, Veracruz.

Large shrub; leaves short-petiolate, mostly ovate-oblong or lance-oblong, 4 to 10.5 cm. long, acuminate, coriaceous, glabrous; racemes usually paniculate; corolla 5 to 8 mm. long; fruit compressed, 5 to 7 mm. long. "Jazmín de novia" (Veracruz).

2. *Chiococca pubescens* Standl. Contr. U. S. Nat. Herb. 20: 209. 1919.

Tamaulipas, Puebla, and Oaxaca; type from San Luis Tultitlanapa, Puebla.

Leaves short-petiolate, ovate to lance-oblong, 3 to 6 cm. long, short-acuminate; racemes few-flowered; corolla 5 to 6 mm. long; fruit pubescent.

3. **Chiococca pachyphylla** Wernham, Journ. Bot. Brit. & For. 51: 323. 1913.
Nuevo León to Veracruz; type collected between Acatlán and Chiconquiaco, Veracruz.

Shrub or tree, glabrous except in the inflorescence; leaves petiolate, elliptic-oblong to ovate, 7 to 14 cm. long, short-acuminate, coriaceous; racemes paniculate; corolla 7 to 8 mm. long, reddish outside; fruit 6 to 7 mm. in diameter.

4. **Chiococca alba** (L.) Hitchc. Rep. Mo. Bot. Gard. 4: 94. 1893.

Lonicera alba L. Sp. Pl. 175. 1753.

Chiococca racemosa L. Syst. Nat. ed. 10. 917. 1759.

Chiococca macrocarpa Mart. & Gal. Bull. Acad. Brux. 11¹: 230. 1844.

Chiococca coriacea Mart. & Gal. Bull. Acad. Brux. 11¹: 231. 1844.

Baja California and Sonora to Tamaulipas, Veracruz, Yucatán, and Chiapas. Florida; West Indies; Central and South America; type from Jamaica.

Shrub, sometimes scandent; leaves petiolate, lanceolate to oval, 2.5 to 9 cm. long, usually short-acuminate; racemes simple or paniculate; corolla 6 to 8 mm. long, white or yellowish white; fruit white, 4 to 8 mm. long. "Suelda con suelda," "oreja de ratón" (*Lumholtz*); "xeanchac-ché" (Yucatán, Maya); "cainca" (*Herrera*; Colombia); "canica," "caninana" (*Ramírez*); "perlilla" (*Sessé & Mociño*); "madreselva" (Nicaragua); "bejuco de berac" (Porto Rico); "bejuco de berraco" (Cuba); "lágrimas de San Pedro," "aceitillo" (El Salvador); "lágrimas de María" (Panama).

The plant was formerly used in Brazil as a remedy for dropsy and has been so used in Europe. It is reported to have diuretic, acrid, tonic, astringent, vomitive, and pectoral properties, and has been employed for venereal diseases, rheumatism, and other affections. The leaves are sometimes applied as poultices to sores.

DOUBTFUL SPECIES.

SIPHONANDRA MEXICANA Turcz. Bull. Soc. Nat. Moscou 21²: 581. 1848. Type from Oaxaca. The genus has been referred to *Chiococca*, but the position of the plant is doubtful.

33. **ASEMNANTHE** Hook. f. in Benth. & Hook. Gen. Pl. 2: 106. 1873.

A single species is known.

1. **Asemnanthe pubescens** Hook. f. in Benth. & Hook. Gen. Pl. 2: 107. 1873.
Yucatán.

Shrub or small tree, 1 to 6 meters high; leaves short-petiolate, lanceolate or ovate, 2.5 to 7 cm. long, acute or acuminate, rounded to acute at base, densely pilose beneath; flowers yellow, in few-flowered axillary fascicles; calyx 4-lobate, the lobes lance-linear, persistent; corolla urceolate-tubular, longer than the calyx lobes, short-pilose, the limb with 4 small lobes; fruit drupaceous, suborbicular, compressed, 4 to 4.5 mm. long, pubescent, the cells 1-seeded.

34. **PLACOCARPA** Hook. f. in Benth. & Hook. Gen. Pl. 2: 107. 1873.

A single species is known.

1. **Placocarpa mexicana** Hook. f. in Benth. & Hook. Gen. Pl. 2: 108. 1873.
Veracruz and Oaxaca; type from Orizaba, Veracruz.

Shrub about 1 meter high; leaves short-petiolate, oblong or obovate-oblong, 1 to 2 cm. long, acute or obtuse, acute at base, glabrous; flowers axillary, solitary, pedicellate; calyx lobes obovate-oblong, 4 mm. long, obtuse; corolla white, salverform, the tube 10 to 12 mm. long, the 4 lobes oval, rounded at apex; fruit laterally compressed, 2-celled, separating into 2 indehiscent cocci.

35. *COFFEA* L. Sp. Pl. 172. 1753.1. *Coffea arabica* L. Sp. Pl. 172. 1753.

Cultivated in Mexico and in some localities naturalized. Native of tropical Africa; cultivated in all tropical regions.

Glabrous shrub or small tree; leaves short-petiolate, oblong-oval to lance-elliptic, 9 to 18 cm. long, acuminate, acute at base, lustrous; flowers white, glomerate in the leaf axils; calyx obscurely dentate; corolla salverform, 1.5 to 2 cm. long, the 5 lobes acute; fruit baccate, oval or subglobose, 10 to 16 mm. long, red, the 2 seeds semiellipsoid, 8 to 12 mm. long, sulcate on the inner side. "Café."

Coffee is grown in most of the warmer regions of Mexico and it is one of the important agricultural products of the country. The most important states in coffee production are Veracruz, Chiapas, Oaxaca, and Tabasco, but Veracruz is reported to produce a larger amount than all the other states combined. The shrub is said to have been cultivated first at Córdoba. It is reported to be abundant in the wild state in some parts of Veracruz.

Coffea liberica Hiern, the Liberian coffee, also is cultivated in Mexico. It is distinguished by having a 6 to 8-lobed corolla. It can be grown at lower levels than *C. arabica*, and is more robust and productive.

36. *STRUMPFIA* Jacq. Enum. Pl. Carib. 8. 1760.1. *Strumpfia maritima* Jacq. Enum. Pl. Carib. 28. 1760.

Yucatán. Florida Keys; West Indies; type from Jamaica.

Densely branched shrub, 2 meters high or less; leaves ternate, linear, 1 to 3 cm. long, acute, rigid, whitish-tomentulose beneath, the margins revolute; flowers in axillary pedunculate few-flowered racemes; calyx 5-lobate, the lobes persistent; corolla pink, deeply 5-lobate, 3 to 4 mm. long, sericeous or tomentulose; fruit drupaceous, white, 4 mm. in diameter, 1 or 2-celled. "Lirio" (Porto Rico).

In the West Indies the plant is reported to have been used as a remedy for fevers.

37. *RUDGEA* Salisb. Trans. Linn. Soc. Bot. 8: 327. 1807.1. *Rudgea fimbriata* (Benth.) Standl. in Standl. & Cald. Lista Pl. El Salvador 274. 1925.

Psychotria fimbriata Benth. Journ. Bot. Hook. 3: 226. 1841.

Chiapas. Central America and northern South America; type from the Essequibo River, British Guiana.

Glabrous shrub; leaves very short-petiolate, elliptic to lance-elliptic, mostly 9 to 15 cm. long, long-acuminate, acute or acuminate at base; flowers whitish, in small terminal panicles, the flowers mostly short-pedicellate; calyx truncate; corolla about 5 mm. long; fruit white, subglobose, 6 mm. in diameter. "Huataco" (Costa Rica).

38. *PSYCHOTRIA* L. Syst. Nat. ed. 10. 929. 1759.

Shrubs or small trees; flowers small, in terminal or axillary cymes, panicles, or corymbs; calyx tube short, the limb truncate or lobate; corolla funnelform, the tube short or elongate, straight, the limb 4 or 5-lobate; fruit drupaceous, containing two 1-seeded nutlets.

Inflorescences all axillary-----1. *P. anomothyrsa*.

Inflorescences mostly terminal, sometimes borne in the forks of the branches.

Leaves pubescent or puberulent beneath, usually densely so, sometimes merely villous or barbate along the costa.

Bracts much exceeding the calyx, even in fruit-----2. *P. purpusii*.

Bracts small and inconspicuous.

Branchlets usually glabrous.

Corolla about 15 mm. long; leaves barbate beneath along the costa.

3. *P. pinularis*.

Corolla 5 mm. long or less; leaves not barbate beneath.

4. *P. horizontalis*.

Branchlets pubescent, puberulent, or villous.

Cymes sessile, branching from the base.

Stipules large, brown, sheathing, finally split along one side.

5. *P. undata*.

Stipules short-deltoid, not sheathing-----6. *P. pulverulenta*.

Cymes pedunculate.

Stipules large and sheathing, brown-----7. *P. erythrocarpa*.

Stipules small, greenish, not sheathing.

Corolla minutely granular-puberulent-----8. *P. pubescens*.

Corolla hirtellous or villosulous-----9. *P. hebeclada*.

Leaves glabrous beneath.

Bracts large and conspicuous.

Bracts obtuse; inflorescence loosely branched-----10. *P. chiapensis*.

Bracts long-acuminate; inflorescence headlike or trichotomous.

11. *P. involucrata*.

Bracts small and inconspicuous.

Stipules persistent, greenish, bilobate.

Branches of the inflorescence reflexed-----12. *P. patens*.

Branches not reflexed-----13. *P. cuspidata*.

Stipules deciduous, brown, entire.

Leaves coriaceous, broadly obovate, broadest above the middle.

14. *P. oerstediana*.

Leaves thin, broadest at or near the middle.

Calyx lobes short, ovate or deltoid, often obtuse.

Leaves mostly elliptic and 6 to 11 cm. wide----15. *P. trichotoma*.

Leaves narrowly elliptic-oblong or lance-elliptic, 1.5 to 5 cm. wide.

16. *P. papantlensis*.

Calyx lobes elongate, lanceolate or linear-lanceolate.

Leaves mostly elliptic and 3 to 6 cm. wide----4. *P. horizontalis*.

Leaves narrowly elliptic-oblong, 1 to 2 cm. wide.

17. *P. oaxacana*.

1. *Psychotria anomothyrsa* K. Schum. & Donn. Smith, Bot. Gaz. 35: 3. 1903.

Chiapas. Central America to Peru; type from Cubilquitz, Guatemala.

Shrub, 1 to 1.5 meters high, glabrous; leaves long-petiolate, elliptic to oblong, 15 to 25 cm. long, acuminate; flowers white, in axillary pedunculate panicles; corolla about 6 mm. long; fruit white.

P. nicotianaefolia Mart. & Gal.¹ is probably closely related to this species if not identical with it.

2. *Psychotria purpusii* Standl., sp. nov.

Type from Cerro del Boquerón, Chiapas (*Purpus* 7012; U. S. Nat. Herb. no. 567269).

Branchlets sordid-villous; leaves slender-petiolate, elliptic, 9 to 12 cm. long, 4 to 5 cm. wide, acuminate, acute at base, fulvous-villosulous above, densely villosulous beneath; flowers in terminal long-pedunculate corymbs about 5 cm. broad; bracts foliaceous, equaling or longer than the flowers, the sessile or short-pedicellate; corolla 8 mm. long in bud, densely villous; fruit 6 mm. long, deeply sulcate, villous.

¹ Bull. Acad. Brux. 11¹: 229. 1844.

3. *Psychotria pinularis* Sessé & Moc. Fl. Mex. ed. 2. 57. 1894.

Sinaloa to Guerrero. West Indies and South America; type from Porto Rico.

Shrub, nearly glabrous; leaves mostly obovate, 4 to 7 cm. long, obtuse to short-acuminate, attenuate to the base, thin, glabrous except for tufts of hairs beneath in the axils of the lateral nerves; cymes few-flowered, the flowers pedicellate, white. "Crucecilla" (Sinaloa).

4. *Psychotria horizontalis* Swartz, Prodr. Veg. Ind. Occ. 44. 1788.

Sinaloa to Chiapas. Greater Antilles; Central America and northern South America.

Shrub, 4 meters high or less; leaves short-petiolate, narrowly or broadly elliptic, 5 to 12 cm. long, long or short-acuminate, acute or obtuse at base, rufous-villous beneath along the costa or glabrous; cymes slender-pedunculate, usually many-flowered; fruit red.

5. *Psychotria undata* Jacq. Pl. Hort. Schönbr. 3: 5. pl. 260. 1798.

Psychotria rufescens H. B. K. Nov. Gen. & Sp. 3: 364. 1818.

Veracruz; Oaxaca (?). Florida; West Indies; Central America.

Shrub, 1 to 3 meters high; stipules thin, brown, deciduous; leaves elliptic-oblong to elliptic, 15 cm. long or less, acuminate, pubescent or glabrate; inflorescence fulvous-villous; corolla white; fruit 5 to 6 mm. long, red, glabrous or pubescent. "Huesito" (Panama).

Psychotria sessilifolia Mart. & Gal.,¹ described from Veracruz, is perhaps to be referred here.

6. *Psychotria pulverulenta* Urban, Symb. Antill. 7: 456. 1913.

Reported from Mexico (San Luis Potosí ?) by Urban. Florida; Greater Antilles; Cuba.

Leaves lanceolate or elliptic-lanceolate, 7 to 15 cm. long, acuminate, pilosulous or puberulent beneath; cymes often borne in the forks of the branches; corolla 3 mm. long, glabrous; fruit 10-costate, 3.5 to 4 mm. long.

7. *Psychotria erythrocarpa* Schlecht. Linnaea 9: 595. 1834.

Tamaulipas and San Luis Potosí to Chiapas; type from Hacienda de la Laguna, Veracruz.

Shrub, the branchlets densely pubescent; leaves short-petiolate, mostly obovate or oblong-obovate, 4 to 9 cm. long, obtuse to short-acuminate, obtuse to attenuate at base, densely pubescent beneath; cymes short and small, usually 2 to 3 cm. wide; corolla pubescent; fruit red, pubescent.

Closely related and perhaps not specifically different is *Mapouria chamissoana* Loesener (Verh. Bot. Ver. Brand. 56: 112. 1923).

8. *Psychotria pubescens* Swartz, Prodr. Veg. Ind. Occ. 44. 1788.

Guerrero to Veracruz. West Indies and Central America.

Shrub, 1 to 3 meters high; leaves short-petiolate, oblanceolate to elliptic, 6 to 14 cm. long, acuminate, acute at base, thin, finely puberulent beneath; inflorescence corymbose, loosely many-flowered, pubescent; corolla white, about 4 mm. long; fruit red.

9. *Psychotria hebeclada* DC. Prodr. 4: 513. 1830.

Veracruz and Oaxaca and perhaps elsewhere. Central America and Panama.

Shrub, 1 to 1.5 meters high, the branches densely pubescent; leaves short-petiolate, lance-oblong to elliptic, 7 to 18 cm. long, acuminate, acute to attenuate at base, thin; inflorescence corymbose, the flowers white or pinkish; fruit 3.5 mm. broad. "Huesito" (Panama).

¹ Bull. Acad. Brux. 11¹: 228. 1844.

Psychotria aureola Bartl.,¹ *P. justicioides* Schlecht.,² and *P. bracteolata* Mart. & Gal.³ all appear to be closely related to this species, judging from descriptions.

10. *Psychotria chiapensis* Standl., sp. nov.

Type from Finca Mexiquito, Chiapas (*Purpus* 6963; U. S. Nat. Herb. no. 567237).

Branchlets obscurely villosulous or glabrate; stipules green, persistent, 3 to 4 mm. long, bilobate, the lobes broad, obtuse; leaves petiolate, oblong-elliptic, 11.5 to 23 cm. long, 5 to 10 cm. wide, short-acuminate, acute at base, thin, glabrous; cymes pedunculate or sessile, trichotomous, 5 to 7 cm. broad, many-flowered, the flowers sessile, the bracts broad, rounded at apex; calyx limb 5 to 6 mm. long, puberulent, denticulate; corolla in bud 1.5 cm. long, nearly glabrous.

11. *Psychotria involucrata* Swartz, Prodr. Veg. Ind. Occ. 45. 1788.

Veracruz. West Indies; Central and South America.

Shrub, glabrous nearly throughout; leaves petiolate, ovate or elliptic, 8 to 14 cm. long, acuminate, acute at base; inflorescence at first dense and headlike, pedunculate, in age branched; fruit 3 to 4 mm. long, sharply costate.

12. *Psychotria patens* Swartz, Prodr. Veg. Ind. Occ. 45. 1788.

Psychotria flexuosa Willd. Sp. Pl. 1: 966. 1798.

Chiapas. Greater Antilles; Central America to Bolivia.

Shrub, 1 to 2 meters high, nearly glabrous; leaves short-petiolate, lanceolate to elliptic, 5 to 14 cm. long, usually long-acuminate; panicles long-pedunculate, narrow and thyriform; corolla white, 5 to 8 mm. long; fruit blue or black, 3 to 5 mm. broad.

13. *Psychotria cuspidata* Bredemeyer; Roem. & Schult. Syst. Veg. 5: 192. 1819.

Oaxaca, Chiapas, and Tabasco. Cuba; Central America to Brazil.

Slender shrub, nearly glabrous; leaves petiolate, ovate to elliptic or oblong-lanceolate, 7 to 18 cm. long, usually cuspidate-acuminate, acute or obtuse at base, thin, lustrous; panicles small, 1 to 3 cm. broad; corolla about 4 mm. long; fruit didymous, 4 mm. broad.

14. *Psychotria oerstediana* Standl.

Mapouria obovata Oerst. Amér. Centr. 17. pl. 14, f. 3, 4. 1863.

Psychotria obovata Hemsl. Biol. Centr. Amer. Bot. 2: 50. 1881. Not *P. obovata* Ruiz & Pav. 1799.

Veracruz.

Shrub, 1 to 1.5 meters high; leaves short-petiolate, 6 to 13 cm. long, rounded to short-acuminate at apex, cuneate at base, pale green; inflorescence short and dense at anthesis, open in fruit, sessile or nearly so; corolla about 5 mm. long; fruit glabrous.

15. *Psychotria trichotoma* Mart. & Gal. Bull. Acad. Brux. 11¹: 227. 1844.

Veracruz, Oaxaca, and Chiapas; type from the region of Jalapa and Mirador, Veracruz. Guatemala.

Shrub, 4.5 meters high or less; leaves short-petiolate, 10 to 25 cm. long, usually short-acuminate, acute at base; inflorescence usually large and much branched, puberulent; fruit sometimes 1 cm. long.

¹ DC. Prodr. 4: 513. 1830.

² Linnaea 9: 596. 1834.

³ Bull. Acad. Brux. 11¹: 228. 1844.

16. *Psychotria papantlensis* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 50. 1881.

Mapouria salicifolia Oerst. Amér. Centr. 17. pl. 14, f. 2. 1863.

?*Mapouria stipulata* Oerst. Amér. Centr. 17. pl. 14, f. 7. 1863.

?*Mapouria miradorensis* Oerst. Amér. Centr. 17. pl. 14, f. 9. 1863.

Psychotria salicifolia Hemsl. Biol. Centr. Amer. Bot. 2: 51. 1881. Not *P. salicifolia* H. B. K. 1818.

San Luis Potosí and Veracruz; Yucatán (?); type from Papantla, Veracruz.

Small shrub, nearly glabrous; leaves short-petiolate, 5 to 17 cm. long, acuminate, attenuate at base; cymes mostly sessile or nearly so, dense or in age open, the flowers white. "Cancerillo" (Yucatán), "pochitoco" (Veracruz).

17. *Psychotria oaxacana* Standl., sp. nov.

Type from Santo Domingo, Oaxaca, altitude 480 meters (Nelson 2688; U. S. Nat. Herb. no. 574444).

Branches slender, glabrous; leaves short-petiolate, lance-oblong or narrowly elliptic-oblong, 4 to 7 cm. long, 1 to 2 cm. wide, long-acuminate, acute or attenuate at base, thin, glabrous, blackish when dry; cymes on long slender peduncles, 1 to 2 cm. wide, the flowers short-pedicellate, glabrous; calyx lobes lance-subulate; corolla 3 mm. long, the lobes obtuse; anthers exserted.

DOUBTFUL SPECIES.

PSYCHOTRIA BIARISTATA Bartl.; DC. Prodr. 4: 513. 1830. Type from somewhere in Mexico; reported from Oaxaca.

PSYCHOTRIA LIMONENSIS LAXINERVIA Loesener, Repert. Sp. Nov. Fedde 18: 361. 1922. Type from Palenque, Chiapas. The species was described from the Atlantic coast of Costa Rica.

PSYCHOTRIA PADIFOLIA Willd.; Roem. & Schult. Syst. Veg. 5: 189. 1819. Type from Jalapa, Veracruz.

PSYCHOTRIA SCABRIUSCULA Bartl.; DC. Prodr. 4: 513. 1830. Type from Acapulco, Guerrero.

PSYCHOTRIA TOMENTOSA (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 51. 1881. *Mapouria tomentosa* Oerst. Amér. Centr. 17. pl. 14, f. 8. 1863. Type from Papantla, Veracruz.

39. *EVEA* Aubl. Pl. Guian. 1: 103. 1775.

Shrubs or small trees; flowers in terminal heads, these subtended by large or small, sessile, often connate bracts; calyx dentate, persistent; corolla funnelform or salverform, the tube straight, the limb 4 or 5-lobate, the lobes valvate; fruit drupaceous, containing 2 bony nutlets, these smooth or costate, 1-seeded.

Plants hirsute.....1. *E. tomentosa*.

Plants glabrous or nearly so.

Leaves petiolate; stipules bilobate, not setiferous.....2. *E. elata*.

Leaves sessile; stipules setiferous, not bilobate.....3. *E. chiapensis*.

1. *Evea tomentosa* (Aubl.) Standl. Contr. U. S. Nat. Herb. 18: 123. 1916.

Tapogomea tomentosa Aubl. Pl. Guian. 1: 160. 1775.

Cephaelis tomentosa Vahl, Eclog. Amer. 1: 19. 1796.

Cephaelis hirsuta Mart. & Gal. Bull. Acad. Brux. 11¹: 135. 1844.

Veracruz, Oaxaca, and Tabasco. Central and South America.

Shrub, 1 to 4 meters high, hirsute throughout; leaves short-petiolate, elliptic to elliptic-oblong, 10 to 25 cm. long, acuminate, acute at base; heads long-pedunculate, the bracts 3 to 6 cm. broad, bright red; corolla yellow.

2. *Evea elata* (Swartz) Standl. Contr. U. S. Nat. Herb. 18: 123. 1916.*Cephaelis elata* Swartz, Prodr. Veg. Ind. Occ. 45. 1788.*Cephaelis punicea* Vahl, Eclog. Amer. 1: 19. 1796.

Oaxaca and Chiapas. West Indies and Central America.

Shrub; leaves oblong-oblongeolate to elliptic-oblong, 10 to 25 cm. long, acuminate, acute to attenuate at base; heads often trichotomous, the bracts large, red or purplish.

3. *Evea chiapensis* Standl., sp. nov.

Type from Cerro del Boquerón, Chiapas (*Purpus* 6928; U. S. Nat. Herb. no. 567214).

Glabrous shrub; leaves sessile, lanceolate or oblong-lanceolate, 7 to 11 cm. long, long-acuminate, narrowed to the base, thin, very lustrous above; heads terminal, the peduncles about 1 cm. long; bracts green, 12 to 15 mm. long, acute, short-connate.

40. *PALICOUREA* Aubl. Pl. Guian. 1: 172. 1775.

Shrubs or small trees; flowers small, in chiefly terminal, usually thyriform panicles, sometimes corymbose; calyx entire or 5-lobate; corolla tube elongate, straight or curved, often gibbous, the limb 5-lobate, the lobes valvate; fruit baccate, usually containing 2 1-seeded nutlets.

Calyx lobate; flowers in pedunculate panicles-----1. *P. galeottiana*.

Calyx truncate; flowers in sessile corymbs-----2. *P. nigrescens*.

1. *Palicourea galeottiana* Mart. Bull. Acad. Brux. 11¹: 136. 1844.*?Psychotria mexicana* Willd.; Roem. & Schult. Syst. Veg. 5: 189. 1819.

Palicourea mexicana Benth.; Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 37. 1853.

Palicourea costaricensis Benth.; Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 38. 1853.

Veracruz, Puebla, Oaxaca, and Chiapas; type from Oaxaca. Central America and Panama.

Shrub, 2 to 4.5 meters high, glabrous or nearly so; stipules bilobate; leaves short-petiolate, oblong or elliptic-oblong, 7 to 20 cm. long, acuminate, acute at base; panicles longer or shorter than the leaves, the branches yellowish or reddish; corolla orange, 1.5 to 2 cm. long; fruit about 5 mm. in diameter.

2. *Palicourea nigrescens* Mart. & Gal. Bull. Acad. Brux. 11¹: 136. 1844.

Veracruz; type from Jalapa.

Shrub; leaves short-petiolate, ovate-lanceolate or elliptic-oblong, 10 to 15 cm. long, acuminate, acute or attenuate at base, glabrous or nearly so; corymbs much shorter than the leaves; corolla pink, 6 to 7 mm. long.

DOUBTFUL SPECIES.

PALICOUREA GARDENIOIDES (Scheidw.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 52. 1881. *Rhodostoma gardenioides* Scheidw. in Otto & Dietr. Allgem. Gartenzeit 10: 286. 1842. Veracruz.

41. *PAEDERIA* L. Mant. Pl. 1: 7. 1767.**1. *Paederia pringlei*** Greenm. Proc. Amer. Acad. 39: 92. 1903.

Guerrero and Morelos; type from Yautepec, Morelos, altitude 1,385 meters.

Slender shrub, scandent to a height of 6 meters; leaves long-petiolate, ovate or broadly ovate, 3 to 8 cm. long, abruptly acuminate, rounded or cordate at base, villous beneath or finally glabrate; flowers in lax axillary cymes or panicles; calyx lobes linear or lanceolate; corolla funnellform, 12 to 14 mm. long; fruit oval, 10 to 12 mm. long, glabrous, strongly compressed, 2-celled, each cell 1-seeded.

42. FARAMEA Aubl. Pl. Guian. 1: 102. 1775.

1. *Faramea occidentalis* (L.) A. Rich. Mém. Soc. Hist. Nat. Paris 5: 176. 1834.

Ixora occidentalis L. Syst. Nat. ed. 10. 893. 1759.

Faramea odoratissima DC. Prodr. 4: 496. 1830.

Veracruz. West Indies; Central and South America.

Glabrous shrub or tree, sometimes 15 meters high; bark smooth, gray; leaves short-petiolate, narrowly oblong to oval, 6 to 18 cm. long, cuspidate-acuminate, acute at base, coriaceous, lustrous; flowers white, fragrant, in terminal and axillary, lax, few-flowered cymes, pedicellate; calyx truncate; corolla salverform, the tube about 17 mm. long, the lobes narrow, 12 mm. long; fruit nearly 1 cm. in diameter, drupaceous, finally black, 1-celled, 1-seeded; sapwood thin, nearly white, the heartwood darker, tinged with yellow, hard, moderately heavy, very tough, close-grained, taking a good polish. "Hueso" (Veracruz, *Ramírez*); "huesito" (Panama); "palo de toro," "cafetillo" (Porto Rico); "café cimarrón," "nabaco," "jujano" (Cuba); "cafecillo" (El Salvador).

43. MORINDA L. Sp. Pl. 176. 1753.

1. *Morinda yucatanensis* Greenm. Field Mus. Bot. 2: 262. 1907.

Yucatán; type from Izamal.

Shrub, subscandent; leaves short-petiolate, lance-oblong to oblong-obovate or elliptic, 5 to 12 cm. long, acute or acuminate, acute or attenuate at base, pubescent, especially beneath; flowers in short-pedunculate or sessile, globose heads 12 mm. or less in diameter, coalescent in fruit; calyx truncate; corolla tubular-funnelform, 7 mm. long, the limb 5-lobate; fruit a succulent syncarp; nutlets 6 mm. long, smooth. "Joyoc," "xo-yen-cab" (Maya).

The Yucatán plant has been referred to *M. royoc* L., a closely related species of Central America and the West Indies.

44. ERNODEA Swartz, Prodr. Veg. Ind. Occ. 29. 1788.

1. *Ernodea litoralis* Swartz, Prodr. Veg. Ind. Occ. 29. 1788.

Yucatán. Southern Florida, West Indies, and Honduras, on coastal rocks and sands.

Prostrate or spreading shrub; leaves crowded, lanceolate or lance-oblong, 1 to 2.5 cm. long, acute, narrowed below, sessile or nearly so, coriaceous, leathery, glabrous, 3-nerved; flowers yellow, solitary and sessile in the leaf axils; calyx 4 to 6-lobate, the lobes lance-subulate; corolla funnelform, the tube 1 cm. long, the 4 to 6 lobes narrow, valvate; fruit drupaceous, 2-celled, yellow, 4 to 6 mm. long, the nutlets cartilaginous, united, 1-seeded.

45. TRIODON DC. Prodr. 4: 566. 1830.

1. *Triodon angulatum* Benth. Pl. Hartw. 70. 1840.

Veracruz, Oaxaca, and Chiapas; reported from Tabasco or Yucatán; type from Teotolcingo, Oaxaca. Guatemala.

Erect or prostrate shrub, glabrous or puberulent; leaves oblong to elliptic, 4 to 20 mm. long, opposite or often appearing verticillate, obtuse or acute, short-petiolate; flowers clustered in the leaf axils; calyx 4-dentate; corolla about 2 mm. long; fruit small, dicoccous, 2-seeded.

46. GALIUM L. Sp. Pl. 105. 1753.

Herbs or rarely shrubs; leaves verticillate; flowers small, usually in axillary or terminal cymes, white or yellow; calyx limb obsolete; corolla rotate, commonly 4-lobate, the lobes valvate; fruit didymous, dry or fleshy, 2-celled, indehiscent.

Numerous herbaceous species occur in Mexico.

- Fruit hirsute.....1. **G. stellatum**.
 Fruit glabrous.....2. **G. angulosum**.

1. **Galium stellatum** Kellogg, Proc. Calif. Acad. 2: 97. f. 26. 1863.

Baja California; type from Cedros Island. Utah, Arizona, and southern California.

Much-branched shrub, 60 cm. high or less, the branchlets hirtellous; leaves in 4's or 5's, linear-lanceolate to ovate, 5 to 15 mm. long, 1-nerved; corolla white.

2. **Galium angulosum** A. Gray, Proc. Amer. Acad. 11: 74. 1876.

Guadalupe Island, Baja California.

Branchlets hirsute-pubescent; leave in whorls of 4 to 7, linear-oblong or elliptic-oblong, 6 to 10 mm. long, acute; corolla greenish white.

DOUBTFUL GENERA.

BERGHESIA COCCINEA Nees, Linnaea 20: 702. 1847. Type from somewhere in Mexico.

154. CAPRIFOLIACEAE. Honeysuckle Family.

Shrubs or trees; leaves opposite, usually estipulate; flowers perfect, regular or irregular; calyx tube adnate to the ovary, the limb 3 to 5-dentate or lobate; corolla gamopetalous, the limb regular or irregular, often bilabiate, the 5 lobes imbricate; stamens usually 5, inserted on the corolla tube; style simple or parted; ovules usually solitary in the cell; fruit baccate, drupaceous, or dry, 1 to 5-celled.

Leaves pinnate.....1. **SAMBUCUS**.

Leaves simple.

Corolla rotate or nearly so.....2. **VIBURNUM**.

Corolla tubular or funnelform.

Fruit dry; flowers in terminal cymes.....3. **ABELIA**.

Fruit fleshy; flowers mostly axillary, or in terminal spikes or heads.

Cells of the ovary 1-ovulate; plants erect; flowers mostly sessile in the leaf axils.....4. **SYMPHORICARPOS**.

Cells of the ovary many-ovulate; plants erect or scandent; flowers never sessile in the axils.....5. **LONICERA**.

1. **SAMBUCUS** L. Sp. Pl. 269. 1753.

Shrubs or trees; leaves pinnate or bipinnate, the leaflets serrate; flowers small, white, in terminal flat-topped cymes; calyx 3 to 5-dentate; corolla rotate, 3 to 5-lobate; fruit a small drupe, containing 3 to 5 1-seeded nutlets.

The English name for plants of the genus is "elderberry." The fruit of all species is edible and is often used in the United States for pies and for making wine. The stems contain a large amount of pith. A decoction of the stems is employed by some of the Indians for dyeing baskets black. In Europe the leaves and flowers have been used for dyeing leather yellow, and the bark or wood, with alum and iron salts, for dyeing green or brown. In Germany oil has been extracted from the seeds, and the flowers are used to flavor wine.

The flowers of *S. canadensis* L. were formerly official in the United States Pharmacopoeia, and those of the Old World *S. nigra* L. are now official in some of the European pharmacopoeias. They have gently excitant and sudorific properties. The fruit is diaphoretic and aperient and has been used as an alterative in treating rheumatism and syphilis. The inner bark is a hydragogue cathartic and in large doses emetic. It has been employed for dropsy and epilepsy.

Leaflets pubescent on one or both surfaces; fruit not glaucous...1. **S. mexicana**.

Leaflets glabrous; fruit glaucous.....2. **S. caerulea**.

1. *Sambucus mexicana* Presl; DC. Prodr. 4: 322. 1830.*Sambucus bipinnata* Schlecht. & Cham. Linnaea 5: 171. 1830.

Widely distributed in Mexico, especially in cultivation. Western Texas to southern California; Central America.

Tree, sometimes 10 meters high, with a trunk 30 cm. in diameter, the bark thick, gray, scaly; leaflets usually 5, ovate to ovate-lanceolate or oval, 3 to 12 cm. long, short-acuminate, pale; cymes 6 to 20 cm. broad; corolla 5 to 8 mm. broad; fruit about 6 mm. in diameter, nearly black; wood soft, coarse-grained, brownish, its specific gravity about 0.46. Usually known in Mexico as "saúco"; "azumiatl" (Veracruz); "cumdemba," "cumdumba" (Tarascan); "xumetl" (Urbina); "nttzirza" (Otomí); "bixhumí" (Oaxaca, Zapotec, Reko); "yutnucate" (Oaxaca, Mixtec, Reko); "shiiksh" (Mixe, Belmar); "coyopa" (Zoque, Gonzales).

The fruit is used in Mexico for various purposes. Some of the Indians of southern California dried it for winter use. The flowers have a heavy odor. They are used medicinally in Mexico, and other parts of the plant are used much as described above. The leaves are sometimes bound upon the forehead to relieve headache.

Sambucus mexicana bipinnata (Schlecht. & Cham.) Schwerin¹ is a form with bipinnate leaves. It was described from Jalapa, Veracruz.

2. *Sambucus caerulea* Raf. Alsogr. Amer. 48. 1838.*Sambucus glauca* Nutt.; Torr. & Gray, Fl. N. Amer. 2: 13. 1841.*Sambucus neomexicana* Wooton, Bull. Torrey Club 25: 309. 1898.

Northern Baja California, Sonora, and Chihuahua. Western United States.

Shrub or tree, sometimes 15 meters high, with a trunk 45 cm. in diameter; bark dark brown, fissured and scaly; leaflets 5 or 7, lanceolate or oblong, 8 to 12 cm. long, attenuate; cymes 10 to 15 cm. broad; corolla 4 to 6 mm. broad; fruit 5 to 7 mm. in diameter, bluish black; wood soft, weak, coarse-grained, dark yellowish brown, its specific gravity about 0.50. "Saúco" (California).

2. *VIBURNUM* L. Sp. Pl. 267. 1753.

Shrubs or small trees; leaves entire or toothed; flowers small, white, in dense cymes; calyx 5-dentate; corolla rotate or broadly campanulate, regular, 5-lobate; fruit drupaceous, 1 to 3-celled.

Numerous species of the genus (mostly known as "black haw") grow in the United States. The fruit is edible, but in most cases insipid. The leaves of some species have been used in the southern United States as a substitute for Chinese tea.

Lateral nerves of the leaves straight, prominent, extending to the margin; leaves conspicuously dentate, often cordate at base, sometimes densely stellate-tomentose beneath.

Calyx lobes lanceolate, equaling the corolla.....1. *V. stenocalyx*.

Calyx lobes obtuse, much shorter than the corolla.

Cymes long-pedunculate, the peduncles longer than the cymes.

Leaves densely grayish-tomentose beneath.....2. *V. loeseneri*.

Leaves green beneath, sparsely pubescent.....3. *V. membranaceum*.

Cymes short-pedunculate, the peduncles equaling or shorter than the cymes.

Leaves covered beneath with a dense close whitish tomentum.

4. *V. microcarpum*.

Leaves glabrate beneath or with a loose coarse tomentum.

Calyx lobes not ciliate.....5. *V. ciliatum*.

¹ Mitt. Deutsch. Dendr. Ges. 1909: 34, 328. 1909.

Calyx lobes ciliate.

Leaves gradually acute or acuminate.....6. *V. rhombifolium*.

Leaves abruptly acuminate or caudate-acuminate.

Calyx hirtellous; leaves pilose on the upper surface.

7. *V. tiliaefolium*.

Calyx merely glandular; leaves glabrous or nearly so on the upper surface.....8. *V. caudatum*.

Lateral nerves of the leaves curved, inconspicuous, anastomosing before reaching the margin; leaves entire or nearly so, not cordate at base, never densely stellate-pubescent beneath.

Cymes sessile.

Leaves broadly rounded at apex, remotely dentate or entire.

9. *V. cuneifolium*.

Leaves obtuse to acuminate, usually entire.....10. *V. elatum*.

Cymes pedunculate.

Peduncles and branchlets glabrous.....11. *V. acutifolium*.

Peduncles and branchlets variously pubescent.

Leaves pulverulent-tomentose beneath.....12. *V. sulcatum*.

Leaves glabrous beneath or with scattered stellate hairs.

Leaves obtusely acuminate; branches of the inflorescence hirtellous.

13. *V. hartwegii*.

Leaves acutely acuminate; branches of the inflorescence finely stellate-pubescent.

Calyx lobes acute; leaves entire.....14. *V. microphyllum*.

Calyx lobes obtuse; leaves remotely dentate.....15. *V. stellatum*.

1. *Viburnum stenocalyx* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881.
Oreinotinus stenocalyx Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 285. 1861.

Type from somewhere in Mexico.

Branches villous-tomentose; leaves oblong-ovate, 6 to 7.5 cm. long, acuminate, obtuse at base, irregularly dentate, stellate-pubescent; cymes pedunculate; calyx tube glandular.

2. *Viburnum loeseneri* Graebn. Repert. Sp. Nov. Fedde 12: 244. 1913.

Described from Mexico, probably from Veracruz.

Branchlets densely stellate-pilose; leaves ovate, 1.5 to 3 cm. long, acuminate, rounded at base, sparsely pilose above, entire or obscurely crenate-dentate; cymes dense, 6 to 15-flowered, the branches stellate-tomentose.

3. *Viburnum membranaceum* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 2. 1881.

Oreinotinus membranaceus Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 284. 1861.

Nuevo León to Hidalgo and Oaxaca; type from Cuesta de San Juan, Oaxaca. Shrub, 1 to 2 meters high; leaves ovate or rounded-ovate, 3 to 5.5 cm. long, acuminate, cordate at base, coarsely serrate-dentate, glabrate above; calyx tube glandular or glabrate, the lobes obtuse.

4. *Viburnum microcarpum* Schlecht. & Cham. Linnaea 5: 179. 1830.

Viburnum microcarpum evanescens Greenm. Proc. Amer. Acad. 35: 313. 1900.

Veracruz and Oaxaca; type from San Miguel del Soldado, Veracruz.

Shrub or tree, 6 meters high or less; leaves rounded-ovate or suborbicular, 4 to 7 cm. long, obtuse or acutish, dentate, green and glabrate above; cymes broad, many-flowered; calyx lobes obtuse; corolla 4 mm. broad.

5. *Viburnum ciliatum* Greenm. Proc. Amer. Acad. 41: 251. 1905.

Type from Trinidad Iron Works, Hidalgo, altitude 1,680 meters; Guerrero (?).

Branchlets glandular or glabrate; leaves ovate or broadly ovate, 5 to 10 cm. long, short-acuminate, cordate at base, dentate, ciliate, nearly glabrous; calyx lobes obtuse; corolla 5 mm. broad.

6. *Viburnum rhombifolium* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881.

Oreiotinus rhombifolius Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 283. 1861.

Mountains of Mexico and Veracruz; type from Mount Orizaba, altitude 2,700 meters.

Shrub or tree, 3 to 6 meters high, the branchlets stellate-pilose; leaves oblong-ovate, ovate, or rhombic, 5 to 15 cm. long, coarsely serrate-dentate, appressed-pilose or glabrate above, loosely stellate-pilose beneath; calyx lobes obtuse.

7. *Viburnum tiliaefolium* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881.

Oreiotinus tiliaefolius Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 282. 1861.

Veracruz and Oaxaca; type collected between Mirador and Jalapa, Veracruz.

Branchlets loosely tomentose; leaves broadly ovate or rounded-ovate, 7 to 13 cm. long, cordate or rounded at base, thin, irregularly sinuate-dentate, ciliate; cymes broad, many-flowered; corolla 7 mm. broad.

8. *Viburnum caudatum* Greenm. Proc. Amer. Acad. 41: 250. 1905.

Type collected near Trinidad Iron Works, Hidalgo, altitude 1,500 meters.

Shrub or tree, 4.5 to 6 meters high, the branchlets glabrate; leaves rounded-ovate or rhombic, 9 to 11 cm. long, cordate or subcordate at base, obscurely sinuate-dentate or entire, nearly glabrous beneath; cymes broad, many-flowered; corolla 6 to 7 mm. broad.

9. *Viburnum cuneifolium* Bartlett, Proc. Amer. Acad. 44: 635. 1909.

Type collected in the Sierra Madre above Monterrey, Nuevo León, altitude 750 meters.

Shrub, 3 to 4.5 meters high, the branchlets ferruginous-furfuraceous; leaves mostly suborbicular, rounded or obtuse at base, glabrous or nearly so; corolla 6 mm. broad.

Probably only a form of *V. elatum*.

10. *Viburnum elatum* Benth. Pl. Hartw. 59. 1840.

?*Viburnum densum* Benth. Pl. Hartw. 59. 1840.

Michoacán to San Luis Potosí and Mexico; type from Tlapujahua, Michoacán.

Large shrub or small tree, the branchlets furfuraceous; leaves ovate-oblong to broadly ovate, 2.5 to 5.5 cm. long, acute to rounded at base, glabrous; fruit black, about 1 cm. long. "Tlamahuacatl" (Ramírez).

11. *Viburnum acutifolium* Benth. Pl. Hartw. 59. 1840.

Oreiotinus fuscus Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 289. 1861.

Viburnum fuscum Hemsl. Biol. Centr. Amer. Bot. 2: 2. 1881.

Oaxaca; type from Cerro Pelado.

Leaves ovate to lance-oblong, 3.5 to 6 cm. long, acutely acuminate, acute to rounded at base, entire, glabrous, pale beneath; fruit black, 6 to 7 mm. long.

12. *Viburnum sulcatum* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881.

Oreiotinus sulcatus Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 287. 1861.

Type from Mount Zempoaltepec, Oaxaca.

Branchlets fuscous-tomentose; leaves ovate, about 7 cm. long, obtusely acuminate, entire, glabrous above.

13. *Viburnum hartwegii* Benth. Pl. Hartw. 84. 1841.

Chiapas. Central America; type from mountains of Santa María, Guatemala.

Shrub or small tree; leaves lance-oblong to oval, 6 to 13 cm. long, long-acuminate, acute to rounded at base, pubescent or glabrate beneath; cymes large and broad; corolla 4 to 5 mm. broad; fruit about 1 cm. long. "Curá" (Costa Rica).

Perhaps not distinct from *V. glabratum* H. B. K. of Peru.

The following Mexican names are reported, but they probably belong to other species: "Achichil," "sunda," "carindapaz" (Hidalgo).

14. *Viburnum microphyllum* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881.

Oreinotinus microphyllus Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 293. 1861.

Jalisco to Oaxaca; type from Cuesta de San Pedro Alto.

Shrub or small tree, 6 meters high or less, the branchlets finely stellate-pubescent; leaves oblong to oblong-ovate, 4 to 7 cm. long, acuminate, acute to rounded at base, glabrous or nearly so; fruit black, 6 to 7 mm. long.

15. *Viburnum stellatum* (Oerst.) Hemsl. Biol. Centr. Amer. Bot. 2: 3. 1881.

Oreinotinus stellatus Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1860: 292. 1861.

Veracruz and Puebla; type from Mount Orizaba, at an altitude of 2,400 meters. Costa Rica.

Branchlets stellate-pubescent; leaves ovate or oblong-ovate, 6 to 7.5 cm. long, obtuse or rounded at base, sparsely stellate-pubescent; cymes broad and many-flowered.

DOUBTFUL SPECIES.

VIBURNUM PARVIFLORUM Mart. & Gal. Bull. Acad. Brux. 11¹: 243. 1844.
Type from Zacatepec, Oaxaca.

3. ABELIA R. Br. in Abel, Narr. Journ. China App. B. 376. 1818.

Shrubs; leaves short-petiolate, entire or dentate; flowers in chiefly terminal, few-flowered cymes; calyx 2 to 5-lobate; corolla tubular or funnelform, the limb 5-lobate; fruit a leathery achene.

The other species are natives of Asia.

Corolla 3 to 4.5 cm. long-----1. **A. floribunda.**
Corolla about 1.5 cm. long-----2. **A. coriacea.**

1. *Abelia floribunda* (Mart. & Gal.) Decaisne, Fl. Serr. Jard. 2: pl. 5. 1846.

Vesalea floribunda Mart. & Gal. Bull. Acad. Brux. 11¹: 242. 1844.

Vesalea hirsuta Mart. & Gal. Bull. Acad. Brux. 11¹: 242. 1844.

Abelia speciosa Decaisne, Fl. Serr. Jard. 2: pl. 5. 1846.

Veracruz, Puebla, and Oaxaca; type from Pico de Orizaba, Veracruz.

Shrub, 2 to 3 meters high; leaves elliptic-oblong to rounded-ovate, 8 to 30 mm. long, obtuse, thin, ciliate, nearly entire; calyx lobes sometimes 13 mm. long, oblong or linear-lanceolate; corolla red-purple.

2. *Abelia coriacea* Hemsl. Diag. Pl. Mex. 53. 1880.

Nuevo León and San Luis Potosí; type from San Luis Potosí.

Leaves oblong-ovate to rounded-ovate, 1 to 2 cm. long, obtuse or acutish, glabrous, coriaceous, lustrous; calyx lobes linear, 7 mm. long or less, puberulent or hirtellous; corolla puberulent.

4. SYMPHORICARPOS Ludwig, Def. Gen. Pl. 35. 1760.

Shrubs; leaves short-petiolate, entire or on young branches sinuate-lobate; flowers in axillary or terminal clusters, white or pinkish; calyx 4 or 5-dentate; corolla salverform, 4 or 5-lobate; fruit a small subglobose 2-seeded berry.

- Anthers equaling the corolla lobes.....1. **S. microphyllus**.
 Anthers shorter than the corolla lobes.....2. **S. rotundifolius**.

1. **Symphoricarpos microphyllus** H. B. K. Nov. Gen. & Sp. 3: 424. 1818.

Symphoricarpos glaucescens H. B. K. Nov. Gen. & Sp. 3: 424. pl. 295. 1818.

Symphoricarpos montanus H. B. K. Nov. Gen. & Sp. 3: 425. pl. 296. 1818.

Margaris barbigera DC. Prodr. 4: 483. 1830.

?*Margaris nudiflora* DC. Prodr. 4: 483. 1830.

Chiococca axillaris Sessé & Moc. Pl. Nov. Hisp. 36. 1887.

Coahuila to Colima, Oaxaca, and Veracruz; type from Morán, Hidalgo.

Shrub, 1 to 2.5 meters high; leaves ovate to rounded, 5 to 20 mm. long, obtuse or acute, pubescent or glabrate, often glaucous beneath; corolla about 1 cm. long, pinkish; fruit white. "Perilla," "perlitas" (Mexico).

2. **Symphoricarpos rotundifolius** A. Gray, Pl. Wright. 2: 66. 1853.

Mountains of northeastern Sonora. New Mexico to Idaho, Washington, and California; type from Santa Rita, New Mexico.

Slender shrub, about 1 meter high; leaves broadly ovate to orbicular, 1 to 2.5 cm. long, obtuse or rounded at apex, pubescent beneath; corolla pinkish, 6 to 8 mm. long; fruit white.

5. **LONICERA** L. Sp. Pl. 173. 1753.

REFERENCE: Rehder, Synopsis of the genus *Lonicera*, Rep. Mo. Bot. Gard. 14: 27-232. pl. 1-20. 1903.

Erect or scandent shrubs; leaves entire; flowers spicate, capitate, or geminate, often irregular; calyx 5-dentate; corolla tubular, funnelform, or campanulate, the limb 5-lobate or bilabiate; fruit a fleshy berry, few-seeded.

Some of the Old World species of honeysuckle (Spanish, "madreselva") are cultivated in Mexican gardens. The flowers of the Old World *L. caprifolium* L. are sometimes used in Europe for making perfumery, and a syrup of the fruit has been employed for treating asthma. The fruits of all species are said to be emetic and cathartic, and that of *L. xylosteum* L. is reported to have caused serious poisoning.

Flowers borne on axillary, mostly 2-flowered peduncles.

Bracts at base of the flowers large, reddish, accrescent in age; leaves acuminate.

1. **L. involucrata**.

Bracts small, subulate; leaves mostly obtuse or rounded at apex.

2. **L. mexicana**.

Flowers in terminal spikes or heads.

Upper leaves not united around the stem; corolla about 12 mm. long.

3. **L. subspicata**.

Uppermost leaves united by their bases around the stem; corolla 1.7 to 5.5 cm. long.

Corolla funnelform, about 2 cm. long.....4. **L. albiflora**.

Corolla tubular, 4 to 5.5 cm. long.....5. **L. pilosa**.

1. **Lonicera involucrata** (Richards.) Banks; Spreng. Syst. Veg. 1: 759. 1825.

Xylosteum involucratum Richards. Bot. App. Frankl. Journ. 733. 1823.

Lonicera mociniana DC. Prodr. 4: 336. 1830.

Distegia involucrata Raf. New Fl. N. Amer. 3: 21. 1836.

Mountains of Chihuahua. Western United States, Canada, and Alaska.

Erect shrub, 1 to 3 meters high; leaves short-petiolate, ovate or oval, 5 to 15 cm. long, sparsely pilose and green beneath; corolla yellow; fruit black, about 8 mm. long.

2. *Lonicera mexicana* (H. B. K.) Rehder, Rep. Mo. Bot. Gard. **14**: 65. 1903.*Xylosteum mexicanum* H. B. K. Nov. Gen. & Sp. **3**: 332. *pl.* 298. 1818.*Lonicera gibbosa* Willd.; Roem. & Schult. Syst. Veg. **5**: 257. 1819.

Hidalgo and Oaxaca; type from Real del Monte, Hidalgo.

Erect shrub or tree, 3 to 6 meters high; leaves short-petiolate, oval to oblong-ovate, 4 to 7 cm. long, sparsely pilose beneath; corolla pink, about 2 cm. long.

3. *Lonicera subspicata* Hook. & Arn. Bot. Beechey Voy. 349. 1840.

Northern Baja California. California.

Scandent shrub; leaves short-petiolate, oval to narrowly oblong, 1 to 3.5 cm. long, rounded at apex, pubescent or glabrate beneath; spikes short or elongate, the flowers yellowish or pale pink.

4. *Lonicera albiflora* Torr. & Gray, Fl. N. Amer. **2**: 6. 1841.*Lonicera dumosa* A. Gray, Pl. Wright. **2**: 66. 1853.*Lonicera albiflora dumosa* Rehder, Rep. Mo. Bot. Gard. **14**: 179. 1903.

Sonora, Chihuahua, and Coahuila. Arizona to Texas.

Scandent shrub; leaves short-petiolate, oblong-ovate to rounded, 3 to 5 cm. long, acute to rounded at apex, glaucous beneath, glabrous or pubescent; flowers capitate, white or yellowish white.

The typical form of the species has glabrous leaves. The Mexican plants belong to *L. albiflora dumosa*, in which the leaves are pubescent beneath.**5. *Lonicera pilosa*** (H. B. K.) Willd.; H. B. K. Nov. Gen. & Sp. **3**: 427. 1818.*Caprifolium pilosum* H. B. K. Nov. Gen. & Sp. **3**: 427. *pl.* 298. 1818.*Lonicera tubulosa* Benth. Pl. Hartw. 37. 1839.

Chihuahua to San Luis Potosí and Mexico.

Scandent shrub; leaves short-petiolate, oblong to oblong-ovate, 4 to 6 cm. long, acute or obtuse, glaucous beneath, glabrous or pubescent; corolla yellow or purplish.

155. GOODENIACEAE. Goodenia Family.**1. SCAEVOLA** L. Mant. Pl. **2**: 145. 1771.**1. *Scaevola plumierii*** (L.) Vahl, Symb. Bot. **2**: 36. 1791.*Lobelia plumierii* L. Sp. Pl. 929. 1753.*Scaevola lobelia* Murr. Syst. Veg. ed. 13. 178. 1774.

On coastal rocks and sands, Yucatán; Clarion Island, Baja California. Florida; West Indies; tropical America.

Fleshy shrub, 1.5 meters high or less; leaves alternate, obovate, 4 to 6 cm. long, short-petiolate, rounded at apex, glabrous; flowers perfect, white, in axillary pedunculate cymes; calyx 5-lobate; ovary inferior; corolla 5-lobate, about 2.5 cm. long, the lobes nearly linear, winged, the tube split along one side; stamens 5, distinct; fruit baccate, oval, 10 to 14 mm. long, black, 2-celled, 2-seeded. "Bosborón," "coralillo" (Porto Rico).

Known in the Bahamas as "inkberry." The plant is said to have sudorific and, in large doses, purgative and emetic properties. It has been employed in the West Indies as a remedy for venereal diseases.

156. LOBELIACEAE. Lobelia Family.

Several other genera are represented in Mexico by herbaceous species.

1. LOBELIA L. Sp. Pl. 929. 1753.

Shrubs, or usually herbs; leaves alternate, entire or dentate; flowers racemose or spicate, often leafy-bracted; calyx tube adnate to the ovary; corolla tube elongate, cleft to the base along one side, the limb 5-lobate, bilabiate; stamens monadelphous, part or all of the anthers with a tuft of hairs at apex; fruit a 2-celled, loculicidally bivalvate capsule.

Numerous herbaceous species occur in Mexico.

Leaves linear or lance-linear.....1. *L. cavanillesiana*.
Leaves ovate to oblong-lanceolate.

Calyx and corolla pubescent.....2. *L. laxiflora*.

Calyx and corolla glabrous.....3. *L. nelsonii*.

1. *Lobelia cavanillesiana* Roem. & Schult. Syst. Veg. 5: 43. 1819.

Lobelia persicaefolia Cav. Icon. Pl. 5: 12. pl. 518. 1799. Not *L. persicaefolia* Lam. 1789.

Lobelia laxiflora angustifolia DC. Prodr. 7: 383. 1839.

Lobelia nelsonii fragilis Robins. & Fern. Proc. Amer. Acad. 43: 27. 1907.

Baja California to Durango, San Luis Potosí, Puebla, and Michoacán.

Plants herbaceous or suffrutescent; leaves short-petiolate, 7 to 15 cm. long, 3 to 12 mm. wide, long-attenuate, serrate, glabrous or nearly so; racemes very leafy, the flowers on elongate pedicels, pubescent or glabrous; corolla 3 to 3.5 cm. long, red.

2. *Lobelia laxiflora* H. B. K. Nov. Gen. & Sp. 3: 311. 1818.

Lobelia rigidula H. B. K. Nov. Gen. & Sp. 3: 311. 1818.

Lobelia lanceolata Hook. & Arn. Bot. Beechey Voy. 88. 1832.

Siphocampylus bicolor Don in Sweet, Brit. Fl. Gard. II. pl. 389. 1831-38.

Lobelia ovalifolia Hook. & Arn. Bot. Beechey Voy. 301. 1839-40.

Lobelia angulato-dentata Hook. & Arn. Bot. Beechey Voy. 301. 1839-40.

Lobelia concolor Mart. & Gal. Bull. Acad. Brux. 11: 15. 1842.

?*Lobelia regalis* Fernald, Proc. Amer. Acad. 36: 503. 1901.

Sonora to Oaxaca and Veracruz; type collected between Cuajiniquilapa and Acaguisotla, Guerrero. Central America.

Plants herbaceous or suffrutescent, about 1 meter high; leaves sessile or short-petiolate, 6 to 20 cm. long, 1 to 5 cm. wide, acute or acuminate, serrate, usually densely pubescent beneath; racemes very leafy, the flowers borne on elongate pedicels; corolla red, 3 to 4 cm. long. "Zarcilillo" (Jalisco); "diente de chucho," "pastorcillo," "diente de perro" (El Salvador).

3. *Lobelia nelsonii* Fernald, Proc. Amer. Acad. 36: 503. 1901.

Type from Huachinango, Jalisco.

Shrub with hard wood; leaves short-petiolate, ovate to lanceolate, 4 to 7 cm. long, 1 to 2.5 cm. wide, acuminate, serrate, sparsely hispidulous; flowers few, at the ends of the branches; corolla red, 2.5 to 3 cm. long.

157. ASTERACEAE. Aster Family.

(Contributed by S. F. Blake; the genera *Ophryosporus* and *Eupatorium* by B. L. Robinson, the genus *Senecio* by J. M. Greenman.¹)

Herbs, shrubs, or trees, sometimes scandent; leaves opposite or alternate, rarely whorled, entire to dissected, never truly compound; flowers collected in a head (this rarely 1-flowered) on a receptacle, surrounded by an involucre of phyllaries (bracts); corolla gamopetalous, regular, tubular, and 5-toothed (rarely 2 to 4-toothed), bilabiate, or ligulate (flattened, strap-shaped, and usually 2 to 5-toothed), rarely wanting in the pistillate flowers; stamens (in the hermaphrodite or staminate flowers) almost always 5, united by the anthers or rarely free, inserted on the corolla; ovary inferior, 1-celled, with an erect anatropous ovule; style usually 2-branched, the branches stigmatiferous inside, often bearing sterile appendages at apex; fruit an achene, with a single erect exalbuminous seed, often bearing a pappus of bristles, awns, or scales.—The corollas are of 4 chief sorts,

¹ The vernacular names and economic notes have been contributed chiefly by Paul C. Standley.

ligulate or strap-shaped, *bilabiate*, *tubular*, and *filiform*. Heads composed of one kind of flowers only are called *homogamous*, those composed of two or more kinds *heterogamous*; when heterogamous, the central flowers (disk) are always hermaphrodite, the peripheral pistillate or neutral (lacking the style). Homogamous heads in which all the flowers are hermaphrodite and have ligulate (in this case always 5-toothed) corollas are called *ligulate*; homogamous heads in which all the corollas are tubular and hermaphrodite or staminate, or filiform and pistillate, are called *discoïd*. Heterogamous heads in which the peripheral corollas are ligulate are called *radiate*; those in which the peripheral flowers are pistillate, with tubular, filiform, or abortive corollas are called *disciform*. The receptacle may be naked, bristly, or paleaceous (bearing pales or chaff). The generic characters are drawn to a considerable extent from the character of the pappus, which may be of bristles, awns, scales, or teeth, or reduced to a crown or cup, or entirely wanting.

KEY TO TRIBES.

Anthers caudate at base.

Corollas all bilabiate, or else (*Gochnatia*) the involucre of graduate indurate phyllaries.....**IX. Mutisieae.**

Corollas tubular or filiform; involucre not of indurate phyllaries.....**IV. Inuleae.**
Anthers not caudate at base.

Style branches elongate, acute, hispidulous outside throughout their length.

Heads yellow.....**VIII. Senecioneae.**

Heads white or purplish, never yellow.

Achenes not 4-angled and clavate; pappus not consisting of paleae with a strong midrib.....**I. Vernonieae.**

Achenes 4-angled, clavate; pappus consisting of paleae with a strong midrib.....**VI. Helenieae.**

Style branches otherwise.

Style branches usually elongate, linear or clavate, obtuse, not hispidulous outside or at apex, the stigmatic lines only below the middle and inconspicuous; heads never yellow.....**II. Eupatorieae.**

Style branches, when elongate, hispidulous outside or at apex, the stigmatic lines reaching nearly to apex; heads often yellow.

Phyllaries scarious-margined; heads nodding, small, discoïd or disciform; style tips truncate, hispidulous.....**VII. Anthemideae.**

Phyllaries not scarious-margined, or else heads not nodding or style tips acute.

Receptacle paleaceous, at least in the staminate heads, or else leaves chiefly or entirely opposite; pappus not of bristles.....**V. Heliantheae**

Receptacle not paleaceous (rarely bristly), or else leaves alternate.

Pappus present, chiefly or entirely of soft capillary bristles; involucre not glandular-punctate.

Style tips acute.....**III. Astereae**

Style tips truncate or subtruncate.....**VIII. Senecioneae.**

Pappus wanting or of squamellae, awns, or stiff bristles, or else involucre glandular-punctate.

Leaves alternate (opposite in one species of *Aplopappus*).

III. Astereae.

Leaves opposite at least below or else involucre glandular-punctate.

(Exceptions are *Venegasia*, with large triangular-ovate leaf blades; *Clappia*, with densely setose-fimbrillate receptacle; *Psilostrophe*, with papery-persistent ligules; *Chaenactis*, with discoïd ochroleucous heads and a pappus of about 13 long paleae).....**VI. Helenieae.**

Tribe I. Vernonieae.

- Pappus double, the outer series short, subpaleaceous or rarely setose, the inner much longer, setose.....1. **VERNONIA**.
 Pappus (in our species) a low entire crown.....2. **OLIGANTHES**.

Tribe II. Eupatorieae.

Pappus none, or a very short crown.

Heads 3-flowered (in our species); anthers unappendaged at apex.

3. **PIQUERIA**.

Heads several to many-flowered; anthers appendaged at apex.

Achenes compressed.....7. **OAXACANIA**.

Achenes prismatic, 4 or 5-angled.

Achenes 4-angled.....6. **JALISCOA**.

Achenes 5-angled.

Pappus entirely wanting.....5. **ALOMIA**.

Pappus a low paleaceous crown.....9. **AGERATUM**.

Pappus present, better developed.

Achenes prismatic and 8 to 10-ribbed, or obovoid and not distinctly ribbed.

Achenes prismatic, 8 to 10-ribbed; receptacle naked.

Pappus of 4 to 14 linear-attenuate scarious-margined awns; phyllaries few, unequal, subherbaceous.....19. **CARPHOCHAETE**.

Pappus of numerous bristles; phyllaries usually multiseriate, dry and striate.....20. **COLEOSANTHUS**.

Achenes obovoid, not distinctly ribbed; receptacle paleaceous.

21. **DYSCRITOTHAMNUS**.

Achenes 4 or 5-ribbed (rarely 2 or 3-ribbed).

Pappus of bristles only.

Phyllaries 4; heads 4-flowered.....18. **MIKANIA**.

Phyllaries and flowers more numerous.

Pappus bristles deciduous.....15. **PIPTOTHRIX**.

Pappus bristles persistent.

Anthers without terminal appendage.

Pappus bristles dilated at tip.....4. **DECACHAETA**.

Pappus bristles not dilated at tip.....17. **OPHRYOSPORUS**.

Anthers with terminal appendage.

Pappus bristles few (5 to 8).....14. **FLEISCHMANNIA**.

Pappus bristles numerous.....16. **EUPATORIUM**.

Pappus at least in part of squamellae or awns.

Phyllaries 5 to 8, uniseriate, subequal.....12. **STEVIA**.

Phyllaries more numerous.

Anthers unappendaged at apex; pappus of 5 squamellae prolonged into awns.....11. **AGERATELLA**.

Anthers appendaged at apex; pappus otherwise.

Pappus of 2 to 10 bristles and a few squamellae; involucre strongly graduate.

Squamellae of pappus evident, paleaceous or scarious.

13. **HOFMEISTERIA**.

Squamellae of pappus minute, setulose.....14. **FLEISCHMANNIA**.

Pappus of squamellae only, these sometimes united into a paleaceous crown.

Involucre strongly graduate; pappus of about 15 membranaceous squamellae.....8. **ASCHENBORNIA**.

Involucre subequal; pappus of 5 to 10 squamellae, or these united into a crown.

Corollas with short tube and scarcely distinct throat.

9. **AGERATUM.**

Corollas with slender tube, abruptly widened into the throat.

10. **OX YLOBUS.**

Tribe III. Astereae.

Plants dioecious or polygamo-dioecious.

Plants dioecious, the heads strictly staminate or pistillate.

29. **BACCHARIS.**

Plants polygamo-dioecious, the staminate heads as in *Baccharis*, the pistillate with 1 to 15 central hermaphrodite flowers.

30. **ARCHIBACCHARIS.**

Plants not dioecious or polygamo-dioecious.

Pappus of squamellae or awns, or wanting.

Pappus wanting.....22. **SELLOA.**

Pappus present.

Pappus of about 10 oblong to lanceolate squamellae; flowers yellow.

23. **GUTIERREZIA.**

Pappus of about 15 to 30 squamellae or awns; flowers white, changing to rose-purple.....26. **GREENELLA.**

Pappus of bristles, sometimes with an outer series of short squamellae.

Flowers all yellow, the rays or disk rarely turning purple in age.

Phyllaries in distinct vertical ranks; heads (in our species) discoid, 5-flowered.....25. **CHRYSOETHAMNUS.**

Phyllaries not in distinct vertical ranks; heads often radiate, usually with more than 5 flowers.

Plants not glaucescent, usually resinous or pubescent.

24. **APLOPAPPUS.**

Plants glaucescent, glabrous, not resinous. Leaves linear, mostly 1 cm. long or less; phyllaries cuspidate-acute or acuminate (*A. carnosus*).....27. **ASTER.**

Flowers (at least those of the ray) white to violet.

Involucre distinctly graduate; style tips acute or acuminate...27. **ASTER.**

Involucre obscurely or not at all graduate; style tips short, obtuse.

28. **ERIGERON.**

Tribe IV. Inuleae.

Flowers all hermaphrodite, the corollas tubular; pappus stiff, of about 10 barbellate bristles and about 30 shorter, somewhat connate bristles.

34. **PELUCHA.**

Outer flowers (3 to many) pistillate, with filiform corollas, the inner (1 to many) hermaphrodite, with tubular corollas; pappus 1-seriate, of essentially equal bristles.

Heads few (about 4)-flowered, the hermaphrodite flowers solitary.

32. **ACHYROCLINE.**

Heads many-flowered, the hermaphrodite flowers several or numerous.

Phyllaries dry, but not scarious.....31. **PLUCHEA.**

Phyllaries scarious.....33. **GNAPHALIUM.**

Tribe V. Heliantheae.

Plants monoecious. Pistillate involucre gamophyllous, 1 to 8-flowered, the staminate many-flowered.

Pistillate involucre bearing transverse scarious wings...43. **HYMENOCLEA.**

Pistillate involucre spiny.....44. **FRANSERIA.**

Plants not monoecious.

Heads 1 or 2-flowered, glomerate, the proper involucre gamophyllous, 3 to 6-toothed.

Proper involucre tubular, not winged.....**35. NOCCA.**

Proper involucre at maturity obovoid, 3-winged, corky.

36. COULTERELLA.

Heads with more numerous flowers, or if 1 or 2-flowered (62. *Alvordia*), then involucre not gamophyllous.

Ray flowers pistillate, fertile; disk flowers hermaphrodite, sterile.

Pistillate corollas tubular; leaves opposite.

Achenes loosely inclosed in sac-shaped phyllaries.

37. DESMANTHODIUM.

Achenes not inclosed in sac-shaped phyllaries.

Heads cymose-panicled, not nodding.....**38. CLIBADIUM.**

Heads in racemes or racemiform panicles, nodding.....**42. IVA.**

Pistillate corollas ligulate; leaves opposite or alternate.

Phyllaries subtending the ray achenes indurate, completely enveloping the achenes, with a small terminal orifice.. **40. MELAMPODIUM.**

Phyllaries not indurate and completely enveloping the achenes.

Ray achenes obcompressed, their nerviform margins adnate at base to the two opposed involute pales of the outer disk flowers and at maturity separating from the body of the achene nearly to apex, the whole falling together; rays white.

41. PARTHENIUM.

Ray achenes not adnate to the opposed pales; rays yellow, orange, or purplish red.

Involucre double, the outer phyllaries few, herbaceous, the inner submembranous.....**78. HIDALGOA.**

Involucre not double.

Achenes all epappose, columnar or columnar-obovoid.

39. GUARDIOLA.

Disk achenes pappose, the ray achenes sometimes epappose.

Receptacle elongate-conic, paleaceous throughout; ray achenes with a single awn; disk achenes (infertile) with a pappus of 4 basally connate awns....**45. PHILACTIS.**

Receptacle not elongate-conic, bearing only a single series of paleae (between the rays and the disk flowers); ray achenes epappose; disk achenes (infertile) with a pappus of 6 to 12 awns or squamellae.....**85. HEMIZONIA.**

Ray flowers, when present, pistillate or neutral; disk flowers hermaphrodite, fertile.

Ray corollas sessile, persistent.

Disk achenes strongly compressed.

Leaves sessile; involucre strongly graduate.....**46. ZINNIA.**

Leaves short-petioled; involucre not strongly graduate.

47. SANVITALIA.

Disk achenes quadrangular.

Pales straight; pappus wanting or of 2 to 4 minute teeth.

48. HELIOPSIS.

Pales usually uncinata; pappus of 1 or 2 awns, and sometimes 1 or 2 short squamellae.....**49. GRYPOCARPHA.**

Ray corollas with distinct tube and deciduous, or wanting.

Pappus of plumose awns or squamellae.

Achenes somewhat compressed; involucre strongly graduate, about 5-seriate.....**83. BEBBIA.**

- Achenes turbinate; involucre less distinctly graduate... **84. TRIDAX.**
Pappus (when present) not of plumose awns or squamellae.
Achenes subcylindric, about 10 or 15-ribbed..... **53. VARILLA.**
Achenes not subcylindric, fewer-ribbed.
Achenes contracted into a conspicuous stipitiform base.
Heads radiate; pappus of 2 awns and several squamellae.
70. PODACHAENIUM.
Heads discoid; pappus of 2 awns..... **71. ACHAENIPODIUM.**
Achenes not contracted into a conspicuous stipitiform base.
Heads 1 to 5-flowered; pappus of 10 to 20 unequal paleaceous
awns..... **62. ALVORDIA.**
Heads with more numerous flowers, or else (52. *Montanoa*)
pappus wanting.
Involucre distinctly double, the outer phyllaries few, herba-
ceous, the inner submembranous.
Disk achenes (sometimes also the ray achenes) surrounded
and included by the convex pales.
Heads yellow..... **50. RUMFORDIA.**
Heads white..... **52. MONTANOA.**
Disk achenes not surrounded and included by the pales,
these flat or flattish.
Inner phyllaries connate about to middle.
79. THELESPERMA.
Inner phyllaries essentially free.
Achenes distinctly rostrate..... **81. COSMOS.**
Achenes not distinctly rostrate.
Pappus awns antrorse-ciliate or smooth, rarely want-
ing; achenes obcompressed, usually marginate or
winged..... **76. COREOPSIS.**
Pappus awns retrorse-hispid (rarely smooth); achenes
(in our species) linear or subquadrangular, not
margined or winged..... **80. BIDENS**
Involucre not distinctly double.
Achenes obcompressed..... **77. COREOCARPUS.**
Achenes not obcompressed.
Pappus of the disk achenes consisting of 4 to many free,
usually equal or subequal awns or squamellae.
Pappus of deciduous setiform awns.
64. PERYMENIUM.
Pappus of persistent paleaceous awns or squamellae.
Achenes obovoid, somewhat compressed; phyllaries
not indurate..... **69. HYMENOSTEPHIUM.**
Achenes subterete or 4 or 5-angled; phyllaries indu-
rate (the outer sometimes herbaceous).
82. CALEA.
Pappus of the disk achenes of 2 or 3 awns, with or without
squamellae, or a crown of united squamellae, or want-
ing.
Achenes strongly compressed, flat or flattish.
Pappus of 1 or 2 awns, without squamellae, or want-
ing.
Achenes winged.
Pappus awns unequal, the inner broadly winged,
the outer usually wingless; involucre gradu-
ate, of indurate, usually subherbaceous-
tipped phyllaries..... **67. NOTOPTERA.**

Pappus awns usually equal and wingless (with a small wing in *V. robinsonii*, which has a subequal herbaceous involucre).

75. VERBESINA.

Achenes wingless.

Leaves opposite; heads whitish, discoid.

66. SALMEA.

Leaves alternate; heads yellow, usually radiate.

Achenes not very strongly flattened, usually not white-margined; plants strongly resinous.....

65. FLOURENSIA.

Achenes very strongly flattened, narrowly white-margined, villous-ciliate; plants usually not resinous.....

68. ENCELIA.

Pappus of awns and squamellae.

Disk achenes closely enveloped and hidden by the transversely rugose pales.....

51. RHYSOLEPIS.

Disk achenes not closely enveloped by the pales, the latter not transversely rugose.

Leaves alternate; plants strongly resinous.

65. FLOURENSIA.

Leaves opposite (alternate in *Zexmenia brevifolia*, which has pistillate rays); plants rarely resinous.

Rays neutral.....

74. OYEDAEA.

Rays pistillate or wanting.

Achenes margined or winged, the wings not decurrent on the awns.

72. ZEXMENIA.

Achenes winged, the wings decurrent on the awns.....

73. OTOPAPPUS.

Achenes thickened.

Rays pistillate.

Pappus of the disk achenes wanting.

Receptacle merely convex; outer phyllaries herbaceous, the inner membranous.

50. RUMFORDIA.

Receptacle conical; phyllaries all similar.

55. ZALUZANIA.

Pappus of the disk achenes present.

Pappus a 4-toothed crown; phyllaries and pales spinescent-tipped.....

56. BORRICHIA.

Pappus a crown of squamellae and usually 2 awns; phyllaries and pales not spinescent-tipped.

Achenes acutely margined or winged.

72. ZEXMENIA.

Achenes not acutely margined or winged.

Leaves opposite; achenes plump, with rounded sides.....

57. WEDELIA.

Leaves alternate; achenes subquadrangular.

58. WYETHIA.

Rays neutral or wanting.

Heads large, 5 to 14 cm. wide, borne on fistulose peduncles.....

60. TITHONIA.

Heads much smaller, or else peduncles not fistulose.
Pappus caducous, of 2 paleaceous awns and
often a few squamellae.

63. HELIANTHUS.

Pappus persistent (of 2 slender deciduous awns
in two species of *Flourensia*) or entirely
wanting.

Heads cylindric; pappus none; involucre
strongly graduate. **54. AGIABAMPOA.**

Heads not cylindric, or else pappus present or
involucre not strongly graduate.

Pales strongly accrescent, including and
greatly surpassing the achenes.

52. MONTANOA.

Pales not strongly accrescent.

Heads discoid; pappus wanting.

55. ZALUZANIA.

Heads radiate, or else pappus present.

Pappus a small cup of united squamel-
lae, sometimes with awns added.

59. ASPILIA.

Pappus of usually free squamellae, with
or without 2 awns, or wanting.

Plants strongly resinous; leaves alter-
nate. **65. FLOURENSIA.**

Plants rarely resinous; leaves oppo-
site, at least below (in *Viguiera*
laciniata alternate and lacini-
ately repand-lobate).

Pappus present.

Pappus of 2 awns and several
squamellae.

61. VIGUIERA.

Pappus of few subequal or un-
equal squamellae.

69. HYMENOSTEPHIUM.

Pappus wanting.

Leaves pinnatilobate, or else
silky-pilose or canescent-
strigillose beneath.

61. VIGUIERA.

Leaves not pinnatilobate, neither
silky-pilose nor canescent-
strigillose beneath.

69. HYMENOSTEPHIUM.

Tribe VI. Helenieae.

Involucre distinctly graduate. Heads radiate, yellow.

Leaves opposite. **86. JAUMEA.**

Leaves alternate.

Pappus wanting; leaves triangular-ovate. **87. VENEGASIA.**

Pappus present; leaves linear. **88. CLAPPIA.**

Involucre equal or subequal (unequal in 95. *Chaenactis*, which has discoid ochro-
leucous heads).

Rays papery-persistent. **89. PSILOSTROPHE.**

Rays not papery-persistent.

Achenes distinctly compressed, 2-nerved.

Achenes ciliate; pappus of squamellae and usually 1 or 2 awns, rarely wanting-----90. **PERITYLE**.

Achenes not distinctly ciliate; pappus (in our species) of 1 awn, or wanting. 91. **LAPHAMIA**.

Achenes not distinctly compressed, with more than 2 nerves.

Involucre glandular-punctate or glandular-lined.

Pappus of 5 to 20 paleae, these often aristate-dissected or awned.

99. **DYSSODIA**.

Pappus setose, the setae sometimes reduced to squamellae.

Heads discoid-----100. **POROPHYLLUM**.

Heads radiate.

Leaves not setose-ciliate; style branches elongate.

101. **CHRYSACTINIA**.

Leaves setose-ciliate; style branches short-----102. **PECTIS**.

Involucre not glandular-punctate or glandular-lined.

Achenes 10-ribbed; pappus none; heads 2 to 8-flowered, aggregated.

92. **FLAVERIA**.

Achenes not 10-ribbed, usually 4-ribbed; pappus present; heads with more numerous flowers, not aggregated.

Pappus of 4 awns alternating with 4 squamellae.----93. **EUTETRAS**.

Pappus otherwise.

Heads radiate, yellow.

Phyllaries about 5; heads in small umbelliform cymes or cymose panicles; achenes without substipitiform base.

95. **ERIOPHYLLUM**.

Phyllaries more numerous; heads solitary or cymose-panicled; achenes with substipitiform base-----97. **BAHIA**.

Heads discoid, white, flesh-color, or ochroleucous.

Pappus oblique, of about 8 paleae, the innermost longest; leaves opposite, broad, crenate or repand.

98. **LOXOTHYSANUS**.

Pappus not oblique; leaves alternate, linear or pinnatilobate.

Pappus of 4 to 6 truncate paleae; leaves linear, entire.

94. **PALAFIXIA**.

Pappus of about 13 acutish paleae; leaves pinnatilobate.

96. **CHAENACTIS**.

Tribe VII. Anthemideae.

A single genus-----103. **ARTEMISIA**.

Tribe VIII. Senecioneae.

Involucre distinctly graduate.

Leaves opposite, not scalelike-----104. **LIABUM**.

Leaves alternate, all except the lower scalelike----105. **LEPIDOSPARTUM**.

Principal phyllaries equal, sometimes with a series of small bractlets at base.

Phyllaries 4 or 5, broadly oval; leaves opposite-----106. **HAPLOESTHES**.

Phyllaries more numerous; leaves alternate.

Phyllaries caudate-attenuate, herbaceous above; involucre without bractlets at base; leaves glandular-punctate-----107. **PEUCEPHYLLUM**.

Phyllaries neither caudate-attenuate nor herbaceous; involucre bracteolate at base; leaves not glandular-punctate-----108. **SENECIO**.

Tribe IX. Mutisieae.

- Corollas all regular, tubular, 5-lobed.....109. **GOCHNATIA**.
 Corollas all bilabiate.
 Corollas crimson; involucre regularly graduate.....110. **ONOSERIS**.
 Corollas yellow or whitish; involucre not regularly graduate.
 Corollas yellow; involucre double.....111. **TRIXIS**.
 Corollas whitish; involucre nearly 1-seriate.....112. **JUNGIA**.

1. **VERNONIA** Schreb. Gen. Pl. 2: 541. 1791.

REFERENCES: Gleason, Bull. N. Y. Bot. Gard. 4: 164-235. 1906; Gleason, N. Amer. Fl. 33: 50-101. 1922.

Herbs, shrubs, or trees, with alternate leaves and small to large, usually purple heads; involucre cylindric to hemispheric, the phyllaries graduated, dry or indurate, rarely with herbaceous tips; flowers 1 to very numerous, all tubular, hermaphrodite, fertile; receptacle naked; anthers sagittate at base; achenes 4 to 10-ribbed, sometimes with an apical callous border; pappus biseriate, the outer much shorter, subpaleaceous or rarely setose, the inner setose.

The root of *Vernonia nigritiana* Oliver & Hiern of West Africa is said to be employed as a febrifuge, antidyenteric, and emetic, and to resemble somewhat ipecac in its therapeutic properties. It contains a glucoside, vernonin, which is a cardiac poison comparable to digitalin, but less active.

Heads large, the involucre 12 to 20 mm. high.

Phyllaries (at least the outer) with ovate or lanceolate to deltoid, herbaceous, spreading or reflexed tips.

Leaves green and merely pilose-strigose beneath.....1. **V. salvinae**.

Leaves grayish-tomentose beneath.

Phyllaries glabrous.....2. **V. mexicana**.

Outer phyllaries densely pubescent.....3. **V. callilepis**.

Phyllaries without spreading herbaceous tips.

Heads subsessile, in close clusters; phyllaries narrowly lanceolate to linear-lanceolate, acuminate, obscurely cuspidate; leaves canescent-tomentose beneath.....4. **V. arctioides**.

Heads pedunculate, not in close clusters; phyllaries oblong, truncate or rounded, abruptly mucronate; leaves green or griseous-tomentose beneath.

Leaves acute at base.....5. **V. alamani**.

Leaves rounded at base.....6. **V. dictyophlebia**.

Heads smaller, the involucre 8 (rarely 10) mm. high or less.

Inflorescence of scorpioid cymes, the heads mostly sessile.

Heads subtended by leafy bracts; involucre 1 cm. high...7. **V. schiedeana**.

Heads not leafy-bracted; involucre 5 mm. high or less.

Heads 11-flowered.....8. **V. aschenborniana**.

Heads 18 to 21-flowered.

Leaves tomentulose or tomentose beneath.

Pappus tawny; achenes pubescent, not glandular...9. **V. deppeana**.

Pappus white or whitish; achenes pubescent and glandular.

10. **V. morelana**.

Leaves puberulous to silky-pilose but not tomentose beneath.

Pappus brownish; phyllaries obtuse or acutish.....11. **V. patens**.

Pappus white; phyllaries acute or acuminate...12. **V. canescens**.

Inflorescence of corymbiform or paniculate clusters, the heads mostly pedicellate.

Heads about 22-flowered; involucre 9 to 10 mm. high...13. **V. karvinskiana**.

Heads 1 to 11-flowered; involucre 3 to 7 mm. high.

Heads 7 to 11-flowered; inner phyllaries not deciduous (except in no. 17).

Leaves floccose-tomentose beneath.....14. *V. oaxacana*.

Leaves not floccose-tomentose beneath.

Leaves scabrous-pubescent on the veins beneath.

15. *V. capreaefolia*.

Leaves puberulent or sordid-pilosulous beneath.

Leaves 1.5 to 2 cm. wide; phyllaries purple-tipped.

16. *V. liatroides*

Leaves 3.2 to 5.7 cm. wide; phyllaries whitish...17. *V. littoralis*.

Heads 1 to 5-flowered; inner phyllaries deciduous.

Heads 1 or 2-flowered.

Phyllaries (at least the middle and outer) distinctly mucronate.

Leaves chiefly oval or obovate; mucros of the middle and outer phyllaries about 0.2 mm. long.....18. *V. mucronata*.

Leaves chiefly broadly ovate; mucros of the middle and outer phyllaries about 0.5 mm. long.....19. *V. aristifera*.

Phyllaries not mucronate, sometimes apiculate.

Leaves densely canescent or cinereous-tomentose beneath.

Leaves broadly ovate or oblong-ovate, rounded or cordate at base, 2 to 7 cm. wide.....20. *V. monosis*.

Leaves elliptic-oblong or oval-oblong, cuneate at base, 1.5 to 4 cm. wide.

Inner phyllaries acute or acuminate.

21. *V. tarchonanthifolia*.

Inner phyllaries obtuse or rounded.....22. *V. obtusa*.

Leaves not densely tomentose beneath.

Leaves oval-ovate or broadly ovate, 3 to 4 cm. wide.

23. *V. steetzii*.

Leaves elliptic, 2.5 cm. wide or less.

Leaves tufted in the axils of the veins beneath; phyllaries usually tomentose at apex.....24. *V. salicifolia*.

Leaves not tufted in the axils of the veins beneath; phyllaries not tomentose at apex.....25. *V. pallens*.

Heads 3 to 5-flowered.

Leaves very densely tomentose over whole surface beneath.

Phyllaries densely tomentose; achenes glabrous.

Achenes whitish or light brown.....26. *V. leiocarpa*.

Achenes dark brown or purplish brown...27. *V. melanocarpa*.

Phyllaries not densely tomentose; achenes pubescent.

Leaves ovate, less than twice as long as wide.

28. *V. durangensis*.

Leaves elliptic to oval-lanceolate, more than twice as long as wide.

Leaves 6.5 to 7.3 cm. long, less than three times as long as wide.

29. *V. oolepis*.

Leaves 7 to 19 cm. long, more than three times as long as wide.

30. *V. palmeri*.

Leaves not densely tomentose over whole surface beneath.

Leaves densely pilosulous at least along the costa beneath.

Leaves elliptic or oblong-elliptic; phyllaries obtuse to acutish, not apiculate.....30. *V. palmeri*.

Leaves oval; phyllaries acute, mostly apiculate.

31. *V. barbinervis*.

Leaves not densely pilosulous along the costa beneath.

Leaves elliptic or oblong-elliptic, 1.5 to 3 cm. wide; achenes pubescent.....

32. *V. triflosculosa*.

Leaves ovate or elliptic, 4.5 to 6 cm. wide; achenes glabrous or glandular.....

33. *V. heydeana*.

1. *Vernonia salvinae* Hemsl. Biol. Centr. Amer. Bot. 2: 73. pl. 41. 1881.

Leiboldia salvinae Gleason, Bull. N. Y. Bot. Gard. 4: 162. 1906.

Chiapas. Guatemala; type from Las Nubes, Cerro de Zunil.

Shrubby (?); branchlets lanate or tomentose, glabrescent; petioles 1 to 4 cm. long; leaf blades obovate or oblanceolate, 10 to 20 cm. long, 4 to 7.5 cm. wide, acuminate, serrulate or serrate; heads few, on peduncles 1 to 6.5 cm. long; involucre 13 to 18 mm. high, the phyllaries with indurate base and broader, ovate or deltoid, spreading, herbaceous apex, puberulent or glabrate; heads violet-purple, 3 to 5 cm. wide; pappus tawny.

2. *Vernonia mexicana* Less. Linnaea 6: 680. 1831.

Leiboldia mexicana Gleason, Bull. N. Y. Bot. Gard. 4: 163. 1906.

Veracruz; type from Cuesta Grande de Chiconquiaco.

Shrub; branches cinerous-tomentose; leaf blades obovate, 20 cm. long, short-acuminate, thinly gray-tomentose beneath; involucre 2 cm. high, 3 cm. wide, the phyllaries glabrous, the outer with spreading rounded herbaceous tips. (Description compiled.)

3. *Vernonia callilepis* Gleason, N. Amer. Fl. 33: 81. 1922.

Known only from the type locality, La Liberia, Michoacán or Guerrero.

Shrubby, 1.5 meters high; stem densely griseous-pilose; leaves short-petioled, the blades elliptic or oval, 14 to 21 cm. long, 5.5 to 7.5 cm. wide, acute at both ends, serrate, griseous-pilose beneath; heads few, 2.5 cm. high, the pedicels 5 cm. long; involucre 2 cm. high, the outer phyllaries linear-lanceolate, foliaceous, acuminate, spreading, the inner with rounded, membranous purple tips; pappus brownish.

4. *Vernonia arctioides* Less. Linnaea 6: 400. 1831.

Diazeuxis ? *serrata* D. Don, Trans. Linn. Soc. 16: 254. 1830. Not *V. serrata* Less. 1829.

Vernonia leiboldiana Schlecht. Linnaea 19: 742. 1847.

Leiboldia ovata Schlecht. Linnaea 19: 742. 1847, as synonym.

Leiboldia arctioides Schlecht. Linnaea 19: 743. 1847, as synonym.

Leiboldia leiboldiana Gleason, Bull. N. Y. Bot. Gard. 4: 163. 1906.

Leiboldia serrata Gleason, Bull. N. Y. Bot. Gard. 4: 164. 1906.

Veracruz and Puebla; type from Cuesta Grande de Chiconquiaco.

Suffrutescent, 1 to 2 meters high, the stout angled stem cinereous-tomentose; petioles about 5 mm. long; leaf blades obovate, 11 to 24 cm. long, 5 to 12 cm. wide, acute, sharply serrate; heads few, in close clusters; involucre 12 to 18 mm. high, the phyllaries lanceolate to linear-lanceolate, acuminate, cuspidate, densely tomentose or glabrescent; flowers purple; pappus white.

5. *Vernonia alamani* DC. Prodr. 5: 61. 1836.

Morelos to Oaxaca; type from Mexico, without definite locality.

Suffrutescent (?), 1 to 2 meters high; stem densely cinereous-puberulous; leaf blades elliptic-lanceolate to elliptic-oblong, 9 to 14 cm. long, 2 to 7 cm. wide, tapering to each end, subentire, tomentose-puberulous on the veins beneath and gland-dotted; involucre 15 to 20 mm. high, glabrous, the phyllaries bearing mucros 2 to 4 mm. long.

6. *Vernonia dictyophlebia* Gleason, Bull. N. Y. Bot. Gard. 4: 203. 1906.

Guanajuato to Oaxaca; type from Pátzcuaro, Michoacán.

Suffrutescent (?), 1 to 2 meters high; stem tomentellous; leaves oval or ovate, 6 to 10 cm. long, 3 to 6 cm. wide, acute, prominulous-reticulate and griseous-tomentellous beneath; heads several or numerous, on peduncles 1 to 4 cm. long; mucros of the phyllaries shorter than in the last species.

7. *Vernonia schiedeana* Less. Linnaea 6: 399. 1831.

?*Vernonia fragrans* Llave in Llave & Lex. Nov. Veg. Descr. 1: 24. 1824.

Veracruz and Tabasco; type from Panantla and Misantla, Veracruz. Honduras and El Salvador.

Scandent, shrubby, 3 meters high; stem puberulous; leaves oval to elliptic, 8 to 15 cm. long, 2 to 5 cm. wide, short-petioled, puberulous or pubescent above chiefly along costa, puberulous to densely pilosulous beneath; involucre 1 cm. high, the outer phyllaries lanceolate, acuminate or mucronate, stiff, the inner linear-oblong, with loose rounded ampliate brownish tips; heads about 26-flowered; pappus whitish. "Flor de borla" (Veracruz); "aroma" (El Salvador).

8. *Vernonia aschenborniana* Schauer, Linnaea 19: 714. 1847.

San Luis Potosí to Nicaragua; type from Mexico, without definite locality.

Shrubby, 2 to 5 meters high; stem sordidly puberulous or pilosulous; leaves elliptic to oblong-ovate, 5 to 10 cm. long, 1 to 3 cm. wide, scabridulous above, usually densely sordid-puberulous or pilosulous beneath; involucre 3 mm. high, its phyllaries ovate or oval, acute or acutish, greenish, with thickish tips, the thin narrow pale margins arachnoid-ciliate; pappus becoming tawny. "Suquinay" (Honduras).

The plant is used medicinally.

9. *Vernonia deppeana* Less. Linnaea 6: 398. 1831.

?*Vernonia stellaris* Llave in Llave & Lex. Nov. Veg. Descr. 1: 23. 1824.

Veracruz to Costa Rica; type from Misantla, Veracruz.

Shrubby, up to 6 meters high; stem tomentulose; leaves oblong to oval, 8 to 15 cm. long, 2 to 6 cm. wide, densely cinereous or sordid-tomentulose beneath; involucre 3.5 mm. high, similar to that of *V. aschenborniana*. "Suquinay" (El Salvador, Guatemala); "tuete" (Costa Rica); "semem" (Guatemala); "cihuapatli," "zi-tit," "flor de cuaresma" (Chiapas, *Seler*); "rájate-luego" (El Salvador).

10. *Vernonia morelana* Gleason, Bull. Torrey Club 46: 241. 1919.

Known only from the type locality, Cuernavaca, Morelos.

Shrub 3 to 5 meters high; stem gray-tomentose; leaves ovate-oblong, 7.5 cm. long, 3 cm. wide, scabrous above, finely gray-tomentose beneath; involucre 4 to 4.5 mm. high, the phyllaries ovate to lanceolate, acute or cuspidate, tomentose-ciliate and somewhat puberulous; achenes thinly pubescent and densely glandular; pappus white or very pale tawny.

11. *Vernonia patens* H. B. K. Nov. Gen. & Sp. 4: 41. 1820.

?*Vernonia lanceolaris* DC. Prodr. 5: 37. 1836.

Michoacán (or Guerrero) to Panama and northern South America; type from Middle America.

Shrubby, 8 meters high or less; stem tomentulose-puberulous; leaves elliptic to oblong-elliptic, 5 to 13 cm. long, 1.5 to 4 cm. wide, smooth to the touch above, puberulous, especially on the veins, beneath; panicles large; involucre 4 mm. high, the phyllaries obtuse or acutish, mostly mucronulate; flowers white. "Tuete" (Costa Rica); "pie de zope," "suquinayo," "suquinay," "palo blanco" (El Salvador).

12. *Vernonia canescens* H. B. K. Nov. Gen. & Sp. 4: 35. pl. 317. 1820.

Vernonia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 197. 1915.

Puebla and Guerrero (or Michoacán) to South America; type from Guancabamba, Peru.

Suffrutescent, 1.3 meters high or less; stem puberulous or tomentose-pilosulous; leaves chiefly ovate or oval-ovate, 6 to 12 cm. long, 2 to 5 cm. wide, sparsely or usually densely pilosulous or silky-pilose beneath; involucre 3.5 to 5 mm. high, the phyllaries all lanceolate or linear-lanceolate, acute or usually acuminate; flowers deep rosy or purplish. "Hierba de San Juan" (Panama); "tuate" (Costa Rica); "ciguapate" (El Salvador).

13. *Vernonia karvinskiana* DC. Prodr. 5: 62. 1836.

Oaxaca.

Suffrutescent, 1 meter high; stem purplish, glabrous to sparsely puberulous; leaf blades elliptic to oblong or ovate-elliptic, 3 to 10 cm. long, 1.5 to 3 cm. wide, scabrous above, pubescent or puberulous beneath chiefly along the venation; heads umbellate-cymose; involucre purplish, the outer phyllaries subulate, appressed, the inner lanceolate, mucronulate, with rather loose tips; achenes gland-dotted.

14. *Vernonia oaxacana* Schultz Bip.; Klatt, Leopoldina 20: 74. 1884.

Oaxaca and Chiapas; type from San Carlos.

Shrubby; leaves elliptic-oblong, 10 cm. long, 3 cm. wide, scabrellate above, floccose beneath; inflorescence hemispheric; heads crowded; involucre 5 mm. high; phyllaries ovate-lanceolate to narrowly oblong, glabrous, acute, cuspidate.

15. *Vernonia capreaefolia* Gleason, Bull. N. Y. Bot. Gard. 4: 200. 1906.

Vernonia ehrenbergiana capreaefolia Schultz Bip.; Gleason, Bull. N. Y. Bot. Gard. 4: 200. 1906, as synonym.

Jalisco to Veracruz and Oaxaca; type from Orizaba, Veracruz.

"Suffrutescent," erect, 1 meter high, puberulent or glabrate; leaves broadly elliptic, 9 to 13 cm. long, 2.5 to 5 cm. wide, acute, coarsely serrate, very scabrous above, nearly glabrous beneath except along the prominent veins; involucre 5 mm. high; phyllaries ciliate, the outer lanceolate, cuspidate, the inner ovate-oblong or oblong, acute or mucronulate; pappus nearly white.

16. *Vernonia liatroides* DC. Prodr. 5: 34. 1836.

Eupatorium tulanum Klatt, Abh. Naturf. Ges. Halle 15: 324. 1882.

Tamaulipas to Veracruz; western Mexico; type collected between Tula, Hidalgo, and Tampico, Tamaulipas.

Herbaceous or suffrutescent; stem puberulent; leaves elliptic-oblong or oblong-lanceolate, 5 to 8 cm. long, 1.5 to 2 cm. wide, serrate, scabrellate above, ferruginous-puberulous beneath; heads in rounded subumbellate cymes; involucre 3 to 4 mm. high; phyllaries lanceolate or oblong-lanceolate, nearly glabrous, cuspidate; pappus flavescent. "Tlamalacatilacotli" (Morelos, Seler).

17. *Vernonia littoralis* T. S. Brandeg. Erythea 7: 3. 1899.

Eremosia littoralis Gleason, N. Amer. Fl. 33: 100. 1922.

Known only from the type locality, Socorro Island.

Shrubby; stem sordid-puberulous; petioles 7 to 17 mm. long; blades broadly ovate or oval-ovate, 6 to 9 cm. long, 3.2 to 5.7 cm. wide, serrulate, above smooth, subglabrate, beneath sordid-pilosulous with crisped hairs especially along the venation; heads 7 or 8-flowered, in rounded corymbiform panicles; involucre 6 mm. high, whitish, the phyllaries ovate to (inner) linear-oblong, acutish to obtuse, ciliate, the inner deciduous; achenes whitish, glabrous or sparsely puberulous.

18. *Vernonia mucronata* Blake, Contr. Gray Herb. n. ser. 52: 19. 1917.*Monosis foliosa* Benth. Pl. Hartw. 19. 1839.*Vernonia foliosa* Schultz Bip. Pollichia 18-19: 161. 1861. Not *V. foliosa* Gardn. 1846.*Eremosis foliosa* Gleason, Bull. N. Y. Bot. Gard. 4: 228. 1906, as to synonym. San Luis Potosí and Jalisco; type from Bolaños, Jalisco.

Low shrub, cinereous-tomentose, glabrescent; leaf blades oval-ovate or ovate, 4 to 6.5 cm. long, 2 to 3.3 cm. wide, thin-coriaceous, entire or sparsely denticulate, closely cinereous-tomentose on both sides, glabrescent above, becoming merely tomentulose-puberulous beneath; involucre 5 to 6 mm. high, purplish, the phyllaries acute to acuminate, the middle and outer with short mucros; achenes densely villous.

19. *Vernonia aristifera* Blake, sp. nov.? *Vernonia steetzii callilepis* Schultz Bip. in Seem. Bot. Voy. Herald 297. 1856.*Eremosis foliosa* Gleason, Bull. N. Y. Bot. Gard. 4: 228. 1906, as to description.*Eremosis callilepis* Gleason, N. Amer. Fl. 33: 98. 1922, at least as to description. Not *V. callilepis* Gleason, 1922.

Jalisco; type collected at Río Blanco (Palmer 678 in 1886; U. S. Nat. Herb. no. 49992).

Similar to *V. mucronata*; leaves mostly broadly ovate, 3.5 to 6 cm. long, 2.2 to 4.5 cm. wide, densely and persistently cinereous-tomentose beneath, glabrescent above; phyllaries more acuminate than in *V. mucronata* and with longer mucros.

20. *Vernonia monosis* Schultz Bip. Linnaea 20: 507. 1847.*Turpinia* ? *tomentosa* Lex. in Llave & Lex. Nov. Veg. Descr. 1: 24. 1824Not *Vernonia tomentosa* Ell. 1822.? *Vernonia paniculata* DC. Prodr. 5: 23. 1836.*Monosis tomentosa* DC. Prodr. 5: 77. 1836.*Eremosis tomentosa* Gleason, Bull. N. Y. Bot. Gard. 4: 229. 1906.

Jalisco to Querétaro; type from Mt. Quinceo, near Morelia.

Shrubby, up to 2.5 meters high, densely cinereous-tomentose; leaf blades 8 to 12.5 cm. long, glabrescent above, densely cinereous-tomentose beneath with loose tomentum; panicles very large; involucre purplish, 5 mm. high, tomentose at base, the phyllaries acute or acuminate; achenes densely appressed-pubescent.

21. *Vernonia tarchonanthifolia* (DC.) Schultz Bip. Linnaea 20: 507. 1847.*Monosis tarchonanthifolia* DC. Prodr. 5: 77. 1836.*Oliganthes karwinskii* Schultz Bip. Linnaea 20: 505. 1847.*Eremosis tarchonanthifolia* Gleason, Bull. N. Y. Bot. Gard. 4: 230. 1906.

Oaxaca.

Shrub 3 to 6 meters high; stem densely cinereous-tomentose; leaf blades 6 to 9 cm. long, green and glabrescent above, densely cinereous-tomentose beneath; involucre purplish, 6 mm. high; achenes gland-dotted and rather sparsely hispidulous.

22. *Vernonia obtusa* (Gleason) Blake.*Eremosis obtusa* Gleason, N. Amer. Fl. 33: 99. 1922.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Shrub; stem cinereous-tomentose, glabrescent; leaves petioled, the blades oval-oblong, 5 to 7 cm. long, 2 to 3.5 cm. wide, acute, cuneate at base, entire or denticulate, densely and loosely griseous-tomentose beneath; involucre 6 mm. high, the phyllaries brown or purple, the outer ovate, obtuse or rounded, tomentose, the middle and inner obtuse or rounded, ciliate, glandular above; achenes glandular, otherwise essentially glabrous.

- 23. *Vernonia steetzii*** Schultz Bip. in Seem. Bot. Voy. Herald 297. 1856.

Eremosis steetzii Gleason, Bull. N. Y. Bot. Gard. 4: 230. 1906.

Chihuahua; type from the Sierra Madre of northwestern Mexico.

Shrubby, sordid-puberulous; petioles 2 to 6 mm. long; leaf blades 5 to 10 cm. long, 3 to 5.5 cm. wide, scabridulous above, hispidulous on the venation beneath; involucre brownish white or slightly purplish-tinged, essentially glabrous; achenes densely appressed-pilose.

- 24. *Vernonia salicifolia*** (DC.) Schultz Bip. Linnaea 20: 507. 1847.

Monosis salicifolia DC. Prodr. 5: 77. 1836.

Vernonia uniflora Schultz Bip. Linnaea 20: 506. 1847.

Eremosis salicifolia Gleason, Bull. N. Y. Bot. Gard. 4: 231. 1906.

Puebla to Oaxaca; type from near "Guchinapa" and Cuernavaca.

Stem tomentulose or tomentose; leaf blades elliptic or narrowly oblong-elliptic, 4 to 8.5 cm. long, 1 to 2 cm. wide, densely gland-dotted on both sides, loosely arachnoid-pilose, glabrescent; involucre purplish; achenes densely appressed-pilose. "Ahuitule" (*Urbina*).

- 25. *Vernonia pallens*** Schultz Bip. Pollichia 18-19: 161. 1861.

Eremosis pallens Gleason, Bull. N. Y. Bot. Gard. 4: 228. 1906.

Eremosis leiophylla Gleason, Bull. N. Y. Bot. Gard. 4: 231. 1906.

Vernonia leiophylla Blake, Contr. Gray Herb. n. ser. 52: 18. 1917.

Morelos and Michoacán or Guerrero; type from Mexico, without definite locality.

Shrubby, 3 to 5 meters high, the branches glabrate; petioles 3 to 4 mm. long; leaf blades lanceolate to elliptic, 4 to 8.5 cm. long, 1.1 to 2.5 cm. wide, acute, entire or obscurely serrulate, glabrous or nearly so on both sides; phyllaries whitish, brownish, or purplish, acute, ciliate; achenes sparsely short-villous.

- 26. *Vernonia leiocarpa*** DC. Prodr. 5: 34. 1836.

Eremosis leiocarpa Gleason, Bull. N. Y. Bot. Gard. 4: 232. 1906.

"Southern Mexico"; type from Mexico, without definite locality. Guatemala.

Shrubby, densely sordid or cinereous-tomentose; petioles about 1.5 cm. long; leaf blades elliptic-oblong or elliptic-ovate, 8 to 14 cm. long, 2 to 6 cm. wide, greenish or grayish above, densely and softly cinereous or sordid-tomentose beneath; phyllaries densely sordid-tomentose on their exposed portions. "Palito de negro" (Guatemala); "palo de asma" (El Salvador).

Employed in El Salvador as a remedy for asthma.

- 27. *Vernonia melanocarpa*** (Gleason) Blake, Contr. Gray Herb. n. ser. 52: 18. 1917.

Eremosis melanocarpa Gleason, Bull. N. Y. Bot. Gard. 4: 232. 1906.

Veracruz to Guatemala; type from Chupadera, Guatemala.

Stem densely puberulous, subglabrate; petioles 1.4 to 2.2 cm. long; leaf blades oval or elliptic-ovate, 6 to 10.5 cm. long, 2.2 to 5 cm. wide; phyllaries colorate only at apex, sordid-pilose at base and apex and on margin.

- 28. *Vernonia durangensis*** Blake, Contr. U. S. Nat. Herb. 22: 587. 1924.

Eremosis ovata Gleason, Bull. Torrey Club 40: 331. 1913. Not *V. ovata* Less. 1829.

Vernonia gleasoni Blake, Contr. Gray Herb. n. ser. 52: 17. 1917. Not *V. gleasonii* Ekman, 1914.

Known only from the type locality, San Ramón, Durango.

Shrubby, the stem tomentulose; petioles about 1.2 cm. long; leaf blades ovate or elliptic-ovate, 6.8 to 9 cm. long, 3.5 to 5 cm. wide, densely canescent-tomentose beneath, the veins about 10 pairs, prominent beneath; heads (3 or) 4-flowered, forming a broad panicle; involucre 5.5 mm. high, the phyllaries tomentulose at apex; achenes pilose.

29. *Vernonia oolepis* Blake, Contr. Gray Herb. n. ser. 52: 20. 1917.

Eremosis oolepis Gleason, N. Amer. Fl. 33: 97. 1922.

Yucatán; type from Izamal.

Shrub, the stem densely pilose-tomentose, subglabrate; petioles 2 to 4 mm. long; leaf blades oval-lanceolate or obovate-lanceolate, about 7 cm. long, 2.8 cm. wide, acuminate at each end, glabrous above, densely and sordidly pilose-tomentose beneath, the veins about 5 pairs, obscure; heads subsessile, 4-flowered; involucre 5.5 mm. high, the phyllaries pale, rounded at apex, ciliate; achenes sparsely pilosulous, blackish brown.

30. *Vernonia palmeri* Rose, Contr. U. S. Nat. Herb. 1: 101. 1891.

Eremosis palmeri Gleason, Bull. N. Y. Bot. Gard. 4: 233. 1906.

Vernonia chacalana Blake, Contr. Gray Herb. n. ser. 52: 19. 1917.

Sonora to Durango and Tepic; type from Alamos, Sonora.

Shrub 5 meters high or less, the stem densely cinereous-tomentulose; petioles 3 to 18 mm. long; blades elliptic, elliptic-oblong, or oblong-lanceolate, 6 to 18 cm. long, 1.5 to 5.5 cm. wide, remotely serrulate, beneath densely griseous-tomentulose or pilosulous, or sometimes glabrescent except along the veins; heads 3(rarely 4 or 5)-flowered; involucre whitish or sometimes purplish-tinged, the phyllaries more or less ciliate; achenes pubescent. "Tacotillo" (Sinaloa).

31. *Vernonia barbinervis* Schultz Bip. in Seem. Bot. Voy. Herald 297. 1856.

Eremosis barbinervis Gleason, Bull. N. Y. Bot. Gard. 4: 232. 1906.

Sinaloa; type from the Sierra Madre of northwestern Mexico.

Shrubby, about 3 meters high, the stem subglabrous; petioles 1 to 1.5 cm. long, obscurely puberulous; leaf blades oval, 8 to 12 cm. long, 4 to 5 cm. wide, rounded to subacute, cuneate at base, subglabrous above, densely pubescent along costa beneath, at least when young, and tufted in the axils of the veins; heads 3-flowered; involucre whitish or brownish-tinged, the phyllaries broadly ovate to oblong-ovate or oblong, acute and often apiculate. "Tacotillo" (Sinaloa).

32. *Vernonia triflosculosa* H. B. K. Nov. Gen. & Sp. 4: 40. 1820.

Gymnanthemum congestum Cass. Dict. Sci. Nat. 20: 110. 1821.

Vernonia triantha Schauer, Linnaea 19: 714. 1847.

Vernonia luxensis Coulter, Bot. Gaz. 20: 41. 1895.

Vernonia dumeta Klatt, "Leopoldina Bot. Beibl. 1. 1895."

Colima to Costa Rica; type collected near Acaguisotla, Guerrero.

Shrubby or arborescent, the stem cinereous-tomentulose, glabrescent; petioles 5 to 10 mm. long; leaf blades elliptic or oblanceolate, 5.5 to 12 cm. long, 1.3 to 3 cm. wide, subglabrous above, subglabrous to thinly tomentulose beneath; heads 3-flowered; involucre whitish, 5 mm. high, the phyllaries rotund-ovate to oblong, obtuse to (inner) acuminate, ciliate or ciliolate; achenes pubescent. "Tubusí" (Costa Rica); "rájate luego," "sauquillo," "suquinay prieto," "barreto" (El Salvador).

33. *Vernonia heydeana* Coulter, Bot. Gaz. 20: 42. 1895.

Eremosis heydeana Gleason, Bull. N. Y. Bot. Gard. 4: 234. 1906.

Southern Mexico. Guatemala; type from San Miguel Uspantán, Department of Quiché.

Shrubby, the stem puberulent or glabrate; leaves elliptic or ovate, 8 to 10 cm. long, 4.5 to 6 cm. wide, acute at each end, sparsely pubescent above, thinly tomentose beneath or glabrescent; involucre 6 mm. high, the phyllaries ovate to oblong-ovate, obtuse, ciliate; achenes glabrous or minutely glandular.

DOUBTFUL SPECIES.

VERNONIA HYPOLEUCA DC. Prodr. 5: 27. 1836. Probably not a *Vernonia*.

VERNONIA PURPURASCENS Schultz Bip.; Walp. Rep. 2: 945. 1843. *Eremosia purpurascens* Gleason, Bull. N. Y. Bot. Gard. 4: 233. 1906. This species has been referred by Gleason¹ to the synonymy of *Eremosia tomentosa* (= *Vernonia monosis*), but the heads are described as 3-flowered, while they are 1-flowered in that species.

2. OLIGANTHES Cass. Bull. Soc. Philom. Paris (1817: 10. 1817, hyponym;) 1818: 58. 1818.

REFERENCE: Gleason, Bull. N. Y. Bot. Gard. 4: 235. 1906.

1. Oliganthes oxylepis Benth.; Benth. & Hook. Gen. Pl. 2: 233. 1873.

Known only from the type locality, Yucatán or Tabasco.

Suffrutescent (?), "0.5 to 0.6 meters high;" stem tomentose; leaf blades rhombic, 8 to 11 cm. long, 3 to 4.5 cm. wide, acute at each end, crenate-dentate, short-petioled, quickly glabrate and green above, densely ochroleucous-tomentose beneath; heads 8 or 9-flowered, sessile or subsessile in small clusters at tips of branches; involucre 9 to 10 mm. high, about 6-seriate, graduate, the phyllaries dry, lanceolate, glabrous, cuspidate-attenuate, erect or slightly spreading at tip; achenes turbinate, 7 or 8-ribbed, glabrous; pappus a low entire crown.

3. PIQUERIA Cav. Icon. Pl. 3: 18. pl. 235. 1795.

REFERENCE: Robinson, Revision of the genus *Piqueria*, Proc. Amer. Acad. 42: 4-16. 1906.

The genus was named for A. Piquer, a Spanish physician of the eighteenth century. *Piqueria trinervia* Cav., a widespread herbaceous species of Mexico, is grown frequently in greenhouses for its handsome fragrant white flowers. The following vernacular names are reported for this species: "Hierba del tabardillo" (Puebla, Jalisco); "hierba de San Nicolás," "yoloxiltic," "xoxonitzal" (Hidalgo); "tabardillo" (Zacatecas). An infusion of the leaves is employed locally as a remedy for typhoid fever.

1. Piqueria serrata A. Gray, Proc. Amer. Acad. 15: 25. 1880.

San Luis Potosí; type from Álvarez Mountains.

Shrubby; stem obscurely bifarious-puberulous; leaves opposite, short-petioled, the blades ovate-oblong, 7 to 9 cm. long, 2.5 to 4 cm. wide, acuminate, abruptly narrowed at base, coarsely and sharply serrate; heads small, numerous in small rounded cymose panicles, 3-flowered; phyllaries elliptic-ovate, 3-nerved, rounded, mucronate, erose-ciliate; flowers white; achenes 5-angled, glabrous, with a deciduous annulus.

1a. Piqueria serrata angustifolia Robins. & Greenm. Amer. Journ. Sci. III. 50: 151. 1895.

Known only from the type locality, Sierra de San Felipe, Oaxaca.

Leaves lanceolate, obscurely crenate-serrate.

4. DECACHAETA DC. Prodr. 5: 133. 1836.

1. Decachaeta haenkeana DC. Prodr. 5: 133. 1836.

Sinaloa to southern Mexico; type from Mexico, without definite locality.

Suffrutescent, erect; leaves alternate, the blades oblong or obovate-oblong, 8.5 to 25 cm. long, 2.3 to 5 cm. wide, serrate, reticulate, short-petioled, puberulous beneath; heads numerous, sessile and clustered on short peduncles in thyrsoid panicles on axillary branches; heads 7 mm. high; involucre graduated, the phyllaries dry, scarious-margined; flowers whitish; achenes black, 5-angled; pappus bristles 10 to 15 in a single series, hispidulous, slightly dilated at tip.

¹ N. Amer. Fl. 33: 100. 1922.

5. **ALOMIA** H. B. K. Nov. Gen. & Sp. 4: 151. pl. 354. 1820.

REFERENCE: Robinson, Revision of the genus *Alomia*, Proc. Amer. Acad. 49: 438-454. 1913.

1. **Alomia isocarphoides** (DC.) Robinson, Proc. Amer. Acad. 49: 449. 1913.

Coelestina isocarphoides DC. Prodr. 5: 107. 1836.

Coelestina isocarphoides dentata DC. Prodr. 5: 107. 1836.

Ageratum isocarphoides Hemsl. Biol. Centr. Amer. Bot. 2: 82. 1881.

Carelia isocarphoides Kuntze, Rev. Gen. Pl. 1: 325. 1891.

Type from Mexico, without definite locality; doubtfully recorded from Veracruz.

Suffruticose, hispid-pubescent; leaves opposite, the blades lanceolate, acuminate, subsessile, 3-nerved, scabrous above, velvety-villous beneath; heads about 25-flowered, corymbose; pappus none. (Description compiled.)

A doubtful species.

6. **JALISCOA** S. Wats. Proc. Amer. Acad. 25: 153. 1890.

Suffrutescent; leaves opposite or ternate, ovate, thin, slender-petioled, triplinerved; heads small, in dense corymbiform panicles terminating stem and branches; involucre 2-seriate, equal, dryish; receptacle paleaceous; flowers white; achene 4-angled, slender; pappus a mere border or a lacerate-fimbriate crown.

Only the two species here listed are known.

Pappus an obscure entire callous border; leaves sharply serrate. 1. **J. pringlei**.

Pappus a lacerate-fimbriate crown; leaves obtusely serrate or crenate-serrate.

2. **J. pappifera**.

1. **Jaliscoa pringlei** S. Wats. Proc. Amer. Acad. 25: 153. 1890.

Known only from the type locality, Río Grande de Santiago, barranca of Guadalajara, Jalisco.

Erect, branched, obscurely puberulous, 1.6 to 2.6 meters high; leaf blades ovate, 6 to 12 cm. long, acuminate, sharply and closely serrate, loosely glandular-puberulous beneath, more densely so along the veins.

2. **Jaliscoa pappifera** Blake, Contr. U. S. Nat. Herb. 22: 587. 1924.

Known only from the type locality, near Cuernavaca, Morelos.

Similar; leaves obtusely serrate or crenate-serrate, sparsely puberulous beneath with mostly appressed hairs; pappus a lacerate-fimbriate crown about 0.3 mm. high.

The stems of this and the preceding species are always more or less densely riddled by elliptic holes, evidently made by weevils, which sometimes extend quite through the stem.

7. **OAXACANIA** Robins. & Greenm. Amer. Journ. Sci. III. 50: 151. 1895.

1. **Oaxacania malvaefolia** Robins. & Greenm. Amer. Journ. Sci. III. 50: 151. 1895.

Oaxaca and Puebla; type from Tomellín Canyon, Oaxaca.

Suffrutescent, much branched, very leafy, densely glandular-pubescent, about 1 meter long; leaves alternate, the blades roundish, 1.5 to 3 cm. wide, shorter than the petioles, about 5-lobed, the lobes again lobulate; heads 1 to 1.2 cm. high, paniced, pedunculate; involucre about 5-seriate, graduated, the phyllaries dryish, vittate; receptacle paleaceous; flowers white; achenes linear, strongly compressed, blackish, hispidulous with subglandular hairs; pappus a short lacerate crown.

8. **ASCHENBORNIA** Schauer, Linnaea 19: 716. 1847.

1. **Aschenbornia heteropoda** Schauer, Linnaea 19: 716. 1847.

Known only from the type locality, Tacubaya, State of Mexico.

Pubescent shrub; leaves opposite, the blades broad-ovate, 2.5 to 3.7 cm. long and about as wide, acute, coarsely acuminate-serrate, venose, scabrous above, resinous-punctate and pubescent on the veins beneath, very short-petioled; heads 4 to 6 at apex of branches, short-pedicel; involucre cylindric-subhemispheric, the phyllaries imbricate, membranaceous, the outer small, the inner oblong-linear, very obtuse, glabrous; receptacle paleaceous; flowers white; achenes subtetragonous, villous, 4 mm. long; pappus of about 15 membranaceous fimbriate obtuse squamellae about 1 mm. long. (Description compiled.)

9. AGERATUM L. Sp. Pl. 839. 1753.

REFERENCE: Robinson, Revision of the genus *Ageratum*, Proc. Amer. Acad. **49**: 454-483. 1913.

Herbs or shrubs; leaves usually opposite, ovate or lanceolate; heads usually in a terminal corymbose cluster on a long peduncle; involucre usually campanulate, 2 or 3-seriate, subequal, with narrow, somewhat indurate phyllaries; receptacle naked or paleaceous; achenes 5-angled; pappus a paleaceous crown (in all the following species) or of distinct or basally united, sometimes aristate squamellae. Receptacle paleaceous.

Leaves densely gray-pilose or tomentose beneath.

Leaves lanceolate to ovate, acuminate to acute or obtusish, densely dotted with reddish glands beneath-----1. **A. paleaceum**.

Leaves ovate, obtuse or acute, not obviously gland-dotted beneath.

2. **A. albidum**.

Leaves green and sparsely puberulous beneath.

Leaves elongate-lanceolate, attenuate, sharply serrate.

8a. **A. salicifolium annectens**.

Leaves ovate, acutish, crenate-----3. **A. elassocarpum**.

Receptacle naked.

Leaves ovate to ovate-oblong, about twice as long as wide, if rarely lanceolate then narrowed to an obtuse tip.

Leaves dull green or only slightly shining above, beneath dull and usually rather densely pubescent.

Leaves densely whitish-tomentose beneath-----4. **A. tomentosum**.

Leaves from nearly glabrous to grayish-tomentose beneath.

5. **A. corymbosum**.

Leaves bright green and shiny above, beneath paler but green, and sparsely puberulous on the nerves.

Leaves crenate-serrate; corollas bluish; stem subglabrous.

6. **A. scabriusculum**.

Leaves serrate; corollas white; stem densely incurved-puberulous.

7. **A. lucidum**.

Leaves narrowly lanceolate, attenuate, 3 to 5 times as long as wide.

8. **A. salicifolium**.

1. **Ageratum paleaceum** (C. Gay) Hemsl. Biol. Centr. Amer. Bot. **2**: 83. 1881.

Coelestina paleacea C. Gay; DC. Prodr. **5**: 107. 1836.

Carelia paleacea Kuntze, Rev. Gen. Pl. **1**: 325. 1891.

Ageratum rhytidophyllum Robinson, Proc. Amer. Acad. **36**: 476. 1901.

Oaxaca; type collected near City of Oaxaca.

Frutescent, about 60 cm. high; leaves short-petioled, the blades lanceolate to ovate, acuminate to acute, beneath reticulate, canescent-pilose, and densely dotted with reddish glands, 2.5 to 4 cm. long, 8 to 22 mm. wide; corollas purplish blue toward apex.

2. *Ageratum albidum* (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 81. 1881.*Coelestina albida* DC. Prodr. 5: 107. 1836.*Carelia albida* Kuntze, Rev. Gen. Pl. 1: 325. 1891.

Oaxaca; type collected between Oaxaca and Mitla.

Herbaceous or suffrutescent, up to 60 cm. high; leaves short-petioled, the blades ovate, 2.5 to 6 cm. long, 1.5 to 3.8 cm. wide, obtuse or merely acute, densely dull-pilose beneath, the glands pale and obscure; flowers white.

This species is described by Robinson as an herbaceous perennial, as it is in two of the sheets in the National Herbarium; Nelson's no. 1208, however, is truly woody below.

2a. *Ageratum albidum nelsonii* Robinson, Proc. Amer. Acad. 49: 471. 1913.

Oaxaca; type collected between Zanantepec and Papana.

Leaves larger and thinner, broadly ovate, 6 to 11 cm. long, 2.5 to 4.5 cm. wide; petioles longer; corollas apparently bluish.

3. *Ageratum elassocarpum* Blake, Contr. U. S. Nat. Herb. 22: 588. 1924.

Known only from the type locality, Sierra de Tonalá, Chiapas.

Base not seen; stem herbaceous above, over 50 cm. high; leaves on petioles 8 to 15 mm. long, the blades triangular-ovate, 3.5 to 7 cm. long, 1.5 to 2.8 cm. wide, narrowed to an obtuse tip, rather dull above, beneath equally green, puberulous along the veins and densely punctate with light glands; heads small, 4 mm. high, the phyllaries and pales somewhat indurate-cuspidate; achenes 1.3 mm. long.

4. *Ageratum tomentosum* (Benth.) Hemsl. Biol. Centr. Amer. Bot. 2: 84. 1881.

Coelestina tomentosa Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 71. 1852.

Carelia tomentosa Kuntze, Rev. Gen. Pl. 1: 325. 1891.

San Luis Potosí and Puebla to Costa Rica; type from Candelaria, Costa Rica.

Herbaceous or suffrutescent; leaves short-petioled, the blades ovate to triangular-ovate, 2 to 6.5 cm. long, 1 to 4 cm. wide, obtuse, dull above, densely whitish-tomentose beneath; flowers bluish purple or white.

5. *Ageratum corymbosum* Zuccagni; Pers. Syn. Pl. 2: 402. 1807.“*Sparganophorus ageratoides* Lag. Elench. Pl. 25. 1815.”*Ageratum coelestinum* Sims in Curtis's Bot. Mag. 42: pl. 1730. 1815.*Coelestina coerulea* Cass. Dict. Sci. Nat. 6: Suppl. 8. 1817.*Coelestina ageratoides* H. B. K. Nov. Gen. & Sp. 4: 151. 1820.*Coelestina suffruticosa* Sweet, Hort. Brit. 229. 1826.*Coelestina corymbosa* DC. Prodr. 5: 108. 1836.*Coelestina lessingiana* Klotzsch; Walp. Repert. Bot. 2: 545. 1843.*Carelia corymbosa* Kuntze, Rev. Gen. Pl. 1: 325. 1891.*Coelestina sclerophylla* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 176. 1913.

Sonora to Zacatecas and the Valley of Mexico. Texas. Type locality not stated.

Suffrutescent or fruticose, up to 70 cm. high; leaves very variable, the blades 2 to 11 cm. long, ovate to oval or rarely lanceolate, obtuse to acute, from nearly glabrous to dull grayish-tomentose beneath, dotted with pale or reddish glands; flowers violet or white. “Cielitos.”

Numerous varieties and forms based on leaf form and color are described by Robinson.¹

¹ Proc. Amer. Acad. 49: 475-477. 1913.

6. **Ageratum scabriusculum** (Benth.) Hemsl. Biol. Centr. Amer. Bot. **2**: 83. 1881.

Coelestina scabriuscula Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. **1852**: 72. 1852.

Carelia scabriuscula Kuntze, Rev. Gen. Pl. **1**: 325. 1891.

Western Mexico (between San Blas and Tepic) to Costa Rica; type from Volcán El Viejo, Costa Rica.

Herbaceous or suffruticose, decumbent; leaf blades ovate, 2 to 5 cm. long, 1 to 3.5 cm. wide, crenate-serrate, shining above, beneath duller green, sparsely puberulous along the veins; corollas glabrous, bluish; pappus usually dentate.

7. **Ageratum lucidum** Robinson, Proc. Amer. Acad. **36**: 475. 1901.

Morelos; type from Sierra de Topaxtlán, near Cuernavaca.

Frutescent, up to 50 cm. high; leaf blades ovate, 1.5 to 6 cm. long, 7 to 25 mm. wide, obtuse or acute, firm, shining above, beneath light-punctate, sparsely puberulous along the veins; heads broader than high, rather large; corollas white, glandular; pappus subentire.

8. **Ageratum salicifolium** Hemsl. Biol. Centr. Amer. Bot. **2**: 83. 1881.

Ageratum strictum Hemsl. Biol. Centr. Amer. Bot. **2**: 83. 1881.

Carelia salicifolia Kuntze, Rev. Gen. Pl. **1**: 325. 1891.

Carelia stricta Kuntze, Rev. Gen. Pl. **1**: 325. 1891.

Jalisco to Morelos; type collected between San Blas and Tepic.

Herbaceous or fruticose, up to 1.3 meters high; leaves short-petioled, the blades narrowly lanceolate, 4.5 to 11 cm. long, 0.5 to 1.7 cm. wide, attenuate, remotely serrate or subentire, green both sides, beneath sparsely puberulous along the veins and densely dotted with yellowish glands; corollas whitish, glandular-dotted; achenes 1.5 to 2 mm. long.

- 8a. **Ageratum salicifolium annectens** Blake, Contr. U. S. Nat. Herb. **22**: 588. 1924.

Known only from the type locality, near Cuernavaca, Morelos.

Receptacle paleaceous except in center, the pales linear-subulate.

10. **OXYLOBUS** Moc.; A. Gray, Proc. Amer. Acad. **15**: 25. 1879.

REFERENCE: Robinson, Revision of the genus *Oxylobus*, Proc. Amer. Acad. **49**: 483-487. 1913.

Fruticose or suffrutescent, densely glandular-pubescent; leaves opposite, subcoriaceous, not punctate; heads cymose-panicled; involucre subequal, the phyllaries subherbaceous, ribbed; receptacle naked; achenes 5-angled; pappus of 5 to 10 unequal, deeply lacerate squamellae.

The genus contains only the following species.

Stem leafy throughout.

Leaves elliptic, entire or subentire, 2 to 10 mm. wide.....1. **O. arbutifolius**.

Leaves oval or oval-ovate, crenate, 10 to 18 mm. wide...2. **O. glanduliferus**.

Leaves chiefly basal, obovate, those of the stem few and remote.

3. **O. adscendens**.

1. **Oxylobus arbutifolius** (H. B. K.) A. Gray, Proc. Amer. Acad. **15**: 26. 1879.

Ageratum arbutifolium H. B. K. Nov. Gen. & Sp. **4**: 149. 1820.

Phania arbutifolia DC. Prodr. **5**: 115. 1836.

Phania trinervia DC. Prodr. **5**: 115. 1836.

Oxylobus trinervius Moc.; DC. Prodr. **5**: 115. 1836, as synonym.

Carelia arbutifolia Kuntze, Rev. Gen. Pl. **1**: 325. 1891.

High mountains, Puebla; type from Mount Nauhcampatepetl or Cofre de Perote, altitude about 3,110 meters.

Fruticose, decumbent, cespitose, the branches up to 60 cm. long, very leafy; leaves subsessile or short-petioled, the blades elliptic, 8 to 20 mm. long, 2 to 10 mm. wide; heads crowded, white, about 7 mm. high.

2. *Oxylobus glanduliferus* (Schultz Bip.) A. Gray; Klatt, *Leopoldina* 20: 75. 1884.

Ageratum glanduliferum Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 82. 1881.

Carelia glandulifera Kuntze, Rev. Gen. Pl. 1: 325. 1891.

High mountains of Oaxaca; type from Mount Zempoaltepec.

Frutescent, up to 1.3 meters high, leafy; leaf blades oval or oval-ovate, 2 to 3.5 cm. long, 10 to 18 mm. wide, crenate, the lower petioled; heads white or bluish, 7 to 8 mm. high.

3. *Oxylobus adscendens* (Schultz Bip.) Robins. & Greenm. Proc. Amer. Acad. 41: 272. 1905.

Ageratum adscendens Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 80. 1881.

Carelia adscendens Kuntze, Rev. Gen. Pl. 1: 325. 1891.

High mountains of Puebla, Hidalgo, and State of Mexico; type from Mount Orizaba.

Scarcely frutescent, creeping and leafy at base; stem herbaceous, up to 50 cm. high, bearing 3 or 4 remote pairs of leaves; leaf blades obovate or spatulate-obovate, 2 to 4 cm. long, 1 to 2 cm. wide, crenulate, narrowed into a shorter petiole; heads crowded at tip of stem, about 8 mm. high.

11. *AGERATELLA* A. Gray in S. Wats. Proc. Amer. Acad. 22: 419. 1887.

REFERENCE: Robinson, Proc. Amer. Acad. 41: 271. 1905.

Frutescent or suffrutescent, with slender stems and alternate or opposite leaves; heads numerous, small or medium, somewhat racemose-paniculate; involucre strongly graduated, the dryish scarious-margined phyllaries more or less in 5 vertical ranks; receptacle naked; achenes 5-angled; pappus of 5 scarious lance-ovate squamellae prolonged into hispidulous bristles much longer than the achene.

The genus contains only two species.

Leaves opposite, broadly ovate, rhombic-ovate, or obovate. 1. ***A. microphylla***.
Leaves alternate, linear to linear-oblongate. 2. ***A. palmeri***.

1. *Ageratella microphylla* (Schultz Bip.) A. Gray in S. Wats. Proc. Amer. Acad. 22: 419. 1887.

Ageratum microphyllum Schultz Bip. in Seem. Bot. Voy. Herald 298. 1856.

Decachaeta seemanni Benth. & Hook. Gen. Pl. 2: 239. 1873; Hemsl. Biol. Centr. Amer. Bot. 2: 78. pl. 42. 1881.

Ageratella microphylla seemanni A. Gray in S. Wats. Proc. Amer. Acad. 22: 419. 1887.

Sinaloa (?) and Jalisco; type from the Sierra Madre of northwestern Mexico.

Shrubby, about 30 cm. high, much branched; leaves mostly opposite, short-petioled, the blades broadly ovate to rhombic or obovate, 6 to 12 mm. long, 4 to 7 mm. wide, crenate-serrate, veiny, finely puberulous and gland-dotted; heads clustered in the axils and toward tip of stem, cylindric, 8 mm. high, forming a very narrow, loosely spicate panicle.

2. *Ageratella palmeri* (A. Gray) Robinson, Proc. Amer. Acad. 41: 272. 1905.
Ageratella microphylla palmeri A. Gray in S. Wats. Proc. Amer. Acad. 22: 419. 1887.

Sinaloa and Jalisco; type from Río Blanco, Jalisco.

Suffrutescent, less branched, up to 60 cm. high; leaves alternate, the blades narrowly oblanceolate to linear, 10 to 22 mm. long, 1.5 to 3.5 mm. wide, subentire or sparsely toothed; heads 7 mm. high, numerous in a close or rather loose, spicate or racemelike panicle.

12. STEVIA Cav. Icon. Pl. 4: 32. 1797.

Shrubs or herbs, often glutinous, with mostly opposite leaves; heads small, 5 to 8-flowered (in all the following species), corymbose-panicled; phyllaries 5 to 8, subequal, stiffish, subherbaceous; corollas all tubular, slender, white or purplish; achenes slender, usually 5-ribbed, glabrous or hispidulous; pappus of 2 to 12 short squamellae, or slender awns, or both.

Leaves more or less densely griseous-pubescent to canescent-tomentose beneath.

Leaves 2.5 cm. long or less; involucre densely canescent-tomentulose.

1. *S. tephrophylla*.

Leaves 2.5 cm. long or more; involucre green, rarely griseous-tomentellous.

Leaves obscurely petioled, lance-linear, entire, densely canescent-tomentose beneath.....

2. *S. revoluta*.

Leaves distinctly petioled, lanceolate to ovate, almost always toothed, griseous-pubescent or puberulous beneath.

Hairs of branches and leaves mostly glandular-capitate.

3. *S. glandulosa*.

Hairs of branches and leaves not glandular-capitate.

Involucre griseous-tomentellous, 4 mm. high; leaves ovate or ovate-elliptic; petioles 3 to 7 mm. long.....

4. *S. dictyophylla*.

Involucre merely griseous-pilosulous or griseous-pubescent; leaves oblong-ovate to lance-ovate or lance-oblong; petioles usually 8 to 25 mm. long.....

5. *S. subpubescens*.

Leaves glabrous or sparsely pubescent beneath.

Leaf blades oval-ovate, obtuse, coarsely crenate, 3.2 cm. long or less, nearly as wide as long.....

6. *S. berlandieri*.

Leaf blades linear to ovate or oval-ovate, usually acute, much longer than wide.

Leaves with all veins (including the secondaries) strongly prominulous-reticulate especially beneath.

Pappus of awns and squamellae.....

7. *S. nervosa*.

Pappus of short squamellae only.

Stem and leaves pubescent.....

8. *S. madreensis*.

Stem and leaves glabrous.

Heads in very dense subglobose glomerules solitary at tips of stem and branches of inflorescence; leaves 8 to 14.5 cm. long, their teeth acute.....

9. *S. phlebophylla*.

Heads densely corymbose-paniculate, not glomerate; leaves 7 cm. long or less.

Leaves obtuse to acute, 13 mm. wide or less; petioles 3 mm. long or less.....

10. *S. venosa*.

Leaves acuminate, 25 to 30 mm. wide; petioles 20 mm. long.

11. *S. nitida*.

Leaves obscurely veined, or at least with the secondaries not prominulous.

Leaves linear to narrowly lanceolate, 1 cm. wide or less.

Leaves linear or linear-ob lanceolate, obtuse, entire, 4 cm. long and 4 mm. wide, or smaller; heads few.....

12. *S. collodes*.

Leaves linear to narrowly lanceolate, acuminate, often toothed, usually 6 to 8 cm. long.

Leaves linear-filiform to very narrowly linear-lanceolate, entire or sharply toothed, 0.8 to 4 mm. wide.....

13. *S. stenophylla*.

Leaves narrowly lanceolate or linear-lanceolate, usually serrulate, usually 5 to 10 mm. wide.....

14. *S. salicifolia*.

Leaves lanceolate to ovate or oval-ovate, rarely less than 1 cm. wide.

Young branches white-lanate, becoming arachnoid, finally glabrate.

15. *S. seleriana*.

Young branches not white-lanate or arachnoid.

Stem villous-pubescent above; pappus of about 10 narrowly linear awns about 0.3 mm. long-----16. *S. microchaeta*.

Stem glabrous or merely puberulous above; pappus otherwise.

Leaves distinctly petioled, the petioles usually 10 to 25 mm. long.

Leaves obtuse or obtusish, ovate, crenate-serrate; stem cinerascenscent-puberulous above-----17. *S. pyrolaefolia*.

Leaves usually acute to acuminate, if obtusish of different shape-----18. *S. lucida*.

Leaves sessile or on petioles 6 mm. long or less.

Leaves sessile, very acute, serrate-----19. *S. connata*.

Leaves short-petioled or with short petioliform bases.

Pappus awns 2 to 10, nearly or quite equaling the corolla; leaves toothed.

Stem thinly velutinous at apex; awns of pappus 10 to 12, equaling the achenes-----20. *S. haenkeana*.

Stem glabrous or sparsely pubescent toward apex; awns of pappus 2 to 5, much longer than the achenes.

21. *S. vernicosa*.

Pappus awns wanting or solitary.

Leaves entire, 6 cm. long or less.

Leaves 3.5 to 6 cm. long; squamellae 0.2 mm. long.

22. *S. flourensioides*.

Leaves 3.3 cm. long or less; squamellae 0.6 mm. long.

23. *S. integra*.

Leaves serrate, 7.5 cm. long-----24. *S. scabrella*.

1. *Stevia tephrophylla* Blake, Contr. U. S. Nat. Herb. 22: 590. pl. 54. 1924.

Known only from the type locality, Los Pinos, Chiapas.

Shrub about 25 cm. high, branched, densely cinereous-tomentulose; leaves opposite, the blades ovate to oval, obtuse, rather abruptly narrowed into the cuneate-margined petioliform base, 2 to 2.5 cm. long, 7 to 13 mm. wide, crenulate, dull cinerascenscent-green above, densely cinereous-tomentulose beneath; corymbs very dense, about 2.8 cm. wide, little exceeding the leaves; flowers white; involucre 4.8 mm. high; pappus of 2 or 3 awns and about 6 squamellae.

2. *Stevia revoluta* Robinson, Proc. Amer. Acad. 44: 617. 1909.

Mountains of Puebla; type from Cerro de Gentile, altitude 2,135 to 2,440 meters.

Shrubby, about 0.5 meter high, dichotomously branched, densely sordid-puberulous above; leaves opposite, the blades linear-lanceolate, 3.5 to 7 cm. long, 3 to 7 mm. wide, acuminate at each end, entire, usually revolute, subsessile, densely canescent-tomentose beneath, dull green and puberulous above; panicles 3.5 to 8 cm. wide; involucre glandular-pilosulous; flowers white; pappus of short lacerate squamellae.

3. *Stevia glandulosa* Hook. & Arn. Bot. Beechey Voy. 296. 1840.

Sonora, Jalisco, and Tepic; type from Jalisco.

Shrubby, dichotomously branched, densely and sordidly spreading-pubescent with chiefly gland-tipped hairs; leaves opposite, the blades ovate, 2.5 to 4 cm. long, 1 to 2.2 cm. wide, acutish, rounded-cuneate at base, serrate, densely glandular-pubescent especially beneath, on petioles 0.5 to 1.5 cm. long; heads densely crowded, the panicles 3 to 5 cm. wide; involucre 5 to 7 mm. high, pubescent with both glandular and eglandular spreading hairs; flowers white; pappus of squamellae only. "Merba" (Tepic).

4. *Stevia dictyophylla* Robinson, Proc. Amer. Acad. 44: 617. 1909.

Guanajuato and Jalisco; type from Guanajuato.

Shrubby, crisp-tomentellous; leaves opposite, the blades ovate or oval-elliptic, 3.5 to 6 cm. long, 12 to 25 mm. wide, acutish, entire or obsoletely crenate-dentate, above scabriusculous, beneath paler, crisp-puberulous, prominently reticulate-nervose, on petioles 3 to 7 mm. long; panicles dense, 12 to 14 cm. wide; involucre 4 mm. long, griseous-tomentellous; flowers white; pappus of minute squamellae.

5. *Stevia subpubescens* Lag. Gen. & Sp. Nov. 28. 1816.

Sonora to Valley of Mexico and Oaxaca.

Shrub 1 to 1.6 meters high, branched, griseous-puberulous; leaves opposite, the blades lance-oblong or lance-ovate, 4 to 9.5 cm. long, 1.3 to 2.8 cm. wide, acuminate or acute, at base acutely cuneate, serrulate or subentire, above green, glabrescent or puberulous, beneath densely or sparsely griseous-puberulous or sometimes merely hispidulous along the costa, on naked petioles mostly 1 to 3 cm. long; heads in rather dense panicles usually 3 to 8 cm. wide; involucre densely or sometimes sparsely griseous-pilosulous or puberulous; flowers white; pappus of short squamellae only.

6. *Stevia berlandieri* A. Gray in Torr. U. S. & Mex. Bound. Bot. 73. 1859.

Nuevo León and Tamaulipas; type from San Carlos, Tamaulipas.

Shrubby, about 0.5 meter high, glandular-dotted but essentially glabrous; leaves opposite, the blades oval-ovate, 1.5 to 3 cm. long, 1 to 2 cm. wide, obtuse or acutish, sparsely crenate-serrate, at base rounded or subtruncate, essentially glabrous, on petioles 1 to 2 cm. long; panicles rather dense, 4 cm. wide or less; involucre 6 mm. high, dotted with sessile glands; corollas apparently pinkish; achene glabrous; pappus coroniform, short.

6a. *Stevia berlandieri podadenia* Robinson, Proc. Amer. Acad. 44: 616. 1909.

San Luis Potosí.

Branches, petioles, and leaves crisp-pubescent; involucre stipitate-glandular.

6b. *Stevia berlandieri anadenotricha* Robinson, Proc. Amer. Acad. 44: 617. 1909.

Southwestern Chihuahua.

Densely crisp-puberulous; leaves 4 to 5 cm. long, 3.5 to 4 cm. wide; involucre 3 to 4 mm. high, crisp-puberulous, not glandular.

7. *Stevia nervosa* DC. Prodr. 5: 117. 1836.

Known only from the type locality, near Villalpando, Guanajuato.

Shrubby, the branches densely short-velutinous; leaves opposite or alternate, the blades elliptic, 12 to 30 mm. long, 10 to 12 mm. wide, subacute, at base attenuate, subserrate, thinly pubescent both sides, the nerves prominulous beneath; branches subhirtellous; heads crowded; involucre subhirtellous; achene glabrous; pappus of squamellae and 1 to 3 awns. (Description compiled.)

No specimens of this species have been examined, and its position here in the genus is inferential.

8. *Stevia madrensis* A. Gray, Proc. Amer. Acad. 21: 382. 1886.

Known only from the type locality, among pines on summit of mountains, Cumbre, above Batopilas, Chihuahua, altitude 2,685 meters.

Suffrutescent, about 30 cm. high, branched, incurved-hispidulous; leaves opposite, the blades narrowly elliptic or lance-elliptic, 3 to 6 cm. long, 5 to 9 mm. wide, obtuse or acute, cuneate into the barely petioled base, serrulate, sparsely pubescent and strongly venose both sides, paler green beneath; panicles dense, 1.2 to 2 cm. wide; involucre sparsely appressed-pubescent; flowers lilac-purple; pappus coroniform.

9. ***Stevia phlebophylla*** A. Gray in S. Wats. Proc. Amer. Acad. **22**: 419. 1887.
Jalisco; type from Río Blanco.

Shrubby, about 1 meter high, simple or slightly branched, glabrous; leaves opposite, the blades oblong-elliptic or oval-ovate, 8.5 to 14 cm. long, 2 to 6 cm. wide, serrulate or sharply serrate, acuminate, cuneate at base, glabrous and glaucescent, very veiny, on petioles 1 cm. long or less; panicles very dense, glomerate, terminating stem and branches or inflorescence; involucre spreading-pubescent and glandular; flowers white; achene glabrous; pappus short, coroniform.

10. ***Stevia venosa*** A. Gray, Proc. Amer. Acad. **21**: 382. 1886.

Chihuahua; type collected 150 miles north of Batopilas.

Suffrutescent or herbaceous, about 0.5 meter high, simple, glabrous but gland-dotted; leaves opposite or alternate, the blades elliptic or oblong-elliptic, 3 to 6 cm. long, 8 to 20 mm. wide, acute or obtuse, at base cuneate, glabrous, glaucescent, very veiny; panicles dense, 4 to 9 cm. wide; involucre 5 to 7 mm. high, incurved-puberulous and glandular; flowers purplish-tinged; achene hispidulous; pappus short, coroniform.

11. ***Stevia nitida*** Walp. Linnaea **14**: 320. 1840.

Mexico; definite locality not known.

Fruticose?, glabrous, oppositely branched; leaves opposite, on petioles about 20 mm. long, the blades ovate-elliptic, about 7 cm. long, 25 to 30 mm. wide, acuminate, serrate, glabrous, shining above, glaucous beneath, penninerved; corymb many-headed, terminal; phyllaries obtuse; achene glabrous; pappus coroniform. (Description compiled.)

No specimens of this species have been examined, and its position here is inferential.

12. ***Stevia collodes*** Greenm. Proc. Amer. Acad. **39**: 93. 1903.

Puebla; type from calcareous hills near Tehuacán.

Shrub about 0.5 meter high or less, oppositely branched, viscid, puberulous above; leaves opposite, sessile or subsessile, linear or linear-oblongate, 1.5 to 4 cm. long, 1.5 to 4 mm. wide, obtuse, narrowed at base, entire, thick, obscurely veined, obscurely puberulous or glabrous; heads few, in small subumbelliform panicles about 1 to 2 cm. wide; involucre 7 to 9 mm. long, the phyllaries acute; corollas white, 8.5 to 9 mm. long, glandular except on teeth; achene hispidulous above; pappus coroniform.

13. ***Stevia stenophylla*** A. Gray, Proc. Amer. Acad. **15**: 25. 1879.

Stevia foliosa Small, Fl. Southeast. U. S. 1163. 1903.

Chihuahua to Querétaro; type collected near San Luis Potosí. Texas.

Slender, oppositely branched shrub, 0.2 to 0.6 meter high, incurved-puberulous chiefly above; leaves opposite, linear-filiform to very narrowly linear-lanceolate, or rarely narrowly lanceolate, 3 to 8 cm. long, 0.8 to 4 mm. wide, acuminate, narrowed into a petioliform base, entire or sharply toothed, essentially glabrous; panicles dense, flattish, 2 to 8 cm. wide; involucre 4 to 5 mm. high, subglabrous or sparsely puberulous; flowers white; achene sparsely hispidulous; pappus of awns and squamellae, rarely of squamellae only.

14. ***Stevia salicifolia*** Cav. Icon. Pl. **4**: 32. pl. 354. 1797.

?*Stevia angustifolia* H. B. K. Nov. Gen. & Sp. **4**: 149. 1820.

Durango to Mexico and Puebla.

Shrub about 0.6 meter high or less, oppositely branched, appressed-puberulous, especially above, or nearly glabrous; leaves opposite, the blades narrowly lanceolate, linear-lanceolate, or lance-elliptic, 3 to 10 cm. long, usually 5 to 10 mm. wide, acuminate at each end, entire or usually serrulate, on petioles 3 to 10 mm. long; panicles dense, flattish, 2.5 to 14 cm. wide; involucre 5 mm. high,

viscid and sparsely puberulous; flowers white; achene finely hispidulous; pappus usually of awns and squamellae, rarely of squamellae only. "Hierba del aire" (Hidalgo, Villada).

14a. *Stevia salicifolia nana* A. Gray, Proc. Amer. Acad. **15**: 25. 1879.

San Luis Potosí. A dwarf viscid form, with narrowly lanceolate or oblanceolate, sometimes obtuse leaves only 2 to 3.3 cm. long and 2 to 7 mm. wide. It makes a near approach to the closely related *Stevia stenophylla* A. Gray.

15. *Stevia seleriana* Robinson, Proc. Amer. Acad. **35**: 327. 1900.

Known only from the type locality, in mountain woods between San Carlos and Santo Bartolo, Yautepec, Morelos.

Stoutish shrub, white-lanate in youth, soon arachnoid, finally glabrate; leaves opposite, on petioles 1.8 cm. long, the blades oblong, 8 to 10 cm. long, 2.3 to 3 cm. wide, crenate, subentire toward the acutish apex, glabrous; panicle 4 cm. wide; involucre 5 to 6 mm. long; flowers apparently white; pappus squamellate.

16. *Stevia microchaeta* Schultz Bip. Linnaea **25**: 291. 1852.

Known only from the type locality, near Oaxaca.

Suffruticulose, somewhat viscous, villous-pubescent above; leaves opposite, lanceolate, 7.5 cm. long, 12 to 14 mm. wide, acuminate at each end, subserrate; panicle compact, very many-headed; involucre 6 mm. long, glabrescent or slightly pubescent, the phyllaries acuminate; achene glabrous, elongate; pappus of about 10 narrowly linear, acute, subcaducous, entire setae about 0.3 mm. long. (Description compiled.)

17. *Stevia pyrolaefolia* Schlecht. Linnaea **16**: 326. 1842.

Known only from the type locality, "Mount Kakandó en la Encarnación," Mexico.

Fruticose, cinerascens-puberulous above; leaves opposite, petioled, ovate, rarely obovate or subspatulate, 5 to 6.3 cm. long, 20 to 25 mm. wide, obtuse, cuneate-attenuate at base, glabrous, depressed-crenate-serrate; panicles small, compact; involucre 6 mm. long, the phyllaries obtuse; pappus of squamellae and 1 or 2 awns. (Description compiled.)

18. *Stevia lucida* Lag. Gen. & Sp. Nov. 28. 1816.

?*Stevia glutinosa oaxacana* DC. Prodr. **5**: 116. 1836.

?*Stevia grandidentata* Schultz Bip.; Klatt, Leopoldina **20**: 75. 1884.

Stevia oaxacana Schultz Bip.; Klatt, Leopoldina **20**: 75. 1884, as synonym.

Jalisco and San Luis Potosí to Oaxaca; type from Ixmiquilpan and Zimapán ("Cimmapan"), Hidalgo. Costa Rica.

Shrub about 1 meter high, very viscous, glabrous or puberulous in the inflorescence; leaves opposite, on petioles usually 10 to 25 mm. long, the blades lance-ovate or lanceolate, sometimes ovate or oval-ovate, 3 to 10 cm. long, (0.7) 1.2 to 4 cm. wide, acute or acuminate, rarely obtusish, at base acute to rounded, serrulate to crenate-serrate, glabrous; panicles dense, 7 cm. wide or less; involucre 5 to 6 mm. long, the phyllaries obtuse to acute; flowers white or purplish-tinged; achene finely hispidulous; pappus of awns and squamellae, or of squamellae only. "Hierba de San Marcos."

19. *Stevia connata* Lag. Gen. & Sp. Nov. 27. 1816.

Mexico, without definite locality.

Fruticose, 2 meters high or more, strict, glabrous; leaves opposite below, alternate above, oblong-lanceolate, sessile and connate at base, serrate, very acute; panicle fastigiate; flowers white; pappus of awns and squamellae. (Description compiled.)

20. *Stevia haenkeana* DC. Prodr. 5: 122. 1836.

Mexico, without definite locality.

Suffruticulose at base, oppositely branched, thinly velutinous at apex; leaves opposite, on petioles 6 mm. long, the blades elliptic, 24 to 28 mm. long, 12 mm. wide, attenuate at each end, dentate; phyllaries acuminate; achenes scabriusculous; pappus of 10 to 12 awns as long as the achene. (Description compiled.)

21. *Stevia vernicosa* Greenm. Proc. Amer. Acad. 40: 33. 1904.

Morelos and Mexico; type from Sierra de Tepoztlán, Morelos.

Shrub about 1 meter high, oppositely branched, very viscid, glabrous and verrucose, sometimes somewhat pubescent above; leaves opposite, the blades lance-elliptic to oblanceolate, 1.5 to 4.5 cm. long, 4 to 8 mm. wide, acute or obtuse, narrowed into a petioliform base, serrulate, glabrous, glutinous; panicles dense, small, leafy-bracted; involucre 6 to 8 mm. high, the phyllaries ciliolate, acuminate; flowers white; achene hispidulous; pappus of minute squamellae and 2 to 5 awns about 8 mm. long.

22. *Stevia flourensioides* Blake, Contr. U. S. Nat. Herb. 22: 589. 1924.

Known only from the type locality, Mount Ixtaccihuatl, State of Mexico, altitude 3,355 to 3,660 meters.

Shrub 0.3 meter high and more, very viscid, loosely puberulous above with many-celled hairs, oppositely branched; leaves opposite, elliptic to oblong-elliptic, 3.5 to 6 cm. long, 5 to 16 mm. wide, obtuse or acutish, cuneately narrowed to a subpetiolate base, thick, entire, with obscure veins; panicles 4.5 to 6.5 cm. wide, dense, leafy-bracted; involucre 7 to 8 mm. high, the phyllaries obtuse to acute; flowers white; achene hispidulous; pappus coroniform, 0.2 mm. long.

23. *Stevia integra* Blake, Contr. U. S. Nat. Herb. 22: 589. 1924.

Known only from the type locality, Sierra de la Paila, Coahuila.

Frutescent, about 25 cm. high, sparsely branched, puberulous, especially above, with ascending or appressed hairs; leaves opposite, scattered above, elliptic to elliptic-obovate, 2.5 to 3.3 cm. long, 4 to 9 mm. wide, acute or obtusish, narrowed into a petioliform base, thick, entire, sparsely pubescent on the costa beneath or glabrous, obscurely veined; panicles dense, 1 to 2.8 cm. wide; flowers white; involucre 6 mm. high, the phyllaries obtuse, sparsely puberulous; achenes hispidulous; pappus of squamellae 0.6 mm. long, rarely with a single awn added.

24. *Stevia scabrella* Benth. Pl. Hartw. 19. 1839.

Known only from the type locality, Bolaños, Jalisco.

Suffrutescent, glabrous; leaves subternate, very short-petioled, the blades oblong-elliptic, 7.5 cm. long, 3.8 cm. wide, acute at each end, sparsely serrate, above glabrous and scabrellous; panicle very dense, fastigate; phyllaries acute; pappus of very short squamellae. (Description compiled.)

DOUBTFUL SPECIES.

STEVIA ELLIPTICA Hook & Arn. Bot. Beechey Voy. 434. 1840-41.

Known only from the type locality, between San Blas and Tepic.

Tall, shrubby, glandular-pubescent; leaves opposite, elliptic or ovate-elliptic, serrate, triplinerved, at base short-attenuate and sessile; heads glomerate; pappus of 3 or 4 awns as long as the corolla. (Description compiled.)

Apparently related to *S. glandulosa* Hook. & Arn.

13. HOFMEISTERIA Walp. Repert. Bot. 6: 106. 1846-47.

Suffrutescent or truly shrubby, branched; leaves alternate or opposite, fleshy, dentate to tripinnatisect, the petioles usually much longer than the blades; heads solitary on long peduncles, or paniced, medium-sized; involucre campanulate, many-seriate, strongly graduate, of narrow acuminate dryish phyllaries;

receptacle naked; achenes linear or prismatic, 2 to 5-ribbed; pappus longer than achene, of 2 to 15 hispidulous bristles and few squamellae, the latter sometimes parted into shorter bristles, or of aristate-tipped squamellae.

Heads paniced; leaves merely dentate.

Leaf blades orbicular or broadly ovate, 0.4 to 2.4 cm. long, half as long as the petioles or more-----1. **H. laphamioides**.

Leaf blades lanceolate or lance-ovate, 2 to 10 mm. long, many times shorter than the petioles-----2. **H. pluriseta**.

Heads solitary on long peduncles; leaves lobed to bipinnatisect.

Leaves very fleshy, bipinnatisect into truly linear segments; squamellae dissected to base into bristles-----3. **H. crassifolia**.

Leaves less fleshy, lobed to bipinnatisect, the ultimate segments not linear; squamellae not dissected-----4. **H. fasciculata**.

1. **Hofmeisteria laphamioides** Rose, Contr. U. S. Nat. Herb. 1: 79. 1890.

Hofmeisteria pluriseta laphamioides I. M. Johnston, Proc. Calif. Acad. IV. 12: 1186. 1924.

Baja California; type from San Pedro Mártir Island.

Shrub 0.6 meter high, glandular-puberulous; leaves chiefly opposite, the blades suborbicular to deltoid-ovate, 0.4 to 2.4 cm. long and wide, crenate to dentate, obscurely or not at all lobed, shorter than the petioles; heads paniced, white; involucre 8 to 10 mm. high, the outer phyllaries with short, obscurely herbaceous, sometimes spreading tips; pappus bristles about 10 to 12, sometimes chaffy-dilated at base, with usually as many alternating squamellae.

1a. **Hofmeisteria laphamioides pauciseta** (I. M. Johnston) Blake.

Hofmeisteria pluriseta pauciseta I. M. Johnston, Proc. Calif. Acad. IV. 12: 1187. 1924.

Baja California; type from San Pedro Nolasco Island, Gulf of California.

Pappus setae 5 to 8, alternating with 5 to 8 oblong squamellae.

2. **Hofmeisteria pluriseta** A. Gray in Torr. U. S. Rep. Expl. Miss. Pacif. 4: Bot. 96. pl. 9. 1857.

Northern Baja California. Southwestern United States; type from Bill Williams Fork, Arizona.

Shrubby, much branched, glandular-puberulous, about 30 cm. high; leaves opposite or alternate, the blades chiefly lanceolate or lance-ovate, 2 to 10 mm. long, 1 to 4 mm. wide, entire or few-toothed, on petioles about 2.5 cm. long; heads white; involucre 6 to 8 mm. high; longer pappus bristles about 12, irregularly alternating with about as many much shorter narrow scarious squamellae or bristles.

3. **Hofmeisteria crassifolia** S. Wats. Proc. Amer. Acad. 24: 53. 1889.

Sonora; type from Guaymas.

Suffrutescent, glabrous, with stout branches; leaves alternate, the blades 1 to 1.5 cm. long, triangular in outline, once or twice ternately parted into linear fleshy lobes; heads pink, broader than high; phyllaries glabrous, with erose margins; longer pappus bristles 5, the squamellae dissected into shorter bristles.

The flowers are said to be very fragrant.

4. **Hofmeisteria fasciculata** (Benth.) Walp. Repert. Bot. 6: 106. 1846-47.

Helogyne fasciculata Benth. Bot. Voy. Sulph. 20. pl. 14. 1844.

Baja California; type from Magdalena Bay.

Suffruticose or frutescent, essentially glabrous; leaves opposite below, alternate above, the blades deltoid or suborbicular in outline, 1.5 to 4 cm. long and wide, ternately parted or lobed, the lobes again irregularly lobed, the ultimate divisions oblong to triangular; involucre resinous-atomiferous; flowers lilac; pappus bristles 2 or 3; squamellae 2 or 3, linear, merely laciniate.

- 4a. *Hofmeisteria fasciculata xanti*** A. Gray in Brewer & Wats. Bot. Calif. 1: 299. 1876.

Hofmeisteria fasciculata grayi T. S. Brandeg. Zoe 5: 160. 1903.

Southern Baja California; type from Cape San Lucas.

Similar, but leaves merely 3-lobed halfway to middle, the lobes broad, sparsely repand-dentate.

- 4b. *Hofmeisteria fasciculata pubescens*** (S. Wats.) Robinson, Proc. Amer. Acad. 47: 192. 1911.

Hofmeisteria pubescens S. Wats. Proc. Amer. Acad. 24: 54. 1889.

Baja California; type from Mulejé.

Densely glandular-pubescent, usually taller than the type; leaves often more finely divided than in the typical form.

14. **FLEISCHMANNIA** Schultz Bip. Flora 33: 417. 1850.

Suffrutescent or herbaceous; leaves opposite or alternate, dentate to biterminately parted; heads (in the following species) solitary on long peduncles, the involucre many-seriate, strongly graduate, the phyllaries dry, acuminate, striate; receptacle naked; achenes linear, 5-angled; pappus of 5 to 8 bristles, with minute setulose squamellae between them, or the latter united into a low crown or obsolete.

Stem densely glandular-pubescent.....1. ***F. schaffneri***.
Stem glabrate below, sparsely glandular-pilose above.....2. ***F. urenifolia***.

- 1. *Fleischmannia schaffneri*** A. Gray, Proc. Amer. Acad. 15: 101. 1879.

San Luis Potosí and Jalisco; type from San Francisco, San Luis Potosí.

Suffrutescent, about 20 cm. high; leaves chiefly alternate, the blades triangular in outline, about 1 cm. long and wide, once or twice ternately parted into spatulate-linear, sparsely dentate lobes 3 mm. wide or less; flowers whitish or purplish-tinged; pappus of 5 or 6 bristles and a low denticulate crown.

- 2. *Fleischmannia urenifolia*** (Hook. & Arn.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 91. 1881, as *F. urenaefolia*.

Phania ? urenifolia Hook. & Arn. Bot. Beechey Voy. 297. 1840.

Fleischmannia langlassei Robinson, Proc. Amer. Acad. 41: 273. 1905.

Tepic and Michoacán or Guerrero; type from Tepic.

Leaves alternate, the blades trifid or pinnately trisect with stalked trifid terminal lobe, the segments obtuse; phyllaries linear-acuminate, except for a few ovate outer ones. "Clavellilo."

15. **PIPTOTHRIX** A. Gray, Proc. Amer. Acad. 21: 383. 1886.

Suffrutescent (or herbaceous?), slender, branched; leaves opposite, ovate, petiolate or subsessile; heads small, in close small panicles; involucre about 2-seriate, of mostly subequal, dryish or subherbaceous phyllaries; flowers white; achenes 5-angled; pappus a single series of capillary deciduous bristles.

All the known species of the genus are included in this treatment.

Stem and branches glabrous.

Petioles 1 to 3 cm. long; leaves triangular or deltoid-ovate, 3 to 7 cm. wide.

Petioles 1 to 1.5 cm. long; leaves deltoid-ovate, with 25 to 30 pairs of teeth, the pubescence of the under leaf surface chiefly incurved.

1. ***P. goldmanii***.

Petioles mostly 2 to 3 cm. long; leaves triangular-ovate, with 11 to 18 pairs of teeth, the pubescence of the under leaf surface spreading.

2. ***P. aegiroides***.

Petioles 1 to 4 mm. long; leaves ovate, 1.3 to 4 cm. wide.

Petioles and leaves glabrous, glaucescent.....3. ***P. jaliscensis***.

Petioles and leaves pubescent, not glaucescent.....4. *P. palmeri*.
Stem and branches densely pubescent.

Heads 11-flowered; leaves rather densely pubescent over whole surface beneath.
5. *P. pubens*.

Heads 8-flowered; leaves sparsely short-pubescent beneath chiefly along the
venation.....6. *P. sinaloae*.

1. *Piptothrix goldmanii* Robinson, Proc. Amer. Acad. 35: 328. 1900.

Known only from the type locality, near Batopilas, Chihuahua.

Suffrutescent (?); stem wine-color; leaf blades deltoid-ovate, 6 to 9 cm. long, 4.5 to 7 cm. wide, acuminate, dentate-serrate, sparsely puberulous on the veins beneath; panicles about 7 cm. wide; heads 4 mm. high, about 24-flowered.

2. *Piptothrix aegiroides* Robinson, Proc. Amer. Acad. 41: 273. 1905.

Known only from the type locality, mountains about Etzatlán, Jalisco, altitude 1,830 meters.

Herbaceous (?), 0.6 to 1.3 meters high; stem purplish; leaf blades triangular-ovate, 5 to 7.5 cm. long, 2.5 to 5.8 cm. wide, acuminate, dentate-serrate, pubescent with several-celled hairs on the veins beneath; heads 6 mm. high, 20-flowered.

3. *Piptothrix jaliscensis* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 268. 1904.

Known only from the type locality, mountains above Etzatlán, Jalisco, altitude 1,830 meters.

Suffrutescent (?), 0.6 to 1 meter high; stem glaucescent; leaf blades ovate, 3 to 5 cm. long, 1.8 to 4 cm. wide, acuminate, rounded or subcordate at base; heads in close clusters, 6 mm. high.

4. *Piptothrix palmeri* A. Gray, Proc. Amer. Acad. 21: 383. 1886.

Known only from the type locality, near Batopilas, Chihuahua.

Frutescent; leaf blades ovate, 3 to 5.5 cm. long, 1.3 to 2.8 cm. wide, acuminate, rounded or subcordate at base, puberulous beneath on the veins, as well as on the petioles; panicles rounded, about 4 cm. wide; heads 5 mm. high, white or "ochroleucous."

5. *Piptothrix pubens* A. Gray in S. Wats. Proc. Amer. Acad. 22: 419. 1887.

Chihuahua and Jalisco; type from Río Blanco, Jalisco.

Frutescent, up to 2 meters high; stem and branches sordid-puberulous; leaf blades ovate, 2 to 6.5 cm. long, 1 to 3.2 cm. wide; heads 3.5 to 5 mm. high.

6. *Piptothrix sinaloae* Blake, Proc. Biol. Soc. Washington 32: 190. 1919.

Known only from the type locality, Sierra del Mineral del Tominil, San Ignacio, Sinaloa, altitude 1,500 meters.

Shrub 0.5 to 0.8 meters high; branches densely incurved-pubescent; leaf blades ovate, 5 to 5.5 cm. long, 2 to 3.2 cm. wide, acuminate, serrate.

16. EUPATORIUM L. Sp. Pl. 836. 1753.

(Contributed by Dr. B. L. Robinson.)

REFERENCES: H. B. K. Nov. Gen. & Sp. 4: 104-134. 1820; DC. Prodr. 5: 141-186. 1836.

Shrubs or small trees, or often herbs; leaves mostly opposite, filiform to orbicular, membranaceous to coriaceous; heads homogamous, (1-mostly) 5 to 100-flowered, usually in corymbose or thyrsoid panicles; corollas red, purple, blue, or white, rarely ochroleucous or greenish yellow; anthers appendaged at the tip, entire at base; style branches long and at maturity much exserted, threadlike or more often club-shaped, often colored; achenes columnar to obovoid, 5-ribbed or 5-angled; pappus of many hairlike bristles, white, sordid, straw-colored, roseate, purple, or tawny, usually subequal, occasionally the outermost much shorter.

A very large, chiefly American genus, most diversified and abundant from Mexico to Argentina. Of little economic importance. Some species are applied in folk medicine. Several have value in horticulture. At least one, with aromatic qualities, is used in flavoring tobacco.

A. Receptacle glabrous, flat or nearly so.

B. Involucre cylindrical, (2-)3-5 times as long as thick; phyllaries closely imbricated in 3-5 series. Section CYLINDROCEPHALA.

Phyllaries herbaceous-tipped, tending to be squarrose... 1. *E. sagittatum*.

Phyllaries appressed, not much altered at tip.

Leaves alternate, subsessile..... 2. *E. pulchellum*.

Leaves opposite.

Leaves subsessile by a narrowed cordate base, pinnate-veined.

3. *E. glaberrimum*.

Leaves petioled, 3 to 5-nerved.

Heads 4 to 6-flowered.

Heads subsessile near tips of panicle branches.

Stems terete, hollow; leaves tapering from near base.

4. *E. lozanoanum*.

Stems angled, pithy; leaves broadest near middle.

5. *E. konzattii*.

Heads slender-pediceled, corymbose..... 44. *E. campechense*.

Heads 10 to 40-flowered.

Heads in ovoid panicles; leaves reticulate-veiny.

Heads about 10 to 13-flowered; involucre 2 to 2.6 mm. thick.

6. *E. bertholdii*.

Heads about 20 to 40-flowered; involucre 4 to 5 mm. thick.

7. *E. ovaliflorum*.

Heads in flattish corymbs; leaves not reticulate... 8. *E. odoratum*.

BB. Involucre normally campanulate or turbinate, rarely more than twice as long as thick; phyllaries less closely imbricated than in the preceding.

C. Phyllaries conspicuously unequal, in 3 or more series. Section SUBIMBRICATA.

D. Heads 1 to 45-flowered; receptacle flat or slightly convex, not noticeably alveolate.

Leaves pinnate-veined.

Petiole not winged.

Leaves opaque.

Proper tube of corolla much longer than throat.

9. *E. araliaefolium*.

Proper tube of corolla not equaling throat.

Leaves 4 times as long as wide, membranaceous, not prominently reticulate..... 10. *E. pinabetense*.

Leaves 2 to 3 times as long as wide, subcoriaceous, reticulate.

Phyllaries rounded at tip..... 11. *E. pittieri*.

Phyllaries pointed at tip..... 12. *E. galeottii*.

Leaves pellucid-reticulate but not pellucid-punctate.

Leaves lance-oblong; achenes smoothish.... 13. *E. oaxacanthum*.

Leaves ovate; achenes gray-villous..... 14. *E. eriocarpum*.

Leaves pellucid-punctate, often also pellucid-reticulate.

Veinlets not raised from upper leaf surface.

Heads sessile or nearly so; leaves drying dark or olivaceous.

Leaves membranaceous, obtusish at base.

15. *E. tepicanum*.

- Leaves chartaceo-coriaceous, cuneate at base.
 Inflorescence glabrous or obscurely puberulent.
 16. *E. hospitale*.
- Inflorescence tawny-velvety-----17. *E. daleoides*.
- Heads shortly slender-pedicled; leaves drying green.
 Leaves subentire, more than twice as long as wide.
 18. *E. hebebotryum*.
- Leaves incisely toothed, less than twice as long as wide.
 20. *E. hemipteropodum*.
- Veinlets raised on upper leaf surface-----19. *E. morifolium*.
- Petiole winged, cordate-clasping at base----21. *E. quadrangulare*.
- Leaves palmate-nerved at or from near base.
 Petiole winged to the cordate-clasping base.
 Stem square in section-----21. *E. quadrangulare*.
- Stem subterete-----22. *E. thyrsoides*.
- Petiole (of cauline leaves) cuneate-winged from top to near middle.
 20. *E. hemipteropodum*.
- Petiole not winged.
- Heads thistle-shaped; florets much exceeding the involucre.
 Heads 4 to 6 (to 7) mm. high; involucre turbinate; phyllaries
 1-nerved.
 Phyllaries linear to lance-linear, attenuate; leaves bright green,
 sharply toothed; veins prominently netted between the
 nerves-----23. *E. ortegae*.
- Phyllaries lanceolate to elliptic, obtuse to merely acutish;
 leaves dull green, subentire; veins not conspicuously
 netted-----24. *E. haenkeanum*.
- Heads 7 to 8 mm. high; involucre ovoid.
 Leaves lance-ovate, twice as long as wide, tomentellous be-
 neath-----25. *E. mendezii*.
- Leaves deltoid-ovate, less than twice as long as wide.
 Phyllaries loosely imbricate, narrowly lanceolate, all acute.
 26. *E. stillingiaefolium*.
- Phyllaries closely imbricate, lance-oblong to rhombic-ovate.
 Phyllaries acute or acutish; pedicels puberulent to slightly
 villous-----27. *E. collinum*.
- Phyllaries obtuse; pedicels stoutish and velvety.
 28. *E. neaeaeum*.
- Heads not thistle-shaped.
- Heads subsolitary; pedicels 6 to 10 cm. long--29. *E. longipes*.
- Heads clustered; pedicels rarely over 1 cm. long.
 Phyllaries all acute.
 Heads 3 to 6-flowered.
 Leaves ovate; inner phyllaries about 3 mm. long.
 30. *E. palmeri*.
- Leaves lanceolate; inner phyllaries 4 to 5 mm. long.
 31. *E. solidaginifolium*.
- Heads 10 to 40(to 60)-flowered.
 Petiole (if present) not above one-sixth length of blade.
 Heads 7 to 8 mm. high; leaves glabrous but often glutin-
 nous-----32. *E. collodes*.
- Heads 10 to 15 mm. high; leaves pubescent beneath.
 Outer phyllaries ovate, acute-----33. *E. bigelovii*.
- Outer phyllaries ovate-lanceolate, attenuate.
 34. *E. turbinatum*.

- Petiole one-fourth to one-third as long as blade.
- Leaves elliptic-lanceolate to ovate-oblong, pointed at base, smoothish.....79. *E. glabratum*.
- Leaves deltoid-ovate, subtruncate to cordate at base, pubescent, crenate-dentate.....35. *E. azureum*.
- Outer and middle phyllaries acute, the inner obtuse.
- Leaves over 10 cm. wide, unlobed.....36. *E. oresbium*.
- Leaves with 1 or 2 sharp lobes or angles on each side.
37. *E. oresbioides*.
- Leaves 2 to 6 cm. wide, unlobed.
- Heads 12 to 30-flowered.
- Involucre less than half as long as florets, glutinous.
79. *E. glabratum*.
- Involucre at least two-thirds as long as florets.
- Leaves cuspidate-denticulate, pinnately nerved from well above the base; phyllaries scarcely nerved or striate.....38. *E. hylobium*.
- Leaves serrate to crenate, 3 or 5-nerved from the base; phyllaries distinctly nerved or striate.
- Heads about 1 cm. long; leaves cordate with a narrow sinus, prominently reticulate-veiny beneath.....50. *E. phoenicolepis*.
- Heads 4 to 6 mm. long; leaves acute to rounded or openly cordate at base, not reticulate-veiny.
39. *E. pycnocephalum*.
- Heads 6 to 8-flowered; phyllaries pearly white.
45. *E. leucocephalum*.
- Phyllaries all obtuse or rounded at tip.
- Leaves sessile.
- Cauline leaves alternate.....40. *E. adenospermum*.
- Cauline leaves opposite.....41. *E. dryophilum*.
- Leaves petioled.
- Heads 1-flowered, in paniced glomerules.
42. *E. monanthum*.
- Heads several to many-flowered.
- Heads in subglobose axillary glomerules.
43. *E. pelotrophum*.
- Heads not in axillary glomerules.
- Heads about 6-flowered.
- Heads about 1 cm. long....44. *E. campechense*.
- Heads about 5 mm. long.45. *E. leucocephalum*.
- Heads 10 to 12-flowered.
- Leaves hastate; pedicels commonly 6 to 10 mm. long.
- Florets about twice as long as inner phyllaries; leaves somewhat fleshy.
46. *E. peninsulare*.
- Florets scarcely exceeding inner phyllaries; leaves membranaceous.
47. *E. spinaciaefolium*.
- Leaves ovate, not hastate; pedicels 0 to 3 mm. long.
20. *E. hemipteropodum*.

Heads 15 to 45-flowered, 5 to 11 mm. high; phyllaries 2 to 5-costulate.

Pedicels glabrous though sometimes glutinous.

Heads 5 to 6 mm. long, in terminal long-peduncled corymbs-----48. *E. blepharolepis*.

Heads 7 to 9 mm. long, in leafy-bracted panicles.
79. *E. glabratum*.

Pedicels villous or glandular-pubescent.

Corollas yellowish to greenish white, dotted with conspicuous orange or brown glands; phyllaries green-----49. *E. nelsonii*.

Corollas purple to rose (rarely white), not conspicuously dotted; phyllaries usually purple-tinged.

Heads 4 to 6 mm. high; leaves not reticulate, at base acute to subcordate with open sinus-----39. *E. pycnocephalum*.

Heads about 1 cm. high; leaves reticulate-veiny beneath, cordate with closed sinus.

50. *E. phoenicolepis*.

DD. Heads 50 to many-flowered; receptacle distinctly convex, ellipsoidal or subconical, conspicuously alveolate.

Phyllaries 2 to 5-costulate; leaves palmately 3-nerved practically from base-----35. *E. azureum*.

Phyllaries obscurely nerved or nerveless; leaves pinnately 5 to 9-nerved from well above base. (Showy, nearly herbaceous undershrubs, known chiefly through horticulture and of very doubtful distinctness.)

Phyllaries lance-oblong, 2 to 2.5 mm. wide; pubescence fuscous.

51. *E. constipatiflorum*.

Phyllaries lance-linear, mostly 1 to 1.5 mm. wide; pubescence not fuscous.

Pubescence of stem and inflorescence long, deeply colored, red or purple-----52. *E. atrorubens*.

Pubescence dull, tawny or rusty, sometimes reduced to mere puberulence.

Leaves suborbicular, sometimes 30 to 40 cm. in diameter, acute or obtuse; style branches azure.

53. *E. megalophyllum*.

Leaves broadly ovate, 10 to 15 cm. wide, acuminate at apex, blunt to subtruncate or even shallowly cordate at base; style branches clear rose-color.

54. *E. thespesiaefolium*.

Leaves ovate-oblong to elliptic, usually pointed at base, mostly 6 to 9 cm. wide.

Leaf blade ovate-oblong, about two-thirds as wide as long; petiole one-fifth to fully one-half as long as blade.

55. *E. sordidum*.

Leaf blade elliptic-oblong, less than half as wide as long; petiole very short, not one-tenth as long as blade.

56. *E. miradorens*.

CC. Phyllaries subequal, in about 2 scarcely imbricate series, usually 1 to 3 of the outermost phyllaries much shorter. Section EXIMBRICATA.

E. Heads 3 to 8(to 10)-flowered.

Leaves pinnately veined-----59. *E. ligustrinum*.

Leaves palmately nerved.

Heads in globose axillary glomerules.....43. *E. pelotrophum*.

Heads not in axillary glomerules.

Corollas nearly tubular, without distinguishable throat.

Leaves dark-punctate beneath.....65. *E. leucoderme*.

Leaves not dark-punctate beneath.

Leaves elliptical, coriaceous; phyllaries chiefly obtuse.

66. *E. albicaule*.

Leaves ovate to lanceolate, membranaceous; phyllaries acute.

Leaves ovate, 2 to 5 cm. wide.....30. *E. palmeri*.

Leaves lanceolate, 8 to 15 mm. wide.

31. *E. solidaginifolium*.

Corollas abruptly or gradually enlarged into a perceptible throat.

Leaves lanceolate to rhombic-oblong, entire or nearly so, 4 to 16 mm. wide.

Leaves lance-oblong, entire, 3 to 4 times as long as wide, vernicose; achenes hispid.....68. *E. glischrum*.

Leaves rhombic-oblong, entire or undulately few-toothed, 1.5 to 2 times as long as wide; achenes glandular-atomiferous.

89. *E. hidalgense*.

Leaves ovate, serrate or dentate, 2 to 4 cm. wide.

60. *E. saltillense*.

EE. Heads normally 10 to 18-flowered but occasionally varying within wider limits.

Leaves linear to lance-oblong.

Leaves mostly attenuate, 3-nerved from the base, gray-pubescent beneath.....70. *E. brevipes*.

Leaves acute or obtusish, pinnate-veined, white-tomentose beneath.

71. *E. liebmannii*.

Leaves (at least the cauline) ovate or ovate-oblong to elliptic or orbicular.

Inflorescence lateral; heads pendulous on long filiform pedicels.

57. *E. cremastum*.

Inflorescence terminal.

Leaves 8 to 14 cm. wide, deciduous before anthesis.

72. *E. crassirameum*.

Leaves rarely over 6 cm. wide, persistent to anthesis.

Inflorescences few(5 to 9)-headed, subsimple, raceme-like.

73. *E. desquamans*.

Heads many, glomerate or subracemose on spreading panicle branches; corollas little longer than achenes.

Petioles of cauline leaves about 3 mm. long; heads 4 to 5 mm. high, densely clustered at tips of panicle branches; phyllaries 2.5 to 3 mm. long; Veracruz.

64. *E. pseudoperfoliatum*.

Petioles of cauline leaves 9 to 17 mm. long; heads 4.5 to 6 mm. long, more loosely clustered; phyllaries 3.5 to 5 mm. long, attenuate; San Luis Potosí.....62. *E. longifolium*.

Petioles of cauline leaves 2 to 4.5 cm. long; heads subracemously disposed.....63. *E. solidaginoides*.

Heads corymbose; corollas 1.5 to 3 times as long as achenes.

Achenes densely canescent-villous.....74. *E. rupicola*.

Achenes glabrous or glandular to hispid, not canescent-villous.

Pappus half to two-thirds length of corolla.

Branchlets terete; leaves of firm texture.

Leaves elliptic to obovate, obtuse at tip, cuneate at base.....75. *E. viburnoides*.

- Leaves ovate, caudate-acuminate at tip, cordate at base-----69. *E. areolare*.
 Branchlets tetragonal; leaves thinly membranaceous.
 76. *E. tetragonum*.
 Pappus at least three-fourths length of corolla.
 Leaves pinnate-veined.
 Leaves about 7 cm. long, acuminate, subglabrous above; petiole about one-eighth as long as blade.
 77. *E. adenachaenium*.
 Leaves about 5 cm. long, obtusish to acute, sparsely setulose above; petiole about one-fourth as long as blade-----58. *E. lucidum*.
 Leaves palmately or subpalmately nerved.
 Phyllaries somewhat vernicose.
 Phyllaries lance-linear, attenuate.
 Leaves membranaceous, obtuse, coarsely crenate-dentate, pubescent beneath.
 78. *E. brandegeanum*.
 Leaves subcoriaceous, acuminate, subentire, glabrous or nearly so----80. *E. subintegrum*.
 Phyllaries oblong, obtusish or merely acute.
 Leaves rhombic-ovate to oblong, cuneate at base; lateral inflorescences on short suberect branches-----79. *E. glabratum*.
 Leaves prevailingly ovate, mostly subtruncate or rounded at base; lateral corymbs on spreading-ascending branches----81. *E. espinosarum*.
 Phyllaries not vernicose.
 Petioles (of cauline leaves) 1.2 to 7 cm. long.
 Cauline leaves reniform-ovate, cordate, coarsely crenate, broader than long.
 61. *E. hederæfolium*.
 Cauline leaves ovate (deltoid with rounded angles), about as wide as long, ferruginous beneath.
 82. *E. hebes*.
 Cauline leaves ovate to oblong, longer than broad, not ferruginous.
 Phyllaries elliptic, obtuse or barely acute.
 24. *E. haenkeanum*.
 Phyllaries lanceolate or narrowly oblong-linear, acute to attenuate.
 Leaves glabrous beneath.
 Phyllaries dorsally glabrous, nerveless or obscurely nerved; leaves 2.5 to 4.5 cm. long, subcoriaceous 83. *E. havanense*.
 Phyllaries dorsally glandular-tomentiferous and puberulent, 1 or 2-costulate; leaves 6 to 10 cm. long 84. *E. gracilicaule*.
 Leaves somewhat arachnoid-pubescent beneath, at least tufted in axils of the larger veins; heads in a mostly elongate thyrses.
 85. *E. mairetianum*.

Leaves pubescent beneath but not arachnoid nor tufted in axils of veins; heads corymbose.

Phyllaries about half length of florets, deep purple----86. *E. subpenninervium*.

Phyllaries acutish to attenuate, decidedly more than half as long as florets.

Phyllaries pale green, not dark-dotted.

87. *E. vernale*.

Phyllaries dark purple, dotted with dark sessile glands----88. *E. chiapense*.

Petioles not exceeding 1 cm. in length.

Petioles at least one-sixth as long as blade.

Heads (or most of them) sessile or subsessile in small glomerules at tips of panicle branches; leaves oblong, 5 to 10 cm. long; tall shrubs or small trees with pale cortex.

Leaves coriaceous; phyllaries rounded to acutish at tip-----66. *E. albicaule*.

Leaves membranaceous; phyllaries attenuate.

67. *E. ymalense*.

Heads well pediceled; leaves 1 to 3 (to 5) cm. long.

Phyllaries linear to narrowly lanceolate.

Phyllaries conspicuously 2-ribbed, at least the outer ones beset with dark glands.

78. *E. brandegeanum*.

Phyllaries faintly if at all ribbed, not glandular.

Leaves not punctate, deltoid-ovate.

Leaves dull green, tawny-puberulent, subentire-----82. *E. hebes*.

Leaves bright green, smooth or nearly so, coarsely toothed.

83. *E. havanense*.

Leaves dark-punctate, rhombic-ovate to ovate-oblong----89. *E. hidalgense*.

Phyllaries ovate to oblong, nearly always pubescent or glandular dorsally.

Corymbs dense, terminal, ovoid, many-headed, 5 to 10 cm. in diameter; leaves rhombic-ovate, 3 to 5 cm. long.

90. *E. rhomboideum*.

Corymbs small and numerous, few-headed; leaves rarely above 2.5 cm. in length.

Leaves densely canescent-tomentose beneath, soft in texture, only 5 to 8 mm. long-----91. *E. irrasum*.

Leaves glabrous, glandular, or pubescent, never tomentose beneath.

Leaves faintly lepidote above, thin, the rameal ovate-oblong and entire or nearly so--92. *E. porriginosum*.

Leaves not lepidote.

Corollas white; rameal leaves (apt to be conspicuously numerous) smaller than the cauline, oval, entire or nearly so; northern Mexico-----93. *E. wrightii*.

Corollas roseate or purple-tinged; rameal leaves rarely differentiated; central and southern Mexico.

Leaves thick, firmly coriaceous, glandular-punctate chiefly on the often prominent and slightly furrowed veinlets beneath.

94. *E. calophyllum*.

Leaves membranaceous to chartaceous, punctate on surface between the closely netted veinlets beneath--95. *E. calaminthaefolium*.

Petioles not over one-tenth as long as the leaf blades-----96. *E. glaucum*.

EEE. Heads 20 to many-flowered.

Young leaves more or less vernicose; branches arcuate or flexuous, usually nodulose; heads large, 1 to 1.5 cm. long; florets little exceeding the involucre.

Leaves 1 to 2 cm. long; most of the rameal internodes not over 2 to 7 mm. long.

Leaves elliptic-lanceolate, about 5 mm. wide, cuneate at base.

98. *E. mygindaefolium*.

Leaves ovate, about 1 to 1.5 cm. wide, rounded at base.

99. *E. campylocladum*.

Leaves 3 to 6 cm. long.

Cauline leaves deltoid-ovate, shallowly cordate, more than two-thirds as wide as long, acuminate, exceedingly glutinous.

100. *E. vernicosum*.

Cauline leaves ovate-oblong, barely acute to obtuse, rounded at base, not two-thirds as wide as long, slightly glutinous.

101. *E. multiserratum*.

Leaves not vernicose.

Leaves lanceolate to lance or linear-oblong, not one third as wide as long.

Leaves entire, 1 to 2.2 cm. long-----102. *E. hyssopinum*.

Leaves serrate, 2.5 to 9 cm. long.

Leaves 3-nerved from near the base.

Petioles (of cauline leaves) 1 to 2 cm. long; leaves subglabrous.

103. *E. riparium*.

Petioles (of cauline leaves) 1 to 5 mm. long; leaves grayish-pubescent-----70. *E. brevipes*.

Leaves pinnate-veined, white-tomentose beneath.

71. *E. liebmännii*.

Leaves ovate, oblong, or suborbicular, more than one-third as wide as long.

Petioles 1 to 2 mm. long, not one-tenth as long as leaf blades.

97. *E. rhodopodum*.

Petioles rarely less than 1 cm. long.

Leaves rounded at apex.

Cinereous-tomentellous; leaves mostly deltoid-ovate and shallowly cordate; branches 6-angled; corymbs 3 to 5 (to 9) cm. in diameter; phyllaries acute, green.

104. *E. tomentellum*.

Ochraceous-tomentellous; leaves suborbicular-ovate, abruptly pointed to rounded or rarely cordate at base; branches subterete; corymbs 9 to 12 cm. wide; phyllaries obtuse, ochraceous-----

105. *E. loesenerii*.

Leaves acute to acuminate.

Heads 4 to 4.5 mm. high; leaves 2 to 4 cm. wide, entire at the obtusely pointed base-----

106. *E. malacolepis*.

Heads 5 to 7 mm. high; leaves 5 to 12 cm. wide, incisely toothed to the cuneately decurrent base.

107. *E. conspicuum*.

Heads 6 to 11 mm. high; leaves not toothed to base.

Leaves areolate above by a fine prominent reticulation of veinlets, narrowly ovate, caudate-acuminate.

69. *E. areolare*.

Leaves not noticeable areolate, acute or moderately acuminate.

Leaves palmately 3-nerved from a usually rounded base.

Decumbent, fruticulose; corymbs mostly 2 to 5-headed.

108. *E. oligocephalum*.

Erect shrubs with many-headed corymbs.

Phyllaries oblong, obtuse, erose, scarious-margined.

109. *E. aschenbornianum*.

Phyllaries lance-linear, acute to attenuate, subherbaceous throughout.

Achenes obscurely puberulent to glabrous; heads 20 to 25-flowered; phyllaries acute, about half as long as florets; leaves rounded or but subcordate at base; pubescence not glandular.

110. *E. etlense*

Achenes distinctly hispid; heads 30 to 40-flowered; phyllaries attenuate, more than half as long as florets; leaves subtruncate to deeply cordate at base; inflorescence glandular-pubescent.

Leaves deltoid-ovate, 1 to 3 (to 4) cm. wide; petiole 4 to 10 mm. long.

111. *E. scorodonioides*.

Leaves broadly ovate with rounded sides; petiole mostly 2 to 6 cm. long.

112. *E. petiolare*.

Leaves pinnately 5-nerved or palmately 3-nerved from a point above the base.

Inflorescence (if normally developed) elongate, forming an ovoid to subcylindric thyse.

Leaves 6 to 10 cm. long, acute to rounded at base, arachnoid-tufted in axils of veins beneath.

85. *E. mairetianum*.

Leaves 3 to 4.5 cm. long, truncate to cordate at base, not arachnoid-tufted-----

113. *E. pringlei*.
Inflorescence a flattish to moderately convex corymb.

Heads 20 to 40-flowered; phyllaries 0.5 to 1.2 mm. wide; pappus simple.

Phyllaries 4 to 5 mm. long, scarcely half length of mature florets, deep purple.

86. *E. subpenninervium*.

Phyllaries 6 to 8 mm. long, decidedly more than half as long as mature florets, acutish to attenuate.

Pubescence pale to whitish, that on the inflorescence gland-tipped; phyllaries pale green, hispid with white hairs, not dark-dotted.

87. *E. vernale*.

Pubescence purple, fading to rusty, that on inflorescence gland-tipped; phyllaries dark purple and dotted with dark sessile glands.

88. *E. chiapense*.

Heads about 60-flowered; phyllaries 1.5 to 1.8 mm. wide; pappus double-----

114. *E. chapalense*.

AA. Receptacle hairy. Section HEBECLINIUM.

Leaves lance-linear to narrowly ovate or oblong, not half as wide as long, pinnate-veined.

Heads about 8 mm. high; corymbs rather dense, 4 to 5 cm. wide; leaves glabrous, attenuate, remotely cuspidate-denticulate.

115. *E. tuerckheimii*.

Heads 10 to 12 mm. high; corymbs lax, 8 to 12 cm. wide; leaves grayish-puberulent on both surfaces, closely serrulate-denticulate.

116. *E. ehrenbergii*.

Leaves ovate, more than half as wide as long, palmately nerved.

117. *E. perornatum*.

1. *Eupatorium sagittatum* A. Gray, Pl. Wright. 1: 88. 1852.

Sonora and Sinaloa; type, though said to be from California, presumably from coastal Sonora.

Slender-stemmed, intricately branched shrub, 1 to 2 meters high; leaves petiolate, lanceolate or ovate, sagittate, tomentellous on both surfaces, mostly 2 to 3 cm. long and half as wide; heads about 35-flowered, 1 cm. long, on somewhat clavate pedicels in open corymbs; corollas lilac.

1a. *Eupatorium sagittatum* var. *deltophyllum* Robinson, Proc. Amer. Acad. 42: 45. 1906.

Sinaloa; type from Culiacán.

Leaves much broader, deltoid, sometimes wider than long. Otherwise like the typical form.

2. *Eupatorium pulchellum* H. B. K. Nov. Gen. & Sp. 4: 119. pl. 345. 1820.

Chihuahua to Puebla and Jalisco; type from shore of Lake Tezcuco, State of Mexico.

Scarcely woody, upright, leafy-stemmed, simple to the corymbose inflorescence, 0.6 to 1.5 meters high; leaves alternate, oblong-lanceolate to ovate, serrate, 3-nerved from near the base; heads very numerous in a dense, round-topped or flattish, compound panicle; corollas purple.

- 2a. *Eupatorium pulchellum* var. *angustifolium*** S. Wats.; Pringle, Pl. Mex. 1889: 2nd [unnumbered] page of printed list. 1889; Robinson, Proc. Amer. Acad. 51: 534. 1916.

Known only from the type station, near Guadalajara, Jalisco.

Leaves longer (8 to 11 cm. in length) and relatively narrower (1 to 2 cm. in width) than in the typical form, subentire.

- 3. *Eupatorium glaberrimum*** DC. Prodr. 5: 144. 1836.

Known only through the type collection, from Mexico without stated locality, presumably from Guerrero.

Shrub, smooth throughout; stem round; leaves obovate-oblong, acuminate, narrowed below to an obtuse subsessile base, serrate, feather-veined, 12 to 17 cm. long, about a third as wide; heads about 20-flowered, cylindric, corymbose, pediceled; phyllaries closely appressed, rounded at tip.

- 3a. *Eupatorium glaberrimum* var. *melichianum*** Robinson, Contr. Gray Herb. n. ser. 68: 18. 1923.

Eupatorium melichianum Robinson, Proc. Amer. Acad. 41: 276. 1905.

Stems, inflorescence, and leaf midribs beset with spreading dark hairs; leaves mostly narrower than in the typical form; corollas white.

- 4. *Eupatorium lozanoanum***¹ Robinson, Proc. Amer. Acad. 41: 275. 1905.

Hidalgo; type collected in a barranca below Trinidad Iron Works.

Branching shrub, 3 to 4 meters high, smooth throughout; leaves lance-ovate, caudate-acuminate, sharply but rather remotely serrate, pinnately 5-nerved from near the base, 8 to 10 cm. long, 2 to 3 cm. wide, short-petioled; heads 4-flowered, subsessile by 3's or 5's at the tips of the panicle branchlets; involucre cylindric, several-seried; phyllaries thin, green, acutish.

- 5. *Eupatorium konzattii*** Greenm. Proc. Amer. Acad. 34: 574. 1899.

Veracruz; type locality, "in humid forests on the Cerro del Chiquihuite, Colonia Melchor Ocampo, alt. 1300 m."

Glabrous, somewhat lucid, probably shrubby; stems slightly compressed, 6-angled; leaves opposite, oblong, acuminate, serrate, thickish, apt to be rugose, dark green on both faces, pinnately 5-nerved, the outer pair of nerves small, intramarginal, the others prominent; blade 9 to 14 cm. long, 3.5 to 5 cm. wide; petiole slender, about 1.5 cm. long, slightly winged toward summit; panicle large, terminal, divaricately branched; heads mostly sessile and clustered at tips of the branchlets; phyllaries round-tipped, glabrous, yellowish brown, striate.

- 6. *Eupatorium bertholdii***² Schultz Bip. in Seem. Bot. Voy. Herald 299. 1856.

Tepic; type locality, Sierra Madre.

Shrub, pubescent or puberulent; stems round, distinctly ligneous, becoming 1 cm. or more in diameter; leaves ovate, acute to acuminate at apex, acutish at base, shallowly serrate to entire, 3-ribbed from above the base, sparingly pubescent on the upper surface, reticulate beneath, 5 to 13 cm. long, 1.5 to 5 cm. wide; petiole 1 cm. long; heads 10 to 13-flowered, sessile to short-pediceled, paniculate; involucre slender; phyllaries obtuse to rounded, striate, stramineous to brownish or purplish-tinged.

- 6a. *Eupatorium bertholdii* var. *stenophyllum*** Robinson, Proc. Amer. Acad. 35: 331. 1900.

Jalisco; type from canyons near Guadalajara.

Leaves of firmer texture, lance-ovate, scarcely one-fourth as wide as long, entire.

¹ Filemón L. Lozano, for several years a field-assistant of C. G. Pringle in his botanical exploration of Mexico.

² Dr. Berthold Seemann, 1825-1871, naturalist on the voyage of the Herald (1845-1851).

7. *Eupatorium ovaliflorum* Hook. & Arn. Bot. Beechey Voy. 297. 1840.

Tepic; type locality stated merely as Mexico.

Shrub, 1 to 2 meters high; stems round, canelike; leaves narrowly ovate, serrate, acuminate, subcoriaceous, at first downy on the upper surface, but later minutely and densely papillose, beneath pubescent to subtomentose, strongly reticulate-veiny, pinnately 5-nerved, 5 to 12 cm. long, 2 to 4.5 cm. wide; petiole 3 to 12 mm. long; heads about 23-flowered, mostly short-pedicel, in small round-topped panicles; involucre oval, the phyllaries ovate, obtuse, commonly tinged with purple or brown, closely appressed, striate, ciliolate.

8. *Eupatorium odoratum* L. Syst. Nat. ed. 10. 1205. 1759.

Eupatorium conyzoides Mill. Gard. Diet. ed. 8. *Eupatorium* no. 14. 1768.

Eupatorium divergens Less. Linnaea 5: 138. 1830.

Eupatorium graciliflorum DC. Prodr. 5: 145. 1836.

Osmia odorata Schultz Bip. Pollichia 22-24: 250. 1866.

Osmia divergens Schultz Bip. Pollichia 22-24: 252. 1866.

Osmia graciliflorum Schultz Bip. Pollichia 22-24: 252. 1866.

Common in nearly all parts of Mexico which are suited by climate for mesophytic vegetation. Widely distributed in tropical America.

Vigorous shrub, erect or somewhat vinelike, with long, leaning or reclining stems; leaves triangular- or rhombic-ovate, acuminate, abruptly narrowed to a more or less pointed base, mostly serrate or crenate and often near the broadest part of the blade somewhat hastately toothed, rarely entire, from glabrous to tomentose, slender-petioled; heads numerous, in flattish corymbs, mostly 15 to 25-flowered; corollas pale blue to white. "Xtokabal" (Yucatán); "cihuapatli," "ciguapazle," "crucita" (San Luis Potosí, *Seler*); "Santa María" (Porto Rico); "crucita olorosa," "garrapata" (Nicaragua); "varejón de caballo" (Colombia).

Seler reports that the roots are employed as an emmenagogue.

9. *Eupatorium araliaefolium* Less. Linnaea 6: 403. 1831.

Eupatorium omphaliaefolium Kunth & Bouché, Ind. Sem. Hort. Berol. 1844, coll. adnot. no. 13; Walp. Repert. Bot. 6: 113. 1846-47.

Eupatorium heterolepis Robinson, Proc. Amer. Acad. 35: 335. 1900.

Veracruz; type collected in woods at Misantla. British Honduras and Guatemala.

Soft-woody shrub, glabrous except in inflorescence; stems 6-angled and often compressed; leaves oblong-elliptic, pointed at both ends, entire, feather-veined, subcoriaceous and somewhat fleshy, opaque, drying dark, 11 to 19 cm. long, 4 to 7 cm. wide; petiole about 5 cm. long; heads paniculate, about 25-flowered, 1 cm. long; inner phyllaries long, narrow, subequal, caducous, the outer much shorter, persistent; corollas white.

Introduced into European horticulture and for several decades cultivated as a greenhouse plant of some decorative value.

10. *Eupatorium pinabetense* Robinson, Proc. Amer. Acad. 36: 482. 1901.

Known only from the type locality, near Pinabete, Chiapas.

Shrubby, essentially glabrous; stems somewhat 6-angled; leaves oblong-lanceolate, attenuate at both ends, serrulate, feather-veined, mostly 10 to 15 cm. long, 2 to 3 cm. wide, opaque, firmly membranaceous; heads about 35-flowered, 4 mm. high, in dense rounded panicles; phyllaries yellowish brown, obtusish, ciliolate.

11. *Eupatorium pittieri* Klatt, Bull. Soc. Bot. Belg. 31¹: 192. 1892.

Chiapas. British Honduras, Guatemala, and Costa Rica.

Shrub, finely pubescent; leaves elliptic-oblong, acuminate, acute at base, serrate (rarely entire), feather-veined, thickish, opaque; veins prominent beneath; heads small, numerous in open pyramidal panicles; phyllaries broadly ovate to elliptical, mostly rounded at the tip, 3 to 5-nerved.

12. *Eupatorium galeottii* Robinson, Contr. Gray Herb. n. ser. 68: 17. 1923.

Veracruz; type collected on the Cordillera at an altitude of about 915 meters.

In habit and foliage close to the preceding, but said to be less lignescent; phyllaries all pointed.

13. *Eupatorium oaxacanthum* Klatt, Abh. Naturf. Ges. Halle 15: 324. 1882.

Oaxaca; type said to have been collected on the mountains of this State.

A smooth, viscid and somewhat vernicose shrub; branches and foliage rather willow-like; leaves opposite, short-petioled, lanceolate, pointed at each end, serrulate, feather-veined, of firmish texture, 4 to 6 cm. long, 12 to 14 mm. wide; heads about 10-flowered, in trichotomous flattish corymbs; phyllaries lanceolate to oblong, acute.

Without obvious Mexican affinities and known only from immature and fragmentary material of an obscure collector, this species is subject to considerable doubt.

14. *Eupatorium eriocarpum* Robins. & Greenm. Proc. Amer. Acad. 32: 42. 1896.

Oaxaca; type from Tomellín Canyon.

Shrub 1.5 to 2.5 meters high; branches smooth, brown; leaves rhombic-ovate, acuminate, acute at base, serrate, green and glabrous on both surfaces except for some woolly pubescence mostly in the axils of the veins beneath, membranaceous, feather-veined, 8 to 12 cm. long, 4 to 5 cm. wide; petioles 6 to 11 mm. long; heads mostly 5-flowered, about 12 mm. long, nodding in a large leafy-bracted panicle; phyllaries ovate, rounded at tip, striate; achenes densely white-tomentose.

15. *Eupatorium tepicanum* (Hook. & Arn.) Hemsl. Biol. Centr. Amer. Bot. 2: 101. 1881.

Hebeclinium tepicanum Hook. & Arn. Bot. Beechey Voy. 434. 1841.

Tepic; type collected between San Blas and Tepic.

Smooth shrub with pale spreading branches and short internodes; leaves narrowly ovate to oblong-lanceolate, acuminate, obtuse or barely acute at base, crenate-serrate, pellucid-punctate; heads both pediceled and subsessile, about 5-flowered, borne in an ovoid puberulent thyrse; phyllaries ovate to elliptical, rounded at tip, stramineous, caducous; achenes thickish, grayish-tomentellous.

Known as yet only from the original collection.

16. *Eupatorium hospitale* Robinson, Proc. Amer. Acad. 43: 32. 1907.

Eupatorium vanillosmoides Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 102. 1881. Not *E. vanillosmoides* Schultz Bip.; Baker in Mart. Fl. Bras. 6²: 346. 1876.

Veracruz and Chiapas; type from Mirador, Veracruz.

Smooth shrub; branchlets dark, shining, 6-angled; leaves oblong, attenuate to each end, serrate, thickish, of firm texture, drying dark, feather-veined, pellucid-punctate, 12 to 15 cm. long, 5 to 6 cm. wide; heads about 6-flowered, sessile mostly in 2's or 3's at the tips of the panicle branchlets; inner phyllaries oblong, deciduous, the outer ovate, much shorter, more persistent, usually purple-tinged; florets violet and fragrant (*Galeotti*); achenes pointed at base, hispid.

Stems sometimes locally deformed by swollen hollow insect-inhabited galls, whence the specific name.

17. *Eupatorium daleoides* (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 94. 1881.

Critonia daleoides DC. Prodr. 5: 141. 1836.

Tamaulipas, Veracruz, and Tabasco; type locality Tampico. Guatemala, El Salvador, Costa Rica, and Panama.

Usually shrubby and 2 to 3 meters high, sometimes a small tree (*Ervendberg*) or at times only a vigorous perennial herb, crisped tawny-pubescent, at least on

the younger parts; leaves oblong or ovate-oblong, acute to acuminate, cuneate at base, serrate, feather-veined, coriaceous, 10 to 20 cm. long, 3 to 6 cm. wide, pellucid-punctate and -lineolate; heads numerous in rounded or ovoid, divaricately branched panicles, 5-flowered, sessile; phyllaries stramineous, ovate to narrowly oblong, obtuse; corollas white or purplish.

18. *Eupatorium hebebotryum* (DC.) Hemsl. Biol. Centr. Amer. Bot. 2: 95. 1881, as *hebebotrya*.

Critonia hebebotrya DC. Prodr. 5: 141. 1836.

Morelos; type locality stated merely as Mexico. El Salvador, Guatemala, and Costa Rica.

Tree of medium size or tall shrub; branches curved, light brown or gray; branchlets angled; leaves rhombic-ovate, acuminate, acute at base, crenate-serrate, feather-veined or pinnately somewhat 5-nerved from above the base, pellucid-punctate and -lineolate, 10 to 20 cm. long, 4 to 8 cm. wide; petioles 1.5 to 3 cm. long; branchlets of the dense ovoid thyrses tomentellous; heads small, about 5-flowered, slender-pedicel; phyllaries pale green to stramineous, obtuse or rounded at tip. "Tamagua" (El Salvador).

Wood used for construction in El Salvador.

19. *Eupatorium morifolium* Mill. Gard. Dict. ed. 8. *Eupatorium* no. 10. 1768.

Eupatorium populifolium H. B. K. Nov. Gen. & Sp. 4: 111. 1820.

Eupatorium critonioides Steetz in Seem. Bot. Voy. Herald 145. 1853.

Eupatorium megaphyllum Baker in Mart. Fl. Bras. 6²: 322. 1876.

Eupatorium sartorii Schultz Bip.; Klatt, Leopoldina 20: 91. 1884.

Tamaulipas, San Luis Potosí, and Oaxaca; type from Veracruz. Widely distributed in Central and tropical South America.

Shrub or stout herb 2 to 6 meters high; stems thick, costate, fistulose; leaves suborbicular-ovate and rounded or subcordate at base, bluntly acuminate, coarsely serrate, feather-veined or pinnately 5-nerved from somewhat above the base, prominently reticulate beneath, coriaceous, mostly 10 to 20 cm. long and 6 to 13 cm. wide, nearly glabrous at maturity; petioles 2 to 5 cm. long; heads small, 6 to 13-flowered, in dense ovoid thyrses; corollas greenish white; phyllaries pale green or stramineous, ovate, obtuse, arachnoid-pubescent. "Arbol de Santa María" (Veracruz); "taco," "chimaliote," "suelta con suelta," "vara hueca," "carrizo" (El Salvador).

20. *Eupatorium hemipteropodum* Robinson, Proc. Amer. Acad. 42: 39. 1906.

"*Eupatorium aromatisans* DC.;" Millsp. & Chase, Field Mus. Bot. 3: 92. 1904.

Yucatán; type from Izamal.

Robust perennial herb, probably becoming somewhat ligneous toward the base; stems smooth, costate; leaves ovate, incisely serrate, membranaceous, cuneately decurrent upon the upper part of the petiole; heads about 10-flowered, borne in ovoid thyrses; phyllaries stramineous. "Chiople," "chiopk."

The leaves are used for flavoring tobacco. An infusion of the leaves in alcohol is applied externally for the relief of pain in rheumatism and kindred affections, and taken internally for stomach disorders.

21. *Eupatorium quadrangulare* DC. Prodr. 5: 150. 1836.

Sinaloa, Durango, Jalisco, Guerrero, and Veracruz; type from Tantoyuca, Veracruz. Guatemala and El Salvador.

Stout perennial, either herbaceous throughout or decidedly woody toward the base, often (especially in the inflorescence) puberulent to rather copiously pubescent or tomentellous; stems canelike, hollow, sharply 4-angled; leaves large, opposite, ovate, acute, serrate, abruptly narrowed at base of blade to a broadly winged petiolar portion, biauriculate at the insertion on the stem; heads mostly 8 to

10-flowered, borne in a dense rounded terminal thyrses; phyllaries stramineous, ovate-oblong, obtusish, striate; corollas white or nearly so; florets fragrant. "Chimaliote" (El Salvador).

22. *Eupatorium thyrsoideum* Moc.; DC. Prodr. 5: 150. 1836.

Tepic, Colima, and Guerrero(?); type locality cited merely as Mexico.

Stem terete or somewhat 4-angled when young. In all other respects exceedingly close to the preceding species, of which it may well prove a mere variety.

Little known and in need of close field study. Including *Eupatorium thyrsoideum* β *puberum* DC. op. cit. 151, merely a slightly hairy form.

23. *Eupatorium ortegae* Robinson, Contr. Gray Herb. n. ser. 75: 10. 1925.

Durango; type from La Bajada.

Smoothish shrub with slender terete branches; leaves opposite, slender-petioled, deltoid-ovate, acuminate, sharply and rather coarsely dentate, abruptly contracted at base, bright green and prominently reticulate on both surfaces, firm in texture, subcoriaceous, 3.5 to 8 cm. long, 2.5 to 5 cm. wide; petiole 1.5 to 3 cm. long; heads about 6 mm. high, thistle-shaped, borne in rounded, paniculately disposed corymbs; pedicels bearing 3 to 7 linear-subulate bractlets; phyllaries narrowly lanceolate, attenuate; corollas white.

24. *Eupatorium haenkeanum* DC. Prodr. 5: 158. 1836.

Guerrero and Oaxaca; type locality stated merely as Mexico.

Shrub with recumbent liana-like stems (*Langlassé*); branches round, rather slender, puberulent to velutinous; leaves rhombic-ovate, gradually acuminate to apex, more abruptly cuneate at base, entire to undulate or crenate-serrate, firmly membranaceous, sparingly puberulent, 3-nerved, 6 to 8 cm. long, 3 to 5 cm. wide; petiole slender, 1 to 2 cm. long; heads about 20-flowered, long-pedicelled, in open compound leafy-bracted corymbose panicles; involucre sub-turbinate; phyllaries elliptic-oblong, obtusish; corollas white.

A somewhat more pubescent form has been distinguished as *Eupatorium haenkeanum* β ? *velutinum* DC. Prodr. 5: 158. 1836.

25. *Eupatorium mendezii* DC. Prodr. 5: 160. 1836.

Guanajuato, San Luis Potosí, and Querétaro; type locality at the west of Guanajuato City.

Shrub; stems round, slender; branches shortly velvety or covered with a grayish crisped puberulence; leaves triangular-ovate or ovate-lanceolate, gradually acuminate, serrate, puberulent above, tomentellous beneath, 3-nerved, 6 to 9 cm. long, 2.5 to 4.5 cm. wide; petioles slender, 1 to 2 cm. long; heads about 25-flowered, pedicellate, disposed in round-topped compound bracteate panicles; involucre ovoid; phyllaries rhombic- or oblong-lanceolate, acute or acutish, pubescent, usually brown or purple-tinged; corollas white.

26. *Eupatorium stillingiaefolium* DC. Prodr. 5: 160. 1836.

Tamaulipas and Veracruz; type from Tamaulipas.

Shrub, 1.3 to 2 meters high, obscurely puberulent, with habit and foliage as in the preceding; leaves more deltoid-ovate and abruptly contracted or even rounded at base; petiole 1.5 to 3.5 cm. long; heads 20 to 25-flowered; phyllaries lance-oblong, all acute; corollas roseate.

A little known species.

27. *Eupatorium collinum* DC. Prodr. 5: 164. 1836.

Eupatorium nigrescens Hook. & Arn. Bot. Beechey Voy. 297. 1840.

Kyrstenia collina Greene, Leaflets 1: 9. 1903.

Widely distributed and frequent from Chihuahua and Tamaulipas to Chiapas; type from Tantoyuca, Veracruz. Guatemala, El Salvador, Nicaragua, and Costa Rica.

Shrub 1 to 5 meters high; stems and branches terete; leaves deltoid-ovate, acuminate, mostly crenate to serrate, rarely subentire, at base cuneate, or more often abrupt or rounded or even subcordate, firmly membranaceous, green on both sides, obscurely puberulent to spreading-pubescent, at least on the nerves beneath, 5 to 10 cm. long, 3 to 7 cm. wide, glandular-punctate beneath; petiole slender, 1 to 3 cm. long; heads 24 to 46-flowered, about 8 mm. long, somewhat fastigiately grouped in round-topped corymbs, mostly slender-pedicelled; corollas white; phyllaries lanceolate to oblong, mostly obtuse. "Cuilotillo" (*Kerber*); "vara blanca," "vara de cama," "arnicacho" (El Salvador).

The vernacular names "hierba del ángel" and "yolochichitl" have been reported for this species. The plant is said to be bitter and aromatic and to be employed locally for affections of the liver and digestive system. It is reported also that the leaves have been employed as a substitute for hops in the brewing of beer. The same properties and uses are reported for several related species.

28. *Eupatorium neaeum* DC. Prodr. 5: 160. 1836.

Guerrero, Oaxaca, and Chiapas; type collected near Acapulco. Guatemala (?).

Shrub, in habit and foliage much resembling the preceding species, but more robust; branchlets and inflorescence densely white-tomentose; pedicels short, thick; heads about 25-flowered; corollas white; phyllaries broadly oblong or elliptic, obtuse or acutish.

29. *Eupatorium longipes* A. Gray, Proc. Amer. Acad. 15: 26. 1879.

Bulbostylis pedunculosa DC. Prodr. 5: 138. 1836.

Eupatorium pedunculosum A. Gray, Pl. Wright. 1: 86. 1852; Hemsl. Biol.

Centr. Amer. Bot. 2: 97. 1881. Not *E. pedunculosum* Hook. & Arn. 1836.

San Luis Potosí, Hidalgo, and Michoacán; type locality, "Mexico circa Villapando."

Fruticulose, many-stemmed from a branching, usually decumbent, slightly woody base; stems slender, flexuous, 20 to 40 cm. high; leaves opposite (or the uppermost alternate), oval to ovate-lanceolate, about 1 cm. long, 4 to 7 mm. wide, obtuse, 1 or 2-toothed on each side or entire, narrowed at base to a short petiole; heads terminal, solitary, about 14 mm. high, about 25-flowered, on peduncles 1.5 to 10 cm. in length; phyllaries oblong, acute, cuspidate, purple-stained on the exposed part.

30. *Eupatorium palmeri* A. Gray, Proc. Amer. Acad. 21: 383. 1886.

Eupatorium arborescens Jones, Contr. West. Bot. 12: 43. 1908.

Sonora, Chihuahua, Sinaloa, Jalisco, and Colima; type locality, "shady places high up in mountains above Batopilas."

Slender branching shrub, at times becoming arborescent; leaves ovate and ovate-lanceolate, acuminate, serrate, rounded at base, mostly 5 to 7 cm. long and 2.5 to 4 cm. wide, membranaceous, subglabrous above, softly pubescent at least on the nerves and veins beneath, 3 to 5-nerved from near the base; petiole about 1 cm. long; heads 8 to 10-flowered, 4 mm. long, subsessile or shortly pedicelled in loose pyramidal leafy-bracted panicles; phyllaries lanceolate.

30a. *Eupatorium palmeri* var. *tonsum* Robinson, Proc. Amer. Acad. 42: 43, 1906.

Known only from the type locality, El Ocote, near the boundary between Michoacán and Guerrero.

Leaves glabrous on both surfaces, longer and much more gradually caudate-acuminate than in the typical form, as much as 14 cm. long and 4 cm. wide.

31. *Eupatorium solidaginifolium* A. Gray, Pl. Wright. 1: 87. 1852.

Chihuahua, Coahuila, and Durango. Type locality, "mountains between the Limpia and the Rio Grande" in western Texas; also Arizona and probably New Mexico.

A low, much-branched, nearly glabrous, calciphile shrub; leaves lanceolate to narrowly ovate, attenuate, subentire, mostly rounded at base, 3 to 5.5 cm. long, 1 to 1.8 cm. wide; petiole 4 to 10 mm. long; heads about 5-flowered, often closely aggregated by 2's and 3's at the tips of the branchlets of the ovoid thyrse-like panicles; phyllaries about 8, lanceolate, 3-nerved; corollas white.

32. *Eupatorium collodes* Robins. & Greenm. Amer. Journ. Sci. III. 50: 152. 1895.

Oaxaca; type from Las Sedas.

A subglabrous but somewhat viscid and vernicose shrub, 60 to 90 cm. high; branches virgate, leafy, purple; leaves opposite, ovate, sessile, acute, serrate except near the rounded base, 2 to 3.5 cm. long, 1.3 to 2 cm. wide, subcoriaceous; heads 20 to 25-flowered, in round-topped corymbs (5 to 10 cm. in diameter); phyllaries lance-linear, puberulent and ciliate, acute, usually purple; corollas white; pappus rose-colored.

33. *Eupatorium bigelovii* A. Gray in Torr. U. S. & Mex. Bound. Bot. 75. 1858-59.

Eupatorium bigelowii Hemsl. Biol. Centr. Amer. Bot. 2: 93. 1881.

Eupatorium madrense S. Wats. Proc. Amer. Acad. 26: 137. 1891.

Coahuila, Nuevo León, and San Luis Potosí. Type collected on the Gila in Arizona.

Shrub or slightly lignescent perennial herb; leaves ovate, acute, sharply and often rather coarsely serrate, 3-nerved, rounded at base, 3 to 7 cm. long, 1.5 to 3.5 cm. wide, finely pubescent above, pubescent to canescent-tomentose beneath; petioles mostly 2 to 7 mm. long; heads 1.2 to 1.6 cm. high, many-flowered, in few-headed cymes; phyllaries lanceolate, acutish to acuminate, striate, green or more often purple; corollas purplish.

A calciphile of middle altitudes.

34. *Eupatorium turbinatum* A. Gray, Proc. Amer. Acad. 15: 26. 1880.

Known only from the original collection, secured in a mountain ravine between San Luis Potosí and Tampico.

Probably somewhat shrubby; stems erect, subterete, purple, soon glabrate, leafy; leaves opposite, sessile, ovate, attenuate, rounded at base, sharply serrate (the teeth few, subremote and unequal), 3-nerved, smooth or nearly so above, softly pubescent to grayish-tomentose beneath, of firm texture, 5 to 6 cm. long, 2 to 3 cm. wide; heads corymbed or subsolitary, pediceled, 30 to 40-flowered, 1.5 cm. long; involucre turbinate; phyllaries numerous, linear, subulate-attenuate, striate, purplish, of firm texture.

35. *Eupatorium azureum* DC. Prodr. 5: 168. 1836.

Tamaulipas, Nuevo León, and San Luis Potosí; type collected at Monterrey.

Shrub with spreading tomentellous branches; stem leaves deltoid-ovate, acute, nearly truncate or even subcordate at base, coarsely toothed at the broadest part, somewhat puberulent above, pubescent to grayish-tomentellous beneath, usually 4 to 6 cm. long, 3 to 4 cm. wide, on slender petioles (1 to 2 cm. long), the rameal leaves usually smaller and more narrowly ovate; heads about 1 cm. in diameter, usually 40 to 70-flowered, slender-pediceled, in small, rather dense, terminal corymbs; phyllaries herbaceous, striate, at least the inner acute; corollas azure.

Used for astringent poultices (*Gregg*).

36. *Eupatorium oresbium* Robinson, Proc. Amer. Acad. 35: 337. 1900.

Morelos; type from a "wet mountain canyon above Cuernavaca, 6,500 ft."

Shrub, 3 to 5 meters high; leaves opposite, ovate, acuminate, cuspidate-dentate, rounded or subcordate at base, 5 or 7-nerved near the base, thin, spreading-villous on the nerves beneath, otherwise nearly smooth, about 13 cm.

long and 11 cm. wide; petiole 7 to 10 cm. long; corymbs trichotomous, convex, moderately dense; heads about 16-flowered; phyllaries thin, not conspicuously nerved, pale green, the inner oblong, obtuse, the outer much shorter, lanceolate, acute; corollas trumpet-shaped, gradually expanded upward, purple but in old specimens turning yellow, exceeding the white pappus.

37. *Eupatorium oresbioides* Robinson, Proc. Amer. Acad. **44**: 618. 1909.

Oaxaca; type from "Alturas de Oaxaca, 1,800 m." Guatemala.

Shrub, resembling the preceding but with leaves somewhat smaller (8 to 11 cm. long) and mostly hastately angled on one or both sides; petioles 1.5 to 5 cm. long; corymbs much rounded, oblate-spherical; phyllaries and corollas purple-tinged.

38. *Eupatorium hylobium* Robinson, Proc. Bost. Soc. Nat. Hist. **31**: 249. 1904.

Known only from the original collection, secured in mountain woods between San Martín and Ococingo, Chiapas.

Shrub with terete flexuous branches at length roughened by prominent lenticels; leaves rhombic-ovate, sharply serrate, thin, membranaceous, green and glabrous above, slightly paler and puberulent on the veins beneath, 5 to 7 cm. long, half as wide; corymbs leafy-bracted, round-topped, about 10 cm. in diameter; pedicels filiform, flexuous, 3 to 6 mm. long; heads about 14-flowered, 7 mm. high; phyllaries pale green, thin, nearly nerveless, the inner oblong, obtuse, the outer much shorter, lanceolate, attenuate; corollas gradually enlarged upward, glabrous, the limb very short.

39. *Eupatorium pycnocephalum* Less. Linnaea **6**: 404. 1831.

Eupatorium diversifolium Schrad. Ind. Sem. Hort. Gotting. **1829**: 2. 1829, without character.

Eupatorium virgatum Schrad. Ind. Sem. Hort. Gotting. **1829**: 2. 1829, without character.

Eupatorium schiedeanum Schrad. Ind. Sem. Hort. Gotting. **1832**: 3. 1832.

Eupatorium sonorae A. Gray, Pl. Wright. **2**: 74. 1853.

Common throughout Mexico. Widely distributed in the warmer parts of continental America.

A tropical weed 30 to 80 cm. high, for the most part wholly herbaceous but occasionally developing distinctly lignescent stems; leaves opposite, petiolate, deltoid-ovate, acuminate, crenate-serrate; heads about 25-flowered, 4 to 6 mm. long, aggregate in small dense rounded corymbs, these often numerous and disposed in ample leafy-bracted panicles; phyllaries mostly elliptic-ovate, the middle and inner rounded at tip, the outermost sometimes acute; corollas purple (rarely white). "Mejorana" (El Salvador); "mejorana morada" (Guatemala).

40. *Eupatorium adenospermum* Schultz Bip. in Seem. Bot. Voy. Herald **299**. 1856.

Type locality, Sierra Madre; subsequently collected only in the Sierra Madre between Michoacán and Guerrero.

Shrub or perennial herb, erect, with slender, terete, virgate, brownish purple, leafy stems; leaves alternate, subsessile, firm-chartaceous, ovate-oblong, acute, subentire or serrulate, 4 to 7 cm. long, 2 to 3 cm. wide, reticulate-veiny on both surfaces, puberulent on the chief veins beneath, sprinkled with sessile resinous globules; corymbs fastigiately branched, flattish; heads about 15 mm. high, about 10-flowered; phyllaries pluriseriate, ovate-oblong, rounded at tip; corollas nearly tubular, white; style branches conspicuously clavate, yellow; achenes slender, tapering at base, closely beset with globular glands.

- 41. *Eupatorium dryophilum*** Robinson, Proc. Amer. Acad. **36**: 478. 1901.
Eupatorium adenospermum var. *pleianthum* A. Gray, Proc. Amer. Acad. **15**: 26. 1879.

Eupatorium pleianthum Robinson, Proc. Amer. Acad. **36**: 483. 1901.
 Jalisco; type locality, "rocky hills near Guadalajara."

Erect perennial, about 60 cm. high, slightly lignescent toward the base, with habit and inflorescence as in the preceding; leaves opposite or subopposite (except a few of the uppermost), subsessile, oval to ovate, rounded to acute at tip, serrate, of firm texture, 1.5 to 4.5 cm. long, two-thirds as wide; heads 1.5 cm. high; phyllaries several-seriate, ovate-oblong, rounded at tip, usually purple-tinged; achenes slender, glandular-atomiferous.

- 42. *Eupatorium monanthum*** Schultz Bip. in Seem. Bot. Voy. Herald 299. 1856.

Colima, Guerrero, and Oaxaca, at 150 to 700 meters; type from the "Sierra Madre."

A straggling, alternately branched shrub; stems terete, mottled, pithy, scarcely lignescent; leaves alternate, slender-petioled, suborbicular-ovate, obtuse to more often shortly acuminate, entire to serrulate, mostly 3 to 8 cm. long and 2.5 to 7 cm. wide; heads 1 or 2-flowered, in paniculately disposed spherical glomerules, sessile. "Zacate minero."

Popularly believed to be an indicator of mineral deposits (*Langlassé*).

- 43. *Eupatorium pelotrophum*** Robinson, Proc. Amer. Acad. **42**: 44. 1906.

Known only from the original collection, secured in clayey soil on the Sierra Madre, near the boundary of Michoacán and Guerrero, altitude 2,300 meters.

Shrub 1.5 meters high; branches virgate, slender, terete, dark brown, puberulent; leaves opposite, ovate, caudate-acuminate, serrate at the sides, rounded at base, 3 or 5-nerved from the base, 7 to 10 cm. long, 2 to 4 cm. wide, of firm texture, sparingly puberulent and openly reticulate-veiny on both surfaces; petiole about 1 cm. long; heads commonly 4-flowered, in short axillary nodding cymes at length forming subglobose glomerules about the upper nodes; phyllaries about 9, lance-oblong, obtuse, purplish brown, scarcely half as long as the florets; corollas white.

- 44. *Eupatorium campechense*** Robinson, Proc. Amer. Acad. **43**: 30. 1907.

Campeche; type from Apazoli near Yohaltún.

Shrubby, nearly glabrous; branches slender, terete, striate, smooth; leaves opposite, petiolate, lanceolate, attenuate, often falcate, 3-nerved, thickish, shining, 8 to 10 cm. long, 2.4 to 3 cm. wide, rather distantly serrate-toothed, glabrous or nearly so; petiole about 1 cm. long; heads about 5-flowered, slender-pedicel, in flattish corymbs; phyllaries stramineous, smooth, striate, obtuse, somewhat 5-ranked vertically; corollas pale, tubulate; achenes pubescent.

- 45. *Eupatorium leucocephalum*** Benth. Pl. Hartw. 86. 1841.

Veracruz, Puebla, Oaxaca, and Chiapas. Guatemala, where the type was collected at Acatenango; also El Salvador.

Suffruticose, 1 to 3 meters high, often slightly pubescent; stems terete; leaves opposite, lance-oblong, long-acuminate, coarsely serrate, 3-nerved from near the entire, obtuse or cuneate base, 6 to 10 cm. long, 2 to 3.5 cm. wide; petiole 1 to 3 cm. long; heads small, 6 to 8-flowered, slender-pedicel in large ovoid thyrses; phyllaries ovate to oblong, white, lustrous. "Flor de plata," "hierba de plata," "coyontura" (El Salvador); "chilca," "chilco" (Guatemala).

- 45a. *Eupatorium leucocephalum* var. *anodontum*** Robinson, Proc. Amer. Acad. **51**: 534. 1916.

Known only from the type collection, secured at La Victoria, near the boundary between Michoacán and Guerrero.

Leaves subentire, somewhat narrower than in the typical form.

46. *Eupatorium peninsulare* T. S. Brandeg *Erythea* 7: 4. 1899.

Southern Baja California; type from San José del Cabo.

Shrub of smoothish appearance but finely pubescent; stems erect, 1 to 2 meters high; leaves opposite, petiolate, deltoid-hastate, acuminate, crenate-serrate to subentire, abruptly narrowed at base, subcoriaceous, 3-nerved; heads about 10-flowered, in a terminal leafy-bracted pyramidal panicle; involucre much shorter than the florets; phyllaries oval to oblong, rounded at tip, striate-costulate, ciliate; corollas slender, tubulate, yellowish white.

46a. *Eupatorium peninsulare* var. *epipolimum* Robinson, *Contr. Gray Herb. n. ser.* 73: 17. 1924.

Baja California; type from Aguaje de Santana.

Grayish-tomentellous; otherwise essentially like the typical form.

47. *Eupatorium spinaciaefolium* (DC.) A. Gray in *Torr. U. S. & Mex. Bound. Bot.* 75. 1858-59.

Bulbostylis spinaciaefolia DC. *Prodr.* 5: 139. 1836.

Eupatorium hastile Schauer, *Linnaea* 19: 719. 1847.

Tamaulipas and San Luis Potosí; type collected between Victoria and Tula, Tamaulipas.

Erect opposite-branched calciphile shrub; leaves opposite, petiolate, triangular-hastate, acuminate, irregularly toothed, membranaceous, green and scantily puberulent on both surfaces; heads 10 to 12-flowered, in ample leafy panicles; involucre nearly equaling the florets; phyllaries oval to oblong, rounded at tip, stramineous, striate; corollas yellowish or greenish white.

48. *Eupatorium blepharolepis* Schultz Bip. in *Seem. Bot. Voy. Herald* 300. 1856.

Known only from the original collection, said to have come from the Sierra Madre.

Slender glabrous shrub with terete purple branches; leaves opposite, ovate or lance-ovate, acute or narrowed to an obtuse tip, sparingly serrate, 3-nerved, mostly 2 to 3 cm. long, half as wide; petiole 2 to 4 mm. long; corymbs rounded, terminal on long peduncles; heads small (about 5 mm. high), 30 to 40-flowered; phyllaries oblong, blunt, purple-stained.

49. *Eupatorium nelsonii* Robinson, *Proc. Amer. Acad.* 35: 337. 1900.

Guerrero and Oaxaca; type collected between Ayusinapa and Petatlán, Guerrero.

Shrub, 1.5 to 3 meters high; leaves opposite, ovate, acuminate, dentate at the sides, cordate or subcordate and sometimes slightly hastate at base, 3 to 7-nerved, membranaceous, finely pubescent, 7 to 10 cm. long, 4 to 5 cm. wide; petiole 3 to 4.5 cm. long; heads about 16-flowered, in short, opposite, chiefly axillary corymbs, nodding; phyllaries elliptical, rounded at tip, light green striate.

50. *Eupatorium phoenicolepis* Robinson, *Proc. Amer. Acad.* 35: 338. 1900.

Known only from the original collection, obtained between San Cristóbal and Teopisca, Chiapas.

Slender-stemmed shrub or perennial herb; leaves opposite, petiolate, ovate, acuminate, finely crenate-serrate, cordate at base, usually with a narrow sinus, above puberulent, dull green, below paler, reticulate-veiny, 5 to 7 cm. long, 2.5 to 4.5 cm. wide; corymbs strongly convex or even ovoid; heads about 18-flowered, 1 cm. long; corollas crimson or purple.

51. *Eupatorium constipatiflorum* Klatt, *Ann. Naturhist. Hofmus. Wien.* 9: 355. 1894.

Known only from the type material, collected in Mexico by Galeotti in 1844; its label is unnumbered and as to locality illegible.

Probably a soft-wooded shrub, clothed with fuscous tomentum; leaves opposite, rhombic-ovate, long-acuminate, often falcate, sharply serrate, about 8 cm. long, 3 to 3.5 cm. wide, cuneate at base; heads few, large, densely clustered; phyllaries oblong, acute, dorsally puberulent on the upper part; corollas purple

52. *Eupatorium atrorubens* (Lem.) Nicholson, Dict. Gard. 1: 540. 1885.

Hebeclinium atrorubens Lem. Illustr. Hort. 9: pl. 310. 1862.

?*Eupatorium grandiflorum* André, Rev. Hort. 1882: 384 (with unnumbered plate). 1882.

?*Eupatorium raffillii* Hemsl. in Curtis's Bot. Mag. 134: pl. 8227. 1908.

Raised from seed collected in Mexico (probably Chiapas) by Ghiesbreght.

Robust but scarcely lignescent, 60 to 80 cm. high; stems several, terete, densely clothed with long, spreading, red or purple, jointed hairs; leaves 10 to 30 cm. long, more than two-thirds as wide, opposite, petiolate, acuminate at apex, obtuse to cordate at base, cuspidate-dentate; corymbs terminal, 20 to 30 cm. in breadth; heads numerous, about 12 mm. high; phyllaries lance-linear, attenuate, red or purple-villous on the back.

A species marked by the highly colored pubescence closely investing its stems. Introduced into European horticulture about 1862. Scarcely more than a selected or ameliorated form of *E. sordidum* Less.

53. *Eupatorium megalophyllum* (Lem.) Klatt, Leopoldina 20: 90. 1884.

Hebeclinium macrophyllum Lem. Cat. Hort. J. Versch.; Lem. Illustr. Hort. 9: 74. 1862.

Hebeclinium megalophyllum Lem. Illustr. Hort. 9: 73. 1862; Regel, Gartenflora 16: pl. 548. 1867.

Described from cultivated material believed to have been of Mexican origin; not known in the wild.

A stout suffrutescent plant with terete green stems; leaves opposite, long-petioled, suborbicular, bluntly pointed to subcordate at base, shortly pointed at apex, shallowly cuspidate-dentate, often 30 cm. or more in diameter; corymbs compound, dense, 30 to 50 cm. wide; heads about 60-flowered; phyllaries oblong-linear, acute; corollas illustrated as roseate and the conspicuous style branches as azure.

Not satisfactorily known.

54. *Eupatorium thespesiaefolium* DC. Prodr. 5: 164. 1836.

Morelos and probably Orizaba; the type from Mexico without locality.

Hollow-stemmed shrub or perhaps scarcely more than a stout herb, 1.5 to 2.5 meters high; stems terete, densely covered with sordid, somewhat tawny wool; leaves opposite, petiolate, ovate, acuminate, very blunt or subtruncate at base, pinnately 7 to 9-nerved, thin, 18 to 22 cm. long, 10 to 15 cm. wide; corymbs 5 to 15 cm. in diameter; phyllaries lanceolate, tomentellous on back; corollas and especially the long style branches clear rose color.

Doubtfully distinct from the following.

55. *Eupatorium sordidum* Less. Linnaea 6: 403. 1831.

Conoclinium ianthinum Morren, Ann. Soc. Agr. Bot. Gand 5: 173. 1849.

Hebeclinium ianthinum Hook. in Curtis's Bot. Mag. 77: pl. 4574. 1851.

Hebeclinium panamense Carr. Rev. Hort. 1877: 330 (with unnumbered plate). 1877.

Eupatorium ianthinum Hemsl. Biol. Centr. Amer. Bot. 2: 96. 1881.

Eupatorium brevipetiolatum Klatt, Leopoldina 20: 90. 1884; in part only, namely as to plant of Sartorius.

Eupatorium septuplinervium Klatt, Leopoldina 20: 90. 1884.

Hebeclinium sordidum Schultz Bip.; Klatt, Leopoldina 20: 91. 1884.

Hebeclinium macrocephalum Schultz Bip.; Klatt, Leopoldina 20: 91. 1884.

Eupatorium "*subtriplinervium* Klatt;" Pringle, Pl. Mex. 1899: on 2nd [un-numbered] page; a clerical error for *E. septuplinervium* Klatt, as explained by Hemsl. in Curtis's Bot. Mag. 134: pl. 8227. 1908.

Veracruz and San Luis Potosí; also from the boundary between Michoacán and Guerrero; originally collected on the "Cuesta grande de Chiconquiaco" and in the woods of Jalapa.

Shrub with terete stems clothed on the younger parts with dense, sordid or tawny, woolly pubescence, this occasionally reduced to a short puberulence; leaves opposite, ovate to ovate-oblong, sharply serrate to merely cuspidate-denticulate, shortly acuminate, pinnately somewhat 5-nerved from well above the base, 7 to 10 cm. long, 5 to 8 (or 10) cm. wide; petiole 2.5 to 5 cm. long; corymbs dense, convex, 4 to 8 cm. in diameter; phyllaries linear, acuminate, dorsally tomentellous; flowers violet, fragrant. "Xiquite" (Oaxaca, Reko).

This species has long been in cultivation in different but inconstant forms, much confused as to their naming and in no way clarified by showy though very inaccurate horticultural plates.

56. *Eupatorium miradoreense* Hieron. Bot. Jahrb. Engler 28: 576. 1901.

Eupatorium brevipetiolatum (Schultz Bip.) Klatt, Leopoldina 20: 90. 1884, as to Liebmann's no. 87 on which Schultz based his *Hebeclinium brevipetiolatum*; not, however, *Eupatorium brevipetiolatum* Schultz Bip.; Baker in Mart. Fl. Bras. 6²: 335, in obs. 1876.

Hebeclinium brevipetiolatum Schultz Bip.; Klatt, Leopoldina 20: 90. 1884.

Veracruz; as yet known only from the original collection secured by Liebmann at Petlapa.

Shrub closely resembling the preceding and having its terete branches similarly clothed with a dirty-tawny wool; leaves distinctly oblong, mostly narrow-acuminate, acute at base, 9 to 15 cm. long, 4 to 7 cm. wide, merely cuspidate-denticulate, distinctly and regularly pinate-veined; petiole 5 to 12 mm. long; otherwise much like the preceding.

57. *Eupatorium cremastum* Robinson, Proc. Amer. Acad. 42: 38. 1906.

Known only from the type collection, gathered on the crest of the Sierra Madre between Michoacán and Guerrero.

Shrub 3 to 4 meters high; branches brown, terete, glabrous; leaves opposite, petiolate, ovate-oblong, acuminate, serrate, at base rounded but with short acumination, feather-veined, glabrous above, slightly woolly on the midrib beneath, about 15 cm. long and a third as wide; petiole 3 cm. long; heads about 10-flowered, long-pediceled, nodding in axillary clusters; phyllaries green, linear, attenuate; corollas white.

58. *Eupatorium lucidum* Ortega, Hort. Matr. Dec. 35. 1797.

Eupatorium capnoresbium Robinson, Proc. Amer. Acad. 35: 331. 1900.

Eupatorium glaucum Schultz Bip.; Robinson, Proc. Amer. Acad. 35: 331, 333. 1900. Not *E. glaucum* Schultz Bip. ex Klatt.

Mexico and Federal District; described from Mexican material cultivated in the Botanical Garden in Madrid.

Shrub 1.5 to 3 meters high; branches flexuous, brown or purple, when young densely covered with spreading gland-tipped pubescence; leaves ovate-oblong, acutish or acute, serrate, but entire toward the rounded to acute base, thickish, glossy, distinctly paler beneath, 2.5 to 5 cm. long, about half as wide; petiole 4 to 15 mm. long; corymbs round-topped, rather dense, 4 to 15 cm. in diameter; heads about 10-flowered; phyllaries subequal, lance-linear, acutish, usually purple-tinged; corollas roseate.

59. *Eupatorium ligustrinum* DC. Prodr. 5: 181. 1836.

Eupatorium micranthum Lag. as doubtfully interpreted by Less. *Linnaea* 5:

138. 1830. Probably not *E. micranthum* Lag. Gen. & Sp. Nov. 25. 1816.

Eupatorium semialatum Benth. Pl. Hartw. 76. 1840.

Eupatorium myriadenium Schauer, *Linnaea* 19: 721. 1847.

Eupatorium weinmannianum Regel & Koern. Ind. Sem. Hort. Petrop. 1857: 41. 1857.

Eupatorium biceps Klotzsch; Vatke, Bot. Zeit. 30: 719. 1872. (A brief paper indicating many horticultural synonyms of this species.)

Eupatorium popocatepeltense Schlecht.; Hemsl. Biol. Centr. Amer. Bot. 2: 99. 1881.

Eupatorium erythropappum Robinson, Proc. Bost. Soc. Nat. Hist. 31: 248. 1904.

Tamaulipas, San Luis Potosí, Hidalgo, Veracruz, and Chiapas; type from Tamaulipas. Guatemala and Costa Rica.

Attractive shrub 1.2 to 5 meters high; leaves oblong, acuminate, serrately few-toothed, cuneate and often somewhat crisped and revolute toward the base, feather-veined, thickish-membranaceous, mostly 4 to 9 cm. long and 2 to 4 cm. wide, usually beset beneath with glistening globules; corymbs convex, fastigate, many-headed; heads 4 to 8-flowered; phyllaries linear, gland-dotted, scarcely half the length of the florets; corollas white; pappus often deep rose.

A highly valued greenhouse plant long cultivated under many horticultural names and running into some more or less striking though apparently inconstant forms. Of these the following seems to justify botanical recognition.

59a. *Eupatorium ligustrinum* var. *villiferum* Robinson, Contr. Gray Herb. n. ser. 75: 10. 1925.

Coahuila and San Luis Potosí; type from mountains near Carneros Pass.

Young branches, petioles, etc., spreading-villous as well as finely puberulent; leaves pubescent on both surfaces.

The leaves in this pubescent form show in venation some transition to the following species, being pinnately 5-nerved from above the base rather than regularly pinnate-veined.

60. *Eupatorium saltillense* Robinson, Proc. Amer. Acad. 43: 34. 1907.

Coahuila and Nuevo León; type collection secured at Saltillo.

Opposite-branched shrub 0.9 to 1.5 meters high; leaves ovate, obtuse, undulate to serrate-dentate, the blade decurrent on the upper part of the petiole and there tending to be revolute and ruffled, sparsely or only obsoletely hirtellous, subconcolorous, of firmly membranaceous texture, distinctly 3-ribbed from well above the base, punctate beneath, 4 to 6 cm. long, 2 to 4 cm. wide; corymbs many-headed, convex, 4 to 10 cm. wide, puberulent; heads about 5-flowered; corollas white or pink-tinged; pappus roseate.

Except in its pronouncedly 3-nerved leaves, very close to *E. ligustrinum*, of which it may prove a mere variety.

61. *Eupatorium hederaefolium* A. Gray, Mem. Amer. Acad. n. ser. 4: 65. 1849.

Known only from the type collection, secured at Cosihuiriachi, in the Sierra Madre west of Chihuahua.

Shrub 1 to 1.3 meters high; branches opposite, terete, ascending, slender; branchlets purple; leaves opposite, long-petioled, reniform-ovate, rounded at tip, coarsely crenate, openly cordate at base, about 4 cm. long and wide, paler beneath, membranaceous; heads 10 to 12-flowered, in dense terminal sessile corymbs; phyllaries oblong, crisped-puberulent.

- 62. *Eupatorium longifolium*** Robinson, Proc. Amer. Acad. **36**: 480. 1901.

San Luis Potosí and Veracruz; type from Tamasopo Canyon, San Luis Potosí.

Suffruticose, 1 meter high; stems slender, terete, covered with fine dark spreading pubescence; leaves opposite, ovate, narrowed from near the base to a caudate-attenuate tip, crenate-serrate at the sides, cordate at base, 3-nerved, thin, dark green above, paler and slightly velvety beneath, 8 to 12 cm. long, 4 to 5 cm. wide; petiole mostly 8 to 16 mm. long; heads 10 to 12-flowered, disposed in a large, leafy-bracted, ovoid or pyramidal panicle; phyllaries linear-attenuate, 3 or 4-nerved, pubescent; corollas greenish white, often with a dull purple tinge.

- 63. *Eupatorium solidaginoides*** H. B. K. Nov. Gen. & Sp. **4**: 126. 1820.

Eupatorium filicaule Schultz Bip.; A. Gray, Proc. Amer. Acad. **21**: 384. 1886.

Eupatorium stipuliferum Rusby, Mem. Torrey Club **4**: 210. 1895.

Ophryosporus solidaginoides Hieron. Bot. Jahrb. Engler **29**: 4. 1900.

San Luis Potosí, Veracruz, Oaxaca, and Chiapas. Widely distributed in Central and South America; type collected between Ticsan and Alausi, Ecuador.

A slender, wholly herbaceous or slightly lignescent calciphile with some tendency to climb; leaves opposite, slender-petioled, ovate, caudate-acuminate, the cauline open-cordate and more or less hastate at base, dentate, membranaceous, 5 to 12 cm. long, half as wide, puberulent to subtomentellous on the nerves beneath; heads 10 to 15-flowered, slender-pedicel and subracemose on the spreading branches of a large leafy-bracted panicle; phyllaries lanceolate, acute, loosely imbricate, usually purple-tinged.

- 63a. *Eupatorium solidaginoides* var. *armourii*** Robinson, Proc. Amer. Acad. **55**: 32. 1919.

Chiapas; known only from the type collection secured at Palenque.

Leaves narrowly triangular, much more decidedly hastate and more deeply crenate-toothed than in the typical form.

A marked variation but inseparable by trustworthy characters.

- 64. *Eupatorium pseudoperfoliatum*** Schultz Bip.; Klatt, Leopoldina **20**: 75. 1884.

Veracruz; known only from the original collection made at Consoquitla.

A slender shrub with virgate stems; leaves opposite, ovate, acuminate, crenate-dentate, cordate, so short-petioled as to appear sessile and stem-clasping, membranaceous, 6 to 10 cm. long, 4 to 5 cm. wide, brown-tomentellous on both surfaces; heads about 12 to 14-flowered, shortly pedicel at tips of the branches of a loose pyramidal leafy-bracted panicle; phyllaries lanceolate, attenuate, 2 or 3-ribbed, brownish-puberulent.

- 65. *Eupatorium leucoderme*** Robinson, Proc. Amer. Acad. **41**: 274. 1905.

Known only from the original collection obtained at Chuta, presumably in Guerrero, altitude 25 meters, in sandy soil.

Shrub with arcuate terete cream-white branches; leaves oblong-lanceolate, caudate-acuminate, serrate to subentire, rounded at base, thin, somewhat puberulent, 5 to 7 cm. long, 2 to 2.5 cm. wide; petiole about 6 mm. long; heads about 6-flowered, in dense, ovoid, lateral or terminal, short-peduncled thyrses; phyllaries lance-linear, less than half as long as the florets; corollas white, slender-tubulate.

- 66. *Eupatorium albicaule*** Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. **2**: 92. 1881, hyponym; Klatt, Leopoldina **20**: 89. 1884.

Eupatorium drepanophyllum Klatt, Ann. Naturhist. Hofmus. Wien. **9**: 356. 1894.

Veracruz, San Luis Potosí, and Yucatán; type from Papantla, Veracruz.

Tall shrub 3 to 9 meters high; branches flexuous or arcuate, terete, cream-white; branchlets sparingly puberulent to fulvous-tomentellous; leaves smooth,

oblong, falcate-acuminate, serrate to subentire, 3-nerved from above the rounded base, 5 to 12 cm. long, 1.5 to 4 cm. wide, subcoriaceous; petiole mostly 8 to 13 mm. long; heads about 7 or 8-flowered, in dense rounded short-peduncled corymbs; phyllaries lance-linear, acute, much shorter than the florets; corollas tubulate, slender, pale.

67. *Eupatorium ymalense* Robinson, Contr. Gray Herb. n. ser. **75**: 14. 1925.

Eupatorium albicaule var. *laxius* Robinson, Proc. Amer. Acad. **35**: 330. 1900.

Sinaloa; type from Ymala.

Tall shrub with firm, light gray bark; leaves opposite, ovate-oblong, acuminate, entire, thin, membranaceous, almost glabrous, 3-nerved from slightly above the rounded base, 7 to 12 cm. long, 3 to 6 cm. wide; petiole slender, 5 to 9 mm. long; panicles pedunculate, lateral and terminal, ovoid, about 6 cm. in diameter; heads pediceled, about 13-flowered, 8 to 10 mm. high; phyllaries linear, attenuate, dorsally puberulent; corollas pale, almost tubular, granulate.

68. *Eupatorium glischrum* Robinson, Proc. Amer. Acad. **54**: 245. 1918.

Known only from the original collection obtained on the summit of the Sierra de Parras, Coahuila.

Glutinous shrub with opposite, ascending, flexuous and nodulose branches; leaves oblong-lanceolate, obtuse, slightly cuspidate at tip, cuneate at base, entire, 3-nerved, glabrous and vernicose on both surfaces, 2 to 3.5 cm. long, 5 to 10 mm. wide; petiole 2 to 6 mm. long; heads 4 to 6-flowered, in small dense convex corymbs scarcely surpassing the leaves; phyllaries narrowly oblong, obtuse; corollas purplish.

69. *Eupatorium areolare* DC. Prodr. **5**: 169. 1836.

Eupatorium tubiflorum Benth. Pl. Hartw. 76. 1841.

Eupatorium brevisetum DC. Prodr. **5**: 169. 1836.

Michoacán and Chiapas; type from the Guachilaca Mountains. Guatemala.

Slender-branched shrub 3 to 5 meters high, shortly purplish-velvety on branchlets, petioles, and inflorescence; leaves opposite, ovate to ovate-oblong or ovate-lanceolate, gradually acuminate to a usually falcate tip, serrate, rounded to shallowly cordate at base, finely areolate above, paler, reticulate, and crisped-pubescent to tomentellous beneath, 6 to 13 cm. long, 3 to 6 cm. wide; petiole 1 to 1.5 cm. long; heads 12 to 20-flowered, in dense rounded terminal and stalked axillary corymbs (much shorter than the leaves); corollas white, with long tubular throat and much exceeding the narrow acute pubescent phyllaries.

70. *Eupatorium brevipes* DC. Prodr. **5**: 168. 1836.

Kyrstenia brevipes Greene, Leaflets **1**: 9. 1903.

San Luis Potosí to Oaxaca, Michoacán, and Durango.

Erect shrub 1.5 to 2.5 meters high with virgate leafy branches; leaves opposite and alternate, shortly petioled, lance-oblong to narrowly oval, acuminate to (rarely) obtuse, crenate-serrate from near the middle outward, 3-nerved, 3 to 8 cm. long, 8 to 25 mm. wide, scabrid-puberulent above, grayish-puberulent to subtomentellous beneath; heads about 20 to 25-flowered, in strongly convex to ovoid corymbs; phyllaries linear, acute, dorsally pubescent; corollas white or nearly so. "Chamiso" (*Seler*).

71. *Eupatorium liebmannis* Schultz Bip.; Klatt, Leopoldina **20**: 75. 1884.

Eupatorium hirsutum DC. Prodr. **5**: 170. Sept. 1836. Not *E. hirsutum* Hook. & Arn. March, 1836.

Eupatorium pseudo-hirsutum Hieron. Bot. Jahrb. Engler **22**: 758. 1897.

Oaxaca and Morelos; type from Planlanito.

Virgate-branched shrub with habit like the preceding but leaves oblanceolate to narrowly oblong, strongly discolorous, canescent-tomentose beneath, and feather-veined instead of 3-nerved; corollas white or pink-tinged.

- 72. *Eupatorium crassirameum*** Robinson, Proc. Amer. Acad. **35**: 332. 1900.
Morelos and Veracruz; type from lava fields near Cuernavaca.

Soft-wooded tree 3 to 4 meters high with thick, curved, pale grayish, at anthesis leafless branchlets; leaves opposite, broadly ovate, coarsely and undulately or sinuately few-toothed or angled, shortly acuminate, thin, green and glabrous on both surfaces, 10 to 16 cm. long, 8 to 14 cm. wide; petiole about 5 cm. long; heads about 15-flowered, in dense rounded compound corymbs; phyllaries linear-oblong, subacute; corollas purple.

A species of unique habit.

- 73. *Eupatorium desquamans*** Robinson, Proc. Amer. Acad. **35**: 333. 1900.
Known only from the original collection, made on the Sierra de San Felipe, Oaxaca.

A low much-branched shrub; branches flexuous, nodulose, leafy chiefly at the tip; buds and young leaves covered with a silvery-gray membranous coating, this breaking away and desquamating; leaves opposite, ovate, obtuse or obtusish at both ends, crenulate, paler beneath, 1 to 1.8 cm. long, 8 to 11 mm. wide; petiole 3 to 5 mm. long; heads about 15-flowered, in racemiform corymbs; phyllaries linear, acute, purplish brown, densely beset with sessile glands.

A little known species, probably rare and local.

- 74. *Eupatorium rupicola*** Robins. & Greenm. Proc. Amer. Acad. **32**: 42. 1896.
Oaxaca; the original collection obtained on dry ledges of the Sierra de San Felipe.

Branching hard-wooded shrub 1.5 to 3 meters high; branchlets slender, purple or brown, leafy, covered with a fine dark incurved puberulence; leaves opposite, petiolate, ovate, acuminate, crenate-serrate, rounded at base, green and smoothish above, somewhat paler, very finely dark-reticulate and on the nerves and larger veins pubescent to tomentellous beneath, 25 to 40 mm. long, 16 to 24 mm. wide; petiole 6 to 8 mm. long; corymbs terminal and on short lateral branchlets, together disposed in elongate leafy-bracted panicles; heads about 16-flowered; phyllaries oblong, obtuse, smoothish, not half as long as the florets; corollas purplish white; achenes subsericeous.

Another well marked and probably very local species, as yet but slightly known.

- 75. *Eupatorium viburnoides*** DC. Prodr. **5**: 171. 1836.

Tamaulipas and Nuevo León; type from gorges of the valley of Palmilla, between Victoria and Tula.

Shrub 1 to 2.4 meters high, sparingly arachnoid-tufted on buds, petioles, axils of leaves, etc.; leaves opposite, large, obovate, obtuse to subacute, cuneate at base, few-toothed to entire, coriaceous, on thick short petioles; heads about 15-flowered, in rather dense corymbs; phyllaries linear-oblong, rounded at tip, smoothish; corollas violet (*Berlandier*).

- 76. *Eupatorium tetragonum*** Schrad. Ind. Sem. Hort. Gott. 1830; Linnaea **6**: Litt. Ber. 72. 1831.

Known only from material cultivated at Goettingen from seeds said to have been procured by Schiede in Mexico.

Said to be suffruticose; stem smooth, erect, weak; branches tetragonal, slightly pubescent toward the summit; leaves opposite, rhombic-ovate, acuminate, serrate except toward the obtusely pointed base, thinly membranaceous, smoothish above, sparingly pubescent beneath, green on both surfaces, 7 to 11 cm. long, 3 to 5.5 cm. wide; petiole 2.5 to 3 cm. long; heads 12 to 15-flowered; phyllaries linear, attenuate; corollas white; pappus scarcely more than half as long as corolla.

- 77. *Eupatorium adenachaenium*** Schultz Bip.; Klatt, *Leopoldina* 20: 75. 1884.

Eupatorium adenochaetum Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 91. 1881; doubtless through clerical or typographical error and without character.

Eupatorium adenachenium Schultz Bip.; Hook. f. & Jacks. Ind. Kew. 1: 915. 1893; also by error.

Veracruz; type from Mount Orizaba.

Shrub with branches subterete and when young clothed with a dull rusty pubescence; leaves opposite, lance-oblong (rather than triangular-ovate as originally described), acuminate at tip, acute at base, coarsely serrate at sides, 6 to 8 cm. long, 2.5 to 3 cm. wide, thickish, darkening in drying; petiole about 5 mm. long; corymbs terminal, convex, 15 cm. wide; heads about 12-flowered, pediceled; phyllaries lance-oblong, obtuse, densely short-pubescent and atomiferous; achenes beset with sessile glands, especially on the angles.

- 78. *Eupatorium brandegeanum*** Robinson, Contr. Gray Herb. n. ser. 68: 10. 1923.

San Luis Potosí; type from Minas de San Rafael.

A slender, openly branched and crisped-puberulent shrub; leaves opposite, ovate, obtuse, crenate, truncate or shallowly cordate at base, membranaceous, 25 to 46 mm. long, 15 to 26 mm. wide; petiole 4 to 5 mm. long; heads 12 to 18-flowered, in loose corymbs; pedicels covered with stipitate dark glands; phyllaries green, lance-linear, acute.

- 79. *Eupatorium glabratum*** H. B. K. Nov. Gen. & Sp. 4: 127. 1820.

Eupatorium xalapense H. B. K. Nov. Gen. & Sp. 4: 128. 1820.

Vernonia toluccana DC. Prodr. 5: 30. 1836.

Eupatorium gonocladum DC. Prodr. 5: 171. 1836.

San Luis Potosí, Hidalgo, Veracruz, Puebla, Mexico, and Federal District; type from Real del Monte, Hidalgo.

Smoothish but viscid shrub 1 to 2.5 meters high; stem subterete, buff to brown; branches ascending, more or less angled; leaves ovate- to rhombic-oblong, obtuse to acute, serrulate to entire, cuneate at base, green above, pale beneath, 2.5 to 6 cm. long, half as wide, slightly fleshy, commonly proliferous in the axils; heads about 15 to 18-flowered, pedicellate in opposite-branched leafy-bracted elongate fastigate terminal panicles; phyllaries oblong, acutish, puberulent, often purple-tinged; corollas pale pink. "Hillo" (*Purpus*); "hierba del golpe" (*Ehrenberg*, who states that steam from a decoction of this plant cures sprains).

A conservatory plant long cultivated for ornament.

- 80. *Eupatorium subintegrum*** (Greene) Robinson, Contr. Gray Herb. n. ser. 75: 13. 1925.

Eupatorium espinosarum var. *subintegrifolium* Robinson, Proc. Amer. Acad. 26: 165. 1891.

Kyrstenia subintegra Greene, Leaflets 1: 10. 1903.

San Luis Potosí; type from shaded ledges of limerock, San José Pass.

Shrubby, vernicose and viscid, especially on the younger parts; stems terete; branches opposite, ascending, flexuous, finely crisped-puberulent toward the tips; leaves deltoid-ovate, subentire, acuminate, subtruncate at base, subcoriaceous, 3 to 5 cm. long, 2 to 3 cm. wide; petiole 5 to 9 mm. long; corymbs (often numerous) round-topped, rather dense, 3 to 5 cm. broad; heads slender, 8 to 12 mm. long; phyllaries linear-attenuate.

81. *Eupatorium espinosarum* A. Gray, Proc. Amer. Acad. **15**: 28. 1879.

Eupatorium spiraeaefolium Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. **2**: 101. 1881, nomen nudum.

Kyrstenia espinosarum Greene, Leaflets **1**: 9. 1903.

Eupatorium spiraeifolium Schultz Bip.; Loesener, Bull. Herb. Boiss. **3**: 624. 1895.

Shrub 1 to 1.5 meters high, always somewhat vernicose and viscid, especially on the involucre, the older branches often blackened; leaves opposite, petiolate, firmly membranaceous to subcoriaceous, chiefly triangular-ovate but varying to rhombic-ovate, obtuse to more often acute or acuminate, mostly subtruncate at base, 2 to 3.8 cm. long, 1 to 2.5 cm. wide, bright green above, scarcely paler and finely dark-reticulate beneath; petiole 5 (to 10) mm. long; corymbs many, 4 to 5 cm. wide, convex; heads about 13-flowered; phyllaries oblong to elliptic, gummy and often yellowish.

81a. *Eupatorium espinosarum* var. *doratophyllum* Robinson, Contr. Gray Herb. n. ser. **75**: 6. 1925.

Eupatorium robinsonianum Greene, Erythea **1**: 150. 1893.

Jalisco and Hidalgo; type from canyon walls near Lake Chapala.

A slightly gummy shrub differing from the typical form in having lanceolate rather than ovate leaves 2.5 to 3 cm. long and 9 to 13 mm. wide, rounded rather than subtruncate at base.

82. *Eupatorium hebes* Robinson, Contr. Gray Herb. n. ser. **75**: 7. 1925.

Southern Mexico, presumably Veracruz; type from "Mecatlan, St. Andrés."

Shrub assuming (at least in dried specimens) a dull yellowish brown color; subterete branches and hexagonal branchlets as well as pedicels and phyllaries closely beset with short spreading gland-tipped bristles; leaves opposite, petiolate, broadly oval, rounded at tip, subentire, scarcely pointed at the base, 2 to 3.3 cm. long, nearly as wide; corymbs 6 to 9 cm. in diameter; phyllaries lanceolate, acute, dorsally glandular-puberulent.

82a. *Eupatorium hebes* var. *rasum* Robinson, Contr. Gray Herb. n. ser. **75**: 8. 1925.

With the typical variety.

Differing in having the branches somewhat more definitely angled and, as well as the branchlets, pedicels, phyllaries, etc., quite free from the spreading bristles characteristic of the typical variety.

83. *Eupatorium havanense* H. B. K. Nov. Gen. & Sp. **4**: 128. 1820.

Eupatorium leiophyllum Less. Linnaea **6**: 402. 1831.

Eupatorium berlandieri DC. Prodr. **5**: 167. 1836.

Eupatorium ageratijolium DC. Prodr. **5**: 173. 1836.

Eupatorium ageratifolium β . ? *mexicanum* DC. Prodr. **5**: 173. 1836.

Eupatorium ageratifolium β . *texense* Torr. & Gray, Fl. N. Amer. **2**: 90. 1841.

Bulbostylis deltoides Buckley, Proc. Acad. Philad. **1861**: 456. 1861.

Eupatorium texense Rydb. Fl. Colo. **335**. 1906.

Coahuila, Nuevo León, Tamaulipas, San Luis Potosí, and Veracruz. Texas, Cuba, and Bahamas.

A neat shrub 1 to 2 meters high, smoothish to more often puberulent; stems and ascending branches terete; leaves opposite, petiolate, of firm texture and subcoriaceous, deltoid- to rhombic-ovate, 3-nerved from base, acute, coarsely crenate-dentate to obscurely serrate or subentire, 3 to 5 (or 8) cm. long, 1.2 to 3 (or 4) cm. wide; corymbs convex; heads at full maturity about 1 cm. long, well pediceled; phyllaries green to purplish, linear, acute; pappus white to roseate; corollas white or nearly so.

An abundant species, somewhat variable as to leaf form, dentation, degree of pubescence, etc., yet without well-marked varieties.

- 84. *Eupatorium gracilicaule*** Schultz Bip.; Robinson, Proc. Amer. Acad. **42**: 39. 1906.

Veracruz or Oaxaca; type from Tlacolula.

Shrub 3 meters high with slender terete smooth stems and opposite curved-ascending branches; leaves ovate, falcate-acuminate, crenate-serrate, rounded or scarcely pointed at base, membranaceous, smoothish, glandular-punctate beneath, 8 cm. long, 3 to 4 cm. wide, the veinlets slightly translucent; petiole slender, 2 to 2.5 cm. long; corymbs rather open, sometimes combined into large leafy-bracted panicles; heads about 13-flowered, slender-pediceled; phyllaries linear, attenuate, dorsally pubescent and atomiferous.

- 85. *Eupatorium mairetianum*** DC. Prodr. **5**: 167. 1836.

Eupatorium lasioneuron Hook. & Arn. Bot. Beechey Voy. 297. 1840.

Eupatorium cognatum Kunth & Bouché, Ind. Sem. Hort. Berol. **1847**: 13. 1847.

Michoacán, Federal District, Morelos, and Oaxaca. Guatemala.

Shrub 1 to 4.5 meters high, more or less arachnoid-tufted on younger parts and especially in axils of the veins on lower surface of leaf; stems terete, brown with white pith; leaves opposite, ovate to rhombic, acuminate, serrate except toward the more often acute base, 6 to 11 cm. long, 3 to 5 cm. wide, of firm texture, green and glabrous above, much paler and more or less pubescent beneath; corymbs usually disposed in ovoid leafy-bracted terminal thyrses; heads about 25-flowered, 12 to 16 mm. high; phyllaries linear, attenuate, pubescent.

- 86. *Eupatorium subpenninervium*** Schultz Bip.; Klatt, Leopoldina **20**: 89. 1884.

Eupatorium melanolepis Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. **2**: 97. 1881, nomen nudum; Klatt, Leopoldina **20**: 89. 1884.

Eupatorium subinclusum Klatt, Leopoldina **20**: 75. 1884.

Eupatorium oxylepis Schultz Bip.; Klatt, Leopoldina **20**: 75. 1884. Not *E. oxylepis* DC.

Oaxaca, Puebla, and Chiapas; type from Cumbre de Ectapa.

Shrub 1.5 to 6 meters high, covered on young branches, petioles, etc., with a dark violet or at length rusty tomentum; leaves opposite, petiolate, ovate, acuminate, crenate-serrate, acute to rounded or rarely subcordate at base, pubescent on both surfaces, deep green above, paler beneath, of soft membranaceous texture, 5 to 12 cm. long, 4 to 8 cm. wide, pinnately nerved from above the base; petiole 2 to 4.5 cm. long; corymbs terminal, compound, 6 to 16 cm. in diameter; heads 17 to 24-flowered; phyllaries dark violet, linear, obtuse to acute, 4 to 5 mm. long, only half the length of the florets; corollas purple.

- 87. *Eupatorium vernale*** Vatke & Kurtz, Ind. Sem. Hort. Berol. **1871**: Append. 2. 1871; Gartenflora **1873**: 36. 1873.

Described from cultivated material thought to have been of Mexican origin.

Shrub, or tall, slightly lignescent herb, in habit similar to the preceding but covered with a much looser, villous or tomentose pubescence of pale spreading hairs; leaves acuminate, coarsely serrate-dentate; phyllaries green, at maturity 7 to 10 mm. long, attenuate.

- 88. *Eupatorium chiapense*** Robinson, Proc. Amer. Acad. **35**: 332. 1900.

Chiapas and Morelos; also on crest of the Sierra Madre between Michoacán and Guerrero; type collected near Pinabete, Chiapas.

A shrub 3 meters high; stems terete, densely clothed with purple or at length rusty tomentum; leaves opposite, oblong-ovate, acuminate to (rarely) obtuse, serrate, rounded, subcordate, or (rarely) obtusely pointed at base, pinnately nerved from well above the base, pubescent on both surfaces, 6 to 14 cm. long, 5 to 8 cm. wide, membranaceous; petiole 2 to 6 cm. long; corymbs ample, convex,

6 to 20 cm. wide, closely beset with stipitate glands; heads 10 to 24-flowered; phyllaries linear, attenuate, purple, gland-dotted.

Some specimens from Zacuapan in the State of Veracruz (*Purpus* 7078) appear to be only a much smoother form of this species.

89. *Eupatorium hidalgense* Robinson, Contr. Gray Herb. n. ser. 75: 8. 1925.

Hidalgo; type from Sierra de Pachuca.

Shrub 1 to 1.5 meters high; stems and spreading branches terete, dark gray to almost black; branchlets dark purple, crisped-puberulent; leaves opposite, rhombic-oblong, narrowed to an obtuse or rounded tip, subcuneate at base, entire or nearly so, essentially glabrous, green above, pale and dark-punctate beneath, 1.5 to 3 cm. long, 1 to 1.5 cm. wide; petiole 2 to 5 mm. long; corymbs terminal, rather dense, flattish to distinctly convex, 3 to 6 cm. wide, often numerous and combined into a compound leafy inflorescence; heads 8 to 10 mm. high; phyllaries linear, narrowed to an obtuse tip, green or purple-tinged, not half the length of the florets; corollas white; pappus usually purplish toward the base.

90. *Eupatorium rhomboideum* H. B. K. Nov. Gen. & Sp. 4: 127. 1820.

Eupatorium calaminthaefolium β *pluridentatum* DC. Prodr. 5: 171. 1836.

Mexico and Federal District; type collected between Tianguillo and Toluca.

Shrub 0.9 to 1.5 meters high; stems and ascending branches round; branchlets somewhat hexagonal, puberulent; leaves opposite, rhombic-ovate, obtusish, crenate except toward the cuneate to obtuse base, puberulent, 3-nerved, 2 to 3 (or 5) cm. long, 1.5 to 2.5 (or 3.5) cm. wide; corymbs multiple or dense, strongly convex to ovoid; heads about 1 cm. high; phyllaries oblong-lanceolate, acute, pubescent; corollas much exserted, purple-tinged.

91. *Eupatorium irrasum* Robinson, Contr. Gray Herb. n. ser. 75: 8. 1925.

Eupatorium calaminthaefolium var. *irrasum* Robinson, Contr. Gray. Herb. n. ser. 68: 11. 1923.

Oaxaca and Puebla; type from the Cordillera of Oaxaca.

A rather densely branched shrub; leaves very small, ovate, obtuse, serrate, conspicuously discolorous, puberulent and dull green above, canescent-tomentose beneath, only 7 to 10 mm. long and 4 to 7 mm. wide; corymbs numerous, few-headed; phyllaries lance-linear, acute, mostly purple-tinged, densely pubescent; corollas purple.

92. *Eupatorium porriginosum* Robinson, Contr. Gray Herb. n. ser. 75: 11. 1925.

Hidalgo, Federal District, and Oaxaca; type from bluffs of a barranca above Metepec Station, Hidalgo.

Copiously branched, small-leaved shrub 0.9 to 1.5 meters high; stems terete, at length glabrous; branches and branchlets crisped-puberulent; leaves opposite, oval, entire or nearly so, obtuse to rounded at each end, membranaceous, slightly paler beneath, sparingly puberulent and punctate on both surfaces, nearly always slightly mottled on the upper as if obscurely lepidote, 1 to 2 cm. long, 7 to 15 mm. wide; corymbs few-headed, umbelliform, numerous; pedicels 1 to 1.8 cm. long, often exceeding the heads; phyllaries narrowly lanceolate, about half the length of the florets; corollas purple or white.

93. *Eupatorium wrightii* A. Gray, Pl. Wright. 1: 87. 1852.

Kyrstenia parvifolia Greene, Leaflets 1: 12. 1903.

Chihuahua, Coahuila, and San Luis Potosí. Texas.

Much-branched grayish-puberulent or -pulverulent shrub 20 to 60 cm. high; stems terete; cortex gray; leaves opposite, broadly oval, rounded to subacute at apex, mostly rounded at base, entire or nearly so, membranaceous to chartaceous, the cauline 1.8 to 3 cm. long, nearly as wide, the rameal often very numerous and much smaller; corymbs small but numerous, often forming irregular compound inflorescences; heads about 12-flowered; phyllaries lance-oblong, acute, green; corollas white.

- 94. *Eupatorium calophyllum*** (Greene) Robinson, Contr. Gray Herb. n. ser. 75: 5. 1925.

Kyrstenia calophylla Greene, Leaflets 1: 11. 1903.

Coahuila, San Luis Potosí, and Hidalgo; type from Saltillo.

A low calciphile shrub 15 to 30 cm. high; stem decumbent or even prostrate and subrepent, sending up erect branches; leaves opposite, suborbicular, varying to ovoid or broadly elliptical, about 1.5 to 2 cm. in diameter, crenate, thick, coriaceous, concolorous, minutely scrobiculate beneath, the glandular punctation tending to follow the yellowish green network of fine veinlets; petiole 3 to 6 mm. long; corymbs mostly 3 to 5 cm. wide; heads about 12-flowered; phyllaries oblong, acute, often purple-tinged, scarcely half as long as the florets; corollas purple.

- 95. *Eupatorium calaminthaefolium*** H. B. K. Nov. Gen. & Sp. 4: 129. 1820.

Coahuila, San Luis Potosí, Guanajuato, and Hidalgo; type from Santa Rosa de la Sierra, near Guanajuato.

Habitally similar to the preceding, but taller; leaves membranaceous or at most chartaceous, sparingly puberulent, not scrobiculate, the glandular dots on the surface of the areolae rather than on the netted veinlets; phyllaries oblong, mostly obtuse.

In the past this species, very broadly interpreted, has been made to include several now pretty readily distinguishable species.

- 96. *Eupatorium glaucum*** Schultz Bip.; Klatt, Leopoldina 20: 89. 1884.

Not *E. glaucum* Schultz Bip.; A. Gray in Hemsl. Biol. Centr. Amer. Bot. 2: 95. 1881. See Robinson, Proc. Amer. Acad. 35: 333. 1900.

Eupatorium orizabae Schultz Bip.; Klatt, Leopoldina 20: 90. 1884.

Veracruz and Oaxaca; type from Pelado.

Low sprawling many-branched alpine undershrub, sordid-pubescent and glandular; leaves opposite (the uppermost sometimes ternate or scattered and alternate), subsessile, elliptic-oblong, thick, coriaceous, 1(or 3)-nerved, revolute at margin, 1 to 1.6 cm. long, 3 to 7 mm. wide; corymbs few-headed, 3 to 4 cm. wide; phyllaries oblong, mostly obtuse, nerveless, purple-tinged; corollas purple.

- 97. *Eupatorium rhodopodum*** Robinson, Contr. Gray Herb. n. ser. 75: 12. 1925.

San Luis Potosí; type from Minas de San Rafael.

Shrub 40 cm. or more in height, sparingly dark-villous on the younger parts, otherwise glabrous; stems terete and branches nearly so; leaves opposite, subsessile, broadly ovate to ovate-oblong, obtuse to barely acute, rounded to subcordate at base, slightly undulate-dentate, thick, coriaceous, 2 to 3 cm. long, 1.4 to 2.5 cm. wide, green and glabrous on both surfaces, not punctate, the very short petiole thick, often reddish purple; corymbs terminal, 3 to 6 cm. wide; heads long-pedicelled; phyllaries lance-oblong, acute, ciliate, often purple-tinged; pappus bright rose-color.

- 98. *Eupatorium mygindaefolium*** A. Gray, Proc. Amer. Acad. 16: 101. 1880.

Bigelovia oppositifolia A. Gray, Proc. Amer. Acad. 15: 32. 1879. Not

Eupatorium oppositifolium Hoffmannsegg.

San Luis Potosí; type from ravine in cool mountains near San Miguel.

Low, much branching, sprawling, vernicose undershrub; stems nodose, fuscous; leaves oblong, acute or acutish at each end, few-toothed above the middle, about 14 mm. long, 6 mm. wide, coriaceous, green and often gummy on both surfaces; heads subsolitary at ends of the branches, at maturity 12 to 14 mm. long, surrounded by foliaceous bracts.

99. *Eupatorium campylocladum* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 247. 1904.

Coahuila; type from General Cepida.

Pliant-stemmed shrub with dark gray cortex; branches flexuous, nodulose (the internodes mostly very short), denuded of leaves except near the tip; leaves ovate-suborbicular, obtuse, serrate, shallowly cordate at base, about 2 cm. long and 1.7 cm. wide, glabrous but gummy on both surfaces; petiole 5 to 7 mm. long; heads 1 to several at tips of branches, about 13 mm. long; phyllaries oblong, acute, thin, green, glandular-puberulent.

100. *Eupatorium vernicosum* Schultz Bip.; Greenm. Zoe 5: 186. 1904.

Mexico; type (i. e., plant described by Greenman) from rocks near timber line on Mount Ixtaccihuatl.

Low shrub with forking nodulose blackish stems and branches; leaves opposite, ovate, shortly acuminate, serrate, rounded to shallowly cordate at base, gummy and very viscid on both surfaces, chartaceous or subcoriaceous, 3 to 6 cm. long, 1.5 to 4 cm. wide; heads mostly 1 to 5 at the ends of the branches, 1.5 cm. long and equally broad, long-pedicelled.

101. *Eupatorium multiserratum* Schultz Bip. in Seem. Bot. Voy. Herald 301. 1856.

Type locality vaguely stated as Sierra Madre, but species rediscovered by Dr. Palmer in Durango.

Tall shrub with terete stems, long internodes, and ascending branches; leaves opposite, ovate to ovate-oblong, acute to obtuse at tip, sharply serrulate, rounded at base, thickish-membranaceous, tufted in the axils of the chief veins beneath, 3.5 to 5.5 cm. long, 1.8 to 2.7 cm. wide; petiole 1 to 1.3 cm. long; corymbs loose, few-headed, umbelliform; heads 1 to 1.2 cm. long, about 32-flowered; phyllaries smoothish, lance-linear, attenuate, nearly equaling the florets.

102. *Eupatorium hyssopinum* A. Gray, Proc. Amer. Acad. 15: 28. 1879.

Eupatorium koelliaefolium Greene, Pittonia 3: 31. 1896.

Kyrstenia koelliaefolia Greene, Leaflets 1: 9. 1903.

San Luis Potosí, Durango, and Chihuahua; type probably from the region of San Luis Potosí.

Erect-stemmed, essentially herbaceous perennial but sometimes developing a decidedly woody base in age; stems terete, 30 to 60 cm. high, bearing almost from base to summit many slender ascending branches; leaves lanceolate, acute or obtuse at apex, cuneate at the sessile base, ciliolate, otherwise nearly glabrous, 12 to 22 mm. long, 3 to 6 mm. wide, membranaceous; corymbs terminal, moderately convex, 6 to 14 cm. in diameter; corollas white.

103. *Eupatorium riparium* Regel, Gartenflora 1866: 324. 1866.

Eupatorium flexicaule Schnittspahn, Zeitschr. Gartenb. Ver. Darmstadt 6: Anlage 2: 5. 1857, without diagnosis.

Eupatorium riparium Schultz Bip.; Schnittspahn, loc. cit. 1857, also without diagnosis.

Eupatorium harrisii Urban, Symb. Antill. 1: 460. 1900.

Slender, nearly herbaceous plant with terete, flexuous, finely pubescent, at length somewhat lignescent stems; leaves opposite, lanceolate, attenuate to each end, serrate from near the middle outward, 3-nerved from somewhat above the base, 5 to 10 cm. long, 1 to 2.5 cm. wide, sparingly pubescent on the nerves; corymbs numerous, small, paniced; phyllaries pale green, lanceolate, scarious-edged; corollas white.

A copious bloomer, easily grown and long valued in hothouse cultivation. In giving this species its first valid publication, Regel in no way alludes to its earlier though invalid mention in print, which therefore does not give ground for use of Schultz's name as authority.

- 104. *Eupatorium tomentellum*** Schrad. Ind. Sem. Hort. Gott. 1833: 3. pl. 3. 1833.

Eupatorium smithii Robinson, Proc. Amer. Acad. 35: 340. 1900.

Oaxaca and Puebla. Guatemala.

Rusty-tomentellous shrub 0.9 to 1.5 meters high, with curved or flexuous, more or less hexagonal branches; leaves deltoid-ovate (rarely ovate-oblong), rounded at the apex and at the basal angles, crenulate, shallowly cordate at base, gray-green and pulverulent above, rusty-tomentellous beneath, 2 to 5 cm. long, equally wide; corymbs convex, leafy-bracted at base, 4 to 6 cm. in diameter; phyllaries narrowly oblong, acute, green, often purple-tinged, gray-tomentellous; corollas purple.

- 105. *Eupatorium loesenerii*** Robinson, Proc. Amer. Acad. 35: 336. 1900.

Oaxaca; type from calcareous hills at Las Sedas.

Similar to the preceding, but taller, 1.5 to 2.5 meters high; cortex buff to gray; tomentum on young parts and lower leaf surface very rusty; leaves round-ovate, entire or obscurely denticulate, broadly rounded at tip, abruptly pointed to rounded or shallowly cordate at base, ochraceous-tomentellous beneath, 3 to 7 cm. long; petiole 1.5 to 3.5 cm. long; corymbs usually 9 to 13 cm. wide; phyllaries oblong, obtuse, ochraceous, gland-dotted.

- 106. *Eupatorium malacolepis*** Robinson, Proc. Amer. Acad. 44: 618. 1909.

Durango and Tepic; type from San Ramón.

Nearly herbaceous, lignescent only toward the base; stem decumbent, 0.3 to 1.2 meters high, terete, brown, bristling with spreading articulate rusty-brown hairs; leaves opposite, ovate, acuminate, serrate except toward the obtuse to rounded base, membranaceous; inflorescence compound, somewhat irregular, the individual corymbs rather dense, 3 to 5 cm. wide; heads about 4 to 4.5 mm. high; phyllaries oblong, obtuse, green, subscarious, erose, dorsally tomentellous.

- 107. *Eupatorium conspicuum*** Kunth & Bouché, Ind. Sem. Hort. Berol. 1847: 13. 1847; Ann. Sci. Nat. III. 9: 315. 1848.

Eupatorium grandifolium Regel, Gartenflora 1: 102. pl. 12. 1852.

Kyrstenia grandifolia Greene, Leaflets 1: 9. 1903.

Oaxaca and Morelos; originally described from material cultivated at Berlin and stated to have come from Mexico. Guatemala.

Seemingly herbaceous or nearly so, but reported to become a shrub about 2 meters in height; branchlets hexagonal; leaves deltoid-ovate, acute to acuminate, serrate (usually rather sharply so) even to the abrupt acumination at the point of attachment, thin, green on both surfaces, 7 to 12 cm. long and wide; petiole 5 to 12 cm. long, winged at summit; corymbs terminal and subterminal, rather loose, often exceeded by the surrounding foliage; heads about 40-flowered, 5 to 7 mm. high; phyllaries lanceolate, acute, green, pubescent; corollas white.

- 107a. *Eupatorium conspicuum* var. *pueblense*** Robinson, Contr. Gray Herb. n. ser. 68: 12. 1923.

Puebla; type from rocky slopes, Boca del Monte.

Stems terete to the inflorescence; leaves with basal acumination entire.

- 108. *Eupatorium oligocephalum*** DC. Prodr. 5: 166. 1836.

Eupatorium erythrocomum Robinson, Proc. Amer. Acad. 43: 31. 1907.

State of Mexico; type recorded merely as from Mexico, where collected by Haenke; the species apparently rediscovered on steep slopes of Mount Ixtacihuatl by Dr. Purpus.

Suffrutescent; stems several, branching, curved-ascending, slender and at most fruticulose, dark purple, finely pubescent; leaves opposite, ovate-lanceolate, acute, serrulate, rounded at base, thickish-membranaceous, green and glabrous above, dark purple and sparingly pubescent on the nerves beneath, 1 to 3 cm.

long, half as wide; petioles 2 to 5 mm. long; corymbs umbelliform, terminal, lax, mostly 3 to 5-headed; heads 25 to 30-flowered, about 1 cm. high; phyllaries oblong, acute, the outer dark purple, originally described as glabrous, but apparently in conspecific material thinly villous; pappus roseate.

109. *Eupatorium aschenbornianum* Schauer, *Linnaea* 19: 720. 1847.

Eupatorium donnell-smithii Coulter, *Bot. Gaz.* 16: 95. 1891.

Eupatorium donnell-smithii var. *parvifolium* Coulter, *Bot. Gaz.* 16: 96. 1891.

Kyrstenia donnell-smithii Greene, *Leaflets* 1: 9. 1903.

Veracruz, Puebla, Michoacán, and Mexico; type from the valley of Toluca. Central America.

Described as shrubby, but apparently a scarcely lignescent perennial herb, 30 to 60 cm. high, copiously spreading-pubescent, the trichomes moniliform with dark purple nodes; stems terete, with white pith; leaves suborbicular-ovate, acuminate, serrate, obtuse to rounded or distinctly cordate at base, softly membranaceous, 3 to 8 cm. long, 2.5 to 6.5 cm. wide; petiole 1 to 3 cm. long; corymbs compound, terminal, often 30 cm. broad; heads 20 to 40-flowered; phyllaries linear, subscarios, lacerate-ciliate toward tip; corollas white or nearly so, hispid near the limb.

Specimens apparently belonging to this species have been confidently referred by Schultz-Bipontinus (in herb.), Klatt (in herb.), and Hemsley (*Biol. Centr. Amer. Bot.* 2: 93. 1881) to the earlier and little known *E. ciliatum* Less., but the latter species is shown by its type to have smaller, relatively shorter-petioled and more incisely toothed leaves with a short but sharp basal acumination. It is described by Lessing (*Linnaea* 6: 404. 1831) as herbaceous and as having glabrous corollas.

110. *Eupatorium etlense* Robinson, *Contr. Gray Herb. n. ser.* 75: 6. 1925.

Type from Las Sedas, Distrito de Etlá, Oaxaca, altitude 1,900 meters.

Slender-branched shrub; stems terete, smooth, grayish buff; branches when young slightly hexagonal and puberulent, soon glabrate; leaves opposite, slender-petioled, ovate, obtuse to subacuminate, crenate-serrate, rounded or subcordate at base, 2.5 to 6 cm. long, 2 to 4.3 cm. wide, sparingly puberulent above, pubescent beneath, chartaceo-membranaceous, the closely netted veinlets beautifully translucent; corymbs terminal, rounded; heads about 23-flowered, 8 mm. high; phyllaries in about 3 series, gray-pubescent; corollas white.

111. *Eupatorium scorodonioides* A. Gray, *Proc. Amer. Acad.* 15: 27. 1879.

Eupatorium scorodonioides var. *grossedentatum* Robinson, *Proc. Amer. Acad.* 35: 340. 1900.

Central Mexico from Coahuila to Veracruz and Zacatecas; type from rocky hills near San Luis Potosí.

A hard-wooded shrub 0.9 to 1.8 meters high, copiously and usually fastigiately branched, grayish-tomentellous to -tomentose; leaves opposite, deltoid, cordate, acute or acutish, finely or coarsely crenate-dentate, paler beneath, 3-nerved from the base, 1.5 to 5 cm. long, rarely over 3 cm. wide; petiole mostly less than 1 cm. long; heads about 1 cm. high, long-pedicelled, in fastigate corymbs; phyllaries lance-linear to linear, attenuate, herbaceous, gray-pubescent, nearly equaling the florets; corollas white.

112. *Eupatorium petiolare* Moc.; DC. *Prodr.* 5: 166. 1836.

Bustamenta cordata Alamán; DC. *Prodr.* 5: 166. 1836.

Widely distributed from Coahuila and Tamaulipas to Oaxaca.

Shrub 0.9 to 1.5 meters high, with terete, thickish, pithy, and brittle stems; cortex when young tomentellous; leaves opposite, triangular-ovate to suborbicular-ovate, acuminate, crenate-dentate, mostly cordate at base, 6 to 10 cm. long and 4 to 7 cm. wide; petiole mostly 2 to 6 cm. long; corymbs dense, often lateral as

well as terminal, little if at all exceeding the surrounding leaves; heads about 1 cm. long; phyllaries linear, attenuate, pale green, pubescent.

Occasionally approaching the preceding species but in most cases readily separable. "Yoyochichil" (*Seler*).

113. *Eupatorium pringlei* Robins. & Greenm. Amer. Journ. Sci. III. 50: 152. 1895.

Oaxaca and Chiapas; type from Sierra de San Felipe, Oaxaca.

Shrub 2 to 3.6 meters high; stems terete, buff; leaves opposite, petiolate, deltoid-ovate, acute to acuminate, crenate-dentate except at the subtruncate base, obscurely pulverulent-puberulent, paler beneath, about 4 to 5 cm. long and 3 to 4 cm. wide; petiole 1 to 1.5 cm. long; inflorescence ovoid and dense or forming a long loose leafy-bracted terminal thyrse; heads 10 to 12 mm. long; phyllaries linear, acute, brownish purple; corollas white to purple-tinged.

114. *Eupatorium chapalense* S. Wats. Proc. Amer. Acad. 26: 138. 1891.

Jalisco and Durango; type from mountains about Lake Chapala, Jalisco.

Shrub with slender, flexuous, terete, brownish purple branches; leaves opposite, petiolate, ovate, acute, serrate, scarcely pointed or distinctly acuminate at base, sparingly puberulent above, woolly along the nerves beneath, 6 to 9 cm. long, 3 to 4 cm. wide; corymbs terminal, fastigate; heads 10 to 12 mm. long, almost as broad; phyllaries thin, green or purple-tinged, oblanceolate, acute, pubescent, nearly equaling the florets; corollas white or nearly so; pappus double, of many long inner capillary bristles and a few much shorter, slightly flattened and almost scalelike outer ones.

114a. *Eupatorium chapalense* var. *salicifolium* Robinson, Proc. Amer. Acad. 35: 332. 1900.

Jalisco; type from mountains about Lake Chapala.

Leaves actually and relatively much narrower than in the typical form, lanceolate, 5 to 6 cm. long, about 1.5 cm. wide, pointed at base.

115. *Eupatorium tuerckheimii* Klatt (as *Türckheimii*), Leopoldina 20: 95. 1884.

Chiapas. Guatemala and Honduras.

Scarcely shrubby, 2 meters high, smooth throughout; leaves opposite, lanceolate or lance-oblong, caudate-acuminate, cuspidate-denticulate, pinnate-veined, with thickened margin; heads about 50-flowered, long-pedicel in terminal, rounded-somewhat umbelliform corymbs; phyllaries well imbricate, lanceolate, acute.

116. *Eupatorium ehrenbergii* (Schultz Bip.) Hemsl. Biol. Centr. Amer. Bot. 2: 94. 1881. (Defined by one previously published though not name bringing synonym.)

Eupatorium ehrenbergii Klatt, Flora 68: 202. 1885.

Hebeclinium macrocephalum Benth. Pl. Hartw. 42. 1840. Not *Eupatorium macrocephalum* Less.

Eupatorium benthamii Klatt, Leopoldina 20: 90. 1884.

Kyrstenia benthami Greene, Leaflets 1: 9. 1903.

Known only from Puente de Dios in South Mexico, where long ago collected both by Hartweg and by Ehrenberg.

Suffruticose; stem terete; branches canescent-tomentose; leaves opposite, petiolate, scabrid above, soft-tomentose beneath, serrulate, pinnate-veined; heads about 50-flowered, 1 cm. high, equally broad; corollas purple; phyllaries lanceolate, acute, subequal, grayish-tomentellous.

117. *Eupatorium perornatum* Klatt, Leopoldina 20: 90. 1884.

Eupatorium liebmannii Hemsl. Biol. Centr. Amer. Bot. 2: 96. 1881. (Without diagnosis or described synonym.)

Hebeclinium liebmannii Schultz Bip.; Hemsl. loc. cit., in synonymy.

Hebeclinium liebmanniae Hook. f. & Jacks. Ind. Kew. 1: 1097. 1893, by error. Veracruz; type from Mirador.

Shrub with slender terete flexuous branches, finely tomentellous or incurved-puberulent; leaves opposite, ovate, slender-petioled, acuminate, sharply serrate, palmately 3 or 5-nerved from near the base, membranaceous, green and smoothish on both surfaces; heads 35 to 40-flowered, in compound leafy-bracted panicles; phyllaries lanceolate to lance-oblong, acute.

DOUBTFUL AND EXCLUDED SPECIES.

CONOCLINIUM (Eupatorium) ALBUM Mart. Linnaea 24: 194. 1851. Described from greenhouse material of Mexican origin and said to be a smooth half-shrub with somewhat deltoid acuminate serrate leaves, 3 to 5-headed corymbs, 24 to 30-flowered heads, and pappus of 13 bristles. The species is wholly obscure and in any event the name under *Eupatorium* is unavailable, owing to the earlier and still valid homonym.

EUPATORIUM KARVINSKIANUM DC. Prodr. 5: 163. 1836. De Candolle, describing this species from very fragmentary material, supposed it to be shrubby. Later specimens secured by Pringle and others seem to show it herbaceous throughout, and one collected by Galeotti is indicated on his label as an annual. It is therefore omitted from the foregoing treatment.

EUPATORIUM MICRANTHUM Lag. Gen. & Sp. Nov. 25. 1816. This wholly obscure plant, to judge from its blue florets, imbricate phyllaries, and the few other remarks regarding it, was presumably an *Ageratum*. There seems no satisfactory ground for applying the name, as did Lessing (Linnaea 5: 138), to a white or pink-flowered *Eupatorium* of Section *Eximbricata*. Lessing's *E. micranthum* must therefore receive the next later designation, namely *E. ligustrinum* DC. Prodr. 5: 181. 1836.

EUPATORIUM MICROCEPHALUM A. Gray, Proc. Amer. Acad. 21: 384. 1886. This is inseparable from *Ophryosporus ovatifolius* (DC.) Benth. & Hook. f.; Hemsl. Biol. Centr. Amer. Bot. 2: 79. 1881.

EUPATORIUM MICROPHYLLUM A. Gray; Dur. & Jacks. Ind. Kew. Suppl. 1: 166. 1902. A clerical error for the preceding and therefore referable to *Ophryosporus ovatifolius* (DC.) Benth. & Hook. f.

EUPATORIUM OLIGOLEPIS (Kunze) Hemsl. Biol. Centr. Amer. Bot. 2: 98. 1881. *Conoclinium oligolepis* Kunze, Del. Sem. Hort. Lips. 4: 2. 1840. Vaguely characterized and wholly obscure species, raised from Mexican seed in the Botanical Garden at Leipzig. Said to have been suffruticose, with erect sulcate pubescent stem, opposite, petiolate, deltoid-ovate, obsoletely sinuate-dentate, pubescent leaves, short-pedicelled heads in contracted terminal corymb, and 15 to 20 subserial phyllaries.

EUPATORIUM PAPANTLENSE Less. Linnaea 6: 403. 1831. This species incompletely described by (briefly and for the most part negatively stated) comparative characters is still doubtful. It may have been only a form of the earlier *E. havanense* H. B. K., to which in any event it seems to have been closely related.

EUPATORIUM PETRAEUM Robinson, Proc. Amer. Acad. 41: 275. 1905. Transferred to *Ophryosporus* as *O. petraeus* Robinson, Contr. Gray Herb. n. ser. 75: 4. 1925.

EUPATORIUM POLYBOTRYUM DC. Prodr. 5: 174. 1836. From described character and tracing of type, this can not with certainty be separated from *Ophryosporus ovatifolius* (DC.) Benth. & Hook. f.; Hemsl. Biol. Centr. Amer. Bot. 2: 79. 1881.

EUPATORIUM POPOCATEPETLENSE, a binomial cited by Hemsley (Biol. Centr. Amer. Bot. 2: 99) and by him wrongly accredited to Schlechtendal, was an herbarium name used by Schultz-Bipontinus and applied by him to plants which fall into the much earlier *E. lucidum* Ortega, Hort. Matr. Dec. 35. 1797. Many specimens have been distributed as *E. popocatepetlense* by Pringle and others which belong to the plant here called *E. ligustrinum villiferum* Robinson.

EUPATORIUM SCABRELLUM Robinson, Proc. Amer. Acad. 35: 339. 1900. Now referred to the genus *Ophryosporus*, where it becomes *O. scabrellus* Robinson, Contr. Gray Herb. n. ser. 75: 4. 1925.

EUPATORIUM TULANUM Klatt, Abh. Naturf. Ges. Halle 15: 323. 1882. This is *Vernonia liatroides* DC. Prodr. 5: 34. 1836.

17. *OPHRYOSPORUS* Meyen, Reis. Erd. 1: 402. 1834.

(Contributed by Dr. B. L. Robinson.)

REFERENCES: Baker in Mart. Fl. Bras. 6²: 186. 1876; Robinson, Proc. Amer. Acad. 42: 17-27. 1906.

Shrubs or herbs with opposite or (in the Mexican species) chiefly alternate, petiolate leaves and numerous small, 4 to 12-flowered, homogamous heads borne in panicles or corymbs; corollas white; anthers without membranaceous apical appendage though with the connective sometimes slightly thickened and expanded between the summits of the anther cells; style branches filiform but perceptibly knobbed at tip.

A chiefly South American genus of about 25 species.

Phyllaries lance-oblong, mostly acutish, about 2-seriate, scarcely imbricate.

Heads about 3 mm. long, 5 to 8-flowered.....1. *O. ovatifolius*.

Heads 4.5 to 5 mm. long, about 10-flowered.....2. *O. scabrellus*.

Phyllaries (except the outermost) elliptic, very obtuse to round-

ed at tip, about 3-seriate, much imbricate.....3. *O. petraeus*.

1. *Ophryosporus ovatifolius* (DC.) Benth. & Hook. f.; Hemsl. Biol. Centr. Amer. Bot. 2: 79. 1881.

Nothites ovatifolia DC. Prodr. 5: 187. 1836.

?*Eupatorium polybotryum* DC. Prodr. 5: 174. 1836.

Eupatorium microcephalum A. Gray, Proc. Amer. Acad. 21: 384. 1886.

Eupatorium microphyllum A. Gray; Dur. & Jacks. Ind. Kew. Suppl. 1: 166. 1902. Clerical error for *E. microcephalum*.

Typical material of this species, early collected by Haenke in Mexico but without indication of locality, has never been precisely matched except by specimens collected by Seemann, also without recorded locality. A plant collected by Brandegee near Culiacán, Sinaloa, though not quite identical, is probably conspecific.

Suffruticose, softly grayish-puberulent and beset with sessile, yellowish to orange-brown, resinous globules; stem slender, terete, flexuous; leaves prevailingly alternate, short-petioled, ovate, crenate-serrate, acuminate, pinnately nerved from above the base, firmly membranaceous, 5 to 10 cm. long, 3 to 6 cm. wide; petiole 7 to 12 mm. long; heads 3 to 3.5 mm. long, 5 to 8-flowered, subracemose at tips of branches of a leafy-bracted panicle.

2. *Ophryosporus scabrellus* Robinson, Contr. Gray Herb. n. ser. 75: 4. 1925.

Eupatorium scabrellum Robinson, Proc. Amer. Acad. 35: 339. 1900.

Chihuahua; known only from the original collection, secured near Batopilas by Goldman.

Suffruticose, grayish-puberulent and somewhat glandular-atomiferous; leaves alternate, ovate, acuminate, crenate-serrate, the lower as much as 16 cm. long and 13 cm. wide, subcordate at base and with petiole 5 cm. in length; heads 4.5 to 5 mm. long, about 10-flowered; phyllaries little imbricate, lance-oblong, distinctly narrowed to an acutish tip.

3. *Ophryosporus petraeus* Robinson, Contr. Gray Herb. n. ser. 75: 4. 1925.
Eupatorium petraeum Robinson, Proc. Amer. Acad. 41: 275. 1905.
 Michoacán and perhaps Guerrero.

Shrub 1.5 meters high; stem terete, single, erect, purple-spotted; leaves alternate, broadly ovate, acutish to acuminate, angled as well as irregularly crenate-dentate, almost palmately nerved from near the base, 9 to 11 cm. long, 8 to 9 cm. wide; panicle pyramidal; heads about 10-flowered; phyllaries (except the outermost) elliptic, very obtuse or rounded at apex, well imbricate in about 3 series.

18. **MIKANIA** Willd. Sp. Pl. 3: 1742. 1804.

REFERENCE: Robinson & Greenman, Synopsis of the Mexican and Central American species of the genus *Mikania*, Proc. Amer. Acad. 32: 10-13. 1896.

Shrubby or herbaceous, scandent; leaves opposite, usually ovate, petioled; heads paniced, 4-flowered; involucre of 4 equal phyllaries; achene 5-angled; pappus multisetose, uniseriate.

The names "guaco," "huaco," and "chichicaste" are reported as used in Mexico for plants of this genus whose specific identity is uncertain.

Heads racemosely or spicately arranged on the branches of ample pyramidal panicles.

Heads pedicellate; pappus sordid..... 1. *M. houstoniana*.

Heads sessile; pappus bright white..... 2. *M. pterocaula*.

Heads in pyramidal, roundish, or flattish cymose panicles.

Stem and branches densely hirsute or setose-pilose with tawny hairs.

3. *M. eriophora*.

Stem and branches not setose-pilose.

Involucre more or less densely puberulous; heads 8 to 10 mm. high.

Leaves ovate, entire, strongly 5 or 7-nerved, subcoriaceous.

4. *M. tonduzii*.

Leaves usually hastate-lobed or toothed, mostly 3-nerved, thin.

Heads pedicellate; phyllaries obtuse..... 5. *M. punctata*.

Heads usually sessile; phyllaries acute or acutish.... 6. *M. cordifolia*.

Involucre nearly or quite glabrous; heads about 7 mm. high.

7. *M. gonzalezii*.

1. *Mikania houstoniana* (L.) Robinson, Proc. Amer. Acad. 42: 47. 1906.

Eupatorium houstonianum L. Sp. Pl. 836. 1753.

Eupatorium houstonis L. Syst. Nat. ed. 10. 2: 1204. 1759.

Eupatorium fruticosum Mill. Gard. Dict. ed. 8. *Eupatorium* no. 6. 1768.

Mikania houstonis Willd. Sp. Pl. 3: 1742. 1804.

Willoughbya houstonis Kuntze, Rev. Gen. Pl. 1: 372. 1891.

Veracruz to Panama and southward; type from Veracruz.

Shrubby twiner, essentially glabrous, or the inflorescence puberulous; leaf blades ovate, 5 to 13 cm. long, acuminate, rounded at base, entire, firm; heads very numerous, about 5 mm. high; involucre 3 mm. long. "Palo guaco" (*Urbina*).

2. *Mikania pterocaula* Schultz Bip. (Hemsl. Biol. Centr. Amer. Bot. 2: 103. 1881, nomen nudum); Klatt, Leopoldina 20: 91. 1884.

Known only from the type locality, Mirador, Veracruz.

Glabrous twiner; branchlets 6-winged; leaves ovate, acuminate, dentate, thin; heads very small.

3. *Mikania eriophora* Schultz Bip. (Hemsl. Biol. Centr. Amer. Bot. 2: 103. 1881, nomen nudum); Robins. & Greenm. Proc. Amer. Acad. 32: 12. 1896.

Willoughbya eriophora Kuntze, Rev. Gen. Pl. 1: 372. 1891, nomen nudum.

Known only from the type locality, Mirador, Veracruz.

Shrubby (?) twiner, densely tawny-hirsute-tomentose, the inflorescence woolly; leaf blades ovate, 7.5 to 10 cm. long, 5 cm. wide, acuminate, cordate, tomentose beneath; heads in large pyramidal panicles.

- 3a. *Mikania eriophora chiapensis* Robinson, Proc. Amer. Acad. 35: 341. 1900.

Chiapas.

Plant setose-pilose with straight hairs, not woolly; leaves large, the blades up to 22 by 17 cm.

4. *Mikania tonduzii* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 256. 1904.

Veracruz. Costa Rica; type from Tucurrique.

Suffrutescent twiner, sordidly glandular-puberulous, glabrate; leaf blades ovate, 5.5 to 14 cm. long, 4 to 9 cm. wide, acuminate, lucid and impressed-veined above; heads densely glomerate on the branches of the rather short inflorescence; involucre sordidly tomentulous; achene much shorter than corolla.

5. *Mikania punctata* Klatt, Bull. Soc. Bot. Belg. 31¹: 195. 1892.

Chiapas. Costa Rica; type from El General.

Suffrutescent (?) twiner, pilose with many-celled hairs, glabrate; leaf blades suborbicular to broadly deltoid-ovate, 4 to 9 cm. long and wide, subentire or hastate-lobed above base with spreading lobes, dotted with dark glands beneath; heads 9 to 10 mm. high, in ample pyramidal panicles.

6. *Mikania cordifolia* (L. f.) Willd. Sp. Pl. 3: 1746. 1804.

Cacalia cordifolia L. f. Suppl. Pl. 351. 1781.

Mikania suaveolens H. B. K. Nov. Gen. & Sp. 4: 135. 1820.

Mikania gonoclada DC. Prodr. 5: 199. 1836.

Tepic and San Luis Potosí to Guerrero and Veracruz. Louisiana; Guatemala to South America; type from "America meridionali" (i. e., Colombia).

Suffrutescent twiner, the 6-angled stems sordid-puberulous; leaf blades ovate, thin, deeply cordate, usually hastate or dentate, more or less densely pubescent; heads subsessile or pedicellate; involucre densely puberulous, 6 to 7 mm. high, with acute or acutish phyllaries. "Toxichec cimarrón" (San Luis Potosí, Seler).

7. *Mikania gonzalezii* Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. 29: 107. 1899.

Veracruz; type from Colonia Melchor Ocampo.

Suffrutescent (?), smoothish; leaf blades ovate, thin, glabrous, 4 to 12 cm. long, 3 to 10 cm. wide; heads open-paniculate; phyllaries obtusish or barely acute, essentially glabrous except at tip.

19. CARPHOCHAETE A. Gray, Mem. Amer. Acad. n. ser. 4: 65. 1849.

Suffrutescent, with narrow sessile opposite entire punctate leaves; heads panicled or rarely solitary, pedunculate or rarely sessile, narrowly cylindric, 2 to 3 cm. long, few-flowered; involucre of few narrow unequal subherbaceous phyllaries; achenes linear, 8 to 10-ribbed; pappus of 4 to 14 linear-attenuate, narrowly scarious-margined awns.

The genus contains only the four following species.

- Leaves narrowly linear, 1 to 3 mm. wide, attenuate; pappus awns 4 or 5; phyllaries all attenuate.....1. *C. wislizeni*.
 Leaves linear-elliptic or narrowly elliptic to linear, obtuse; pappus awns 7 to 14; phyllaries obtuse and mucronate to acute, or the inner acuminate.
 Phyllaries mucronate from an obtuse or rounded apex, densely arachnoid-ciliate at tip.....2. *C. grahami*.
 Phyllaries acute to acuminate, not densely arachnoid-ciliate at tip.
 Phyllaries glandular-punctate but not stipitate-glandular; leaves linear-elliptic to elliptic-spatulate.....3. *C. bigelovii*.
 Phyllaries densely stipitate-glandular; leaves linear.....4. *C. schaffneri*.

1. *Carphochaete wislizeni* A. Gray, Mem. Amer. Acad. n. ser. 4: 65. 1849.

Chihuahua to Durango; type from Cosihuiriachi, Chihuahua.

Suffrutescent, much branched at base, 20 to 35 cm. high, resiniferous-glandular; leaves linear, 3 to 6 cm. long, 1 to 3 mm. wide; heads flattish-panicled or rarely solitary, 2 to 2.5 cm. high, purple; achenes about 7 mm. long, exceeded by the pappus.

2. *Carphochaete grahami* A. Gray, Pl. Wright. 1: 89. 1852.

Jalisco to Mexico; type from Mexico, without definite locality.

Suffrutescent, many-stemmed, branched above, about 40 cm. high; leaves elliptic to elliptic-spatulate, about 2.5 cm. long, 3 to 5 mm. wide, the upper alternate and smaller; panicle open; involucre strongly graduated, the outer phyllaries obtuse or rounded, mucronate, the inner acute.

3. *Carphochaete bigelovii* A. Gray, Pl. Wright. 1: 89. 1852.

Chihuahua. New Mexico and Arizona; type from the boundary between New Mexico and Mexico.

Suffrutescent, branching, 30 to 50 cm. high; leaves linear-elliptic to spatulate-elliptic, 1.5 to 3 cm. long, 2 to 5 mm. wide, with fascicles of smaller ones in the axils; heads chiefly sessile, 2.5 to 3 cm. high, the flowers purplish-tinged; phyllaries narrowly oblong-lanceolate, acute to acuminate, densely glandular-punctate and sparsely puberulous.

4. *Carphochaete schaffneri* Greenm. Proc. Amer. Acad. 40: 34. 1904.

San Luis Potosí; type from Valley of San Luis Potosí.

Suffrutescent, slender, branched, 20 to 35 cm. high; leaves linear, 2 to 5 cm. long, 2 to 3 mm. wide; heads pedunculate, the flowers purplish; phyllaries as in the last, but densely stipitate-glandular.

20. *COLEOSANTHUS* Cass. Bull. Soc. Philom. Paris 1817: 67. 1817.

REFERENCE; Robinson, A monograph of the genus *Brickellia*, Mem. Gray Herb. 1: 1-151. 1917.

Herbs or shrubs; leaves opposite or alternate; heads usually panicled, small to large, white to purple, rarely ochroleucous; involucre cylindric or campanulate, the phyllaries usually multiseriate, dry, striate, the outermost rarely herbaceous; achenes prismatic, 10-ribbed (very rarely 5 to 8 or 20-ribbed); pappus of numerous smooth or barbellate, rarely subplumose setae.

The name "hierba del carbonero" is reported for some undetermined species of the genus.

Pedicels gemmiparous; heads 4 to 20-flowered.

Leaves linear or narrowly lanceolate; heads 4 to 12-flowered.

Leaves entire; heads 6 to 12-flowered.....1. *C. squamulosus*.

Leaves spinulose-serrate; heads 4 or 5-flowered.....2. *C. spinulosus*.

Leaves ovate; heads about 20-flowered.....3. *C. vernicosus*.

Pedicels not gemmiparous; heads 8 to 100-flowered.

Heads large, 28 to 62-flowered.

Pedicels stipitate-glandular.

Leaves sessile or subsessile; outer phyllaries sometimes dentate.

42. *C. argutus*.

Leaves petiolate; phyllaries not dentate.

Petioles 3 to 4 mm. long.

Phyllaries all acute or acutish.....43. *C. brandegei*.

Middle and inner phyllaries very obtuse.....44. *C. macromerus*.

Petioles usually 1 to 2.5 cm. long.

Leaves griseous-tomentose beneath, crenate ...45. *C. peninsularis*.

Leaves merely puberulous and green beneath, entire or repand.

46. *C. rhomboideus*

- Pedicels without stipitate glands.....47. *C. lanatus*.
 Heads small or medium, 8 to 26-flowered (rarely to 62-flowered in forms of
C. veronicaefolius).
 Leaves sessile or very short-petioled.
 Leaves spatulate, 3 to 12 mm. long.....4. *C. frutescens*.
 Leaves not spatulate, usually larger.
 Leaves 1 to 2 cm. long, suborbicular-ovate; outer phyllaries more or
 less squarrose-tipped.....5. *C. microphyllus*.
 Leaves larger, not suborbicular.
 Leaves lanceolate to oblong or elliptic, not cuspidate, not cordate
 at base.
 Heads about 10-flowered.
 Phyllaries numerous (about 40); achenes about 5 mm. long.
 6. *C. cylindraceus*.
 Phyllaries few (about 15); achenes about 3 mm. long.
 7. *C. lemmoni*.
 Heads 14 to 24-flowered.
 Heads (at least in part) slender-pedicelled.
 Leaves crenate or crenate-serrate.
 Outer phyllaries suborbicular, rounded or retuse and
 abruptly mucronate.....8. *C. venosus*.
 Outer phyllaries ovate or ovate-oblong, usually acute or
 acuminate.....9. *C. oliganthes*.
 Leaves entire.....10. *C. reticulatus*.
 Heads sessile or subsessile.
 Phyllaries thin, colored, with very acuminate tips.
 11. *C. verbenaceus*.
 Phyllaries thick, usually stramineous, with obtuse tips.
 12. *C. pringlei*.
 Leaves ovate or oval-ovate, cordate at base, strongly cuspidate.
 13. *C. cuspidatus*.
 Leaves distinctly petioled, the petiole at least one-fifth as long as the
 blade.
 Leaves more or less hastately toothed or lobed.
 Leaves lance-oblong or lanceolate, rounded at apex...14. *C. hastatus*.
 Leaves deltoid-ovate, acuminate, or rarely obtuse but then not lance-
 oblong.
 Outer phyllaries ovate-lanceolate, acute or acuminate.
 Leaves 1.5 to 2.5 (rarely 6.5) cm. long, thickish; petioles 8 to 15 mm.
 long.....15. *C. coulteri*.
 Leaves 4.5 to 7 cm. long, thin; petioles 1.2 to 4 cm. long.
 16. *C. megalodontus*.
 Outer phyllaries ovate-oblong or suborbicular, obtuse or rounded.
 Phyllaries scarious-margined, mucronulate.
 Grayish-pubescent; leaves membranaceous, acutely acuminate.
 17. *C. brachiatus*.
 Glabrous; leaves thick, often obtuse.....18. *C. glabratus*.
 Phyllaries scarcely scarious-margined, not mucronulate.
 19. *C. cymuliferus*.
 Leaves not at all hastate.
 Leaves broadly ovate to suborbicular or reniform, mostly 0.5 to 2
 (rarely 6) cm. long; heads smaller, often glomerate.
 Involucre 5 to 9 mm. high.
 Outer phyllaries shortly caudate; leaves very small, flabellate-
 rhomboid.....20. *C. glutinosus*.

Outer phyllaries not caudate; leaves otherwise.

Leaves mostly rhombic-ovate, coarsely toothed.

21. *C. laciniatus*.

Leaves ovate to suborbicular, crenate-serrate.

Heads 8 to 18-flowered, 3 to 5 mm. thick; leaves ovate, on petioles usually about 1 cm. long. 22. *C. californicus*.

Heads 18 to 62-flowered, 6 to 11 mm. thick; leaves suborbicular or reniform, short-petioled. 23. *C. veronicaefolius*.

Involute 12 to 14 mm. high. 24. *C. palmeri*.

Leaves narrower, ovate to oblong or elliptic, 2 to 15 cm. long.

Phyllaries slightly graduate, the outermost subherbaceous or foliaceous, from half as long as the inner to longer.

Leaves softly tomentose beneath. 40. *C. pacayensis*.

Leaves puberulous to nearly glabrous beneath.

41. *C. floribundus*.

Phyllaries strongly graduate, the outermost very short.

Achenes 3 to 3.7 mm. long.

Leaves elliptic-ovate to rhombic-ovate.

Heads subsessile, glomerate. 25. *C. glomeratus*.

Heads mostly pedicellate.

Inflorescence dichotomous; phyllaries obtuse.

26. *C. hebecarpus*.

Inflorescence paniculate, elongate; phyllaries acute.

27. *C. nelsonii*.

Leaves suborbicular-ovate to deltoid-ovate.

Leaves suborbicular-ovate; outer phyllaries with subsquarrose tips. 28. *C. paniculatus*.

Leaves deltoid-ovate; outer phyllaries not subsquarrose-tipped.

Inner phyllaries acute. 29. *C. secundiflorus*.

Inner phyllaries obtuse. 30. *C. parryi*.

Achenes 4 to 5.5 mm. long.

Middle and usually also the inner phyllaries obtuse, sometimes mucronate.

Leaves coriaceous or thickish.

Leaves deltoid-ovate.

Outermost phyllaries ovate-lanceolate, acutish.

30. *C. parryi*.

Outermost phyllaries broadly oval, rounded.

31. *C. tomentellus*.

Leaves lanceolate. 32. *C. lancifolius*.

Leaves thin, membranaceous. 33. *C. orizabaensis*.

Middle and inner phyllaries acute or acuminate.

Leaves oblong-ovate to ovate-lanceolate. Pedicels densely glandular. 34. *C. pendulus*.

Leaves ovate to suborbicular-ovate.

Leaves ovate, chartaceous.

Heads secund-racemose. 35. *C. seemannii*.

Heads thyrsoid. 36. *C. saltillensis*.

Leaves deltoid-ovate to suborbicular-ovate, never chartaceous.

Inflorescence loose, the cymes strongly nodding.

37. *C. squarrosus*.

Inflorescence rather dense, the cymes erect or slightly nodding.

Leaves membranaceous. 38. *C. botterii*.

Leaves subcoriaceous or firm. 39. *C. adenocarpus*.

1. **Coleosanthus squamulosus** (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia squamulosa A. Gray, Proc. Amer. Acad. 15: 30. 1879.

Chihuahua to Guanajuato; type from City of San Luis Potosí. New Mexico and Arizona.

Shrub 50 cm. high; stem leaves sessile, parallel-veined, 3 to 7 cm. long, 1 to 1.5 mm. wide, mostly absent in flowering specimens; panicle dense, narrow, elongate; many of the pedicels bearing small cypress-like bulblets; heads about 12 mm. high.

2. **Coleosanthus spinulosus** (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Clavigera spinulosa A. Gray, Mem. Amer. Acad. n. ser. 4: 63. 1849.

Brickellia spinulosa A. Gray, Pl. Wright. 1: 84. 1852.

Chihuahua to Zacatecas and San Luis Potosí; type collected near Chihuahua City.

Similar to *C. squamulosus*; leaves linear to linear-lanceolate, spinulose-serrate, petiolate, glabrous, 1 to 1.7 cm. long, 1 to 3 mm. wide.

- 2a. **Coleosanthus spinulosus asperatus** (Robinson) Blake.

Brickellia squamulosa asperata Robinson, Mem. Gray Herb. 1: 35. 1917.

Known only from vicinity of City of Chihuahua.

Leaves papillose-asperate.

3. **Coleosanthus vernicosus** (Robinson) Blake.

Brickellia vernicosa Robinson, Proc. Amer. Acad. 36: 487. 1901.

Durango; type from Santiago Papasquiaro.

Shrub 50 cm. high, resinous-puberulous; leaves short-petioled, the blades ovate or oval-ovate to (on the branches) narrowly lanceolate, 1 to 1.7 cm. long, 4 to 12 mm. wide, serrate, short-petioled; heads racemed on the branches, 13 to 16 mm. high. (Description compiled.) "Barba de chivo."

4. **Coleosanthus frutescens** (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia frutescens A. Gray, Proc. Amer. Acad. 17: 207. 1882.

Baja California; type from Tantillas Canyon. Nevada and California.

Low much-branched shrub, griseous-tomentellous; leaves alternate, the blades spatulate, 3 to 12 mm. long, 1.5 to 4 mm. wide, 1-nerved, entire or sparsely denticulate; heads pedunculate, loosely paniced, 14 mm. high, about 26-flowered.

5. **Coleosanthus microphyllus** (Nutt.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Bulbostylis microphylla Nutt. Trans. Amer. Phil. Soc. II. 7: 286. 1840.

Brickellia microphylla A. Gray, Pl. Wright. 1: 85. 1852.

Brickellia cedrosensis Greene, Bull. Torrey Club 10: 86. 1883.

Coleosanthus cedrosensis Greene, Erythea 1: 54. 1893.

Brickellia grayana Hieron. Bot. Jahrb. Engler 28: 583. 1901.

Cedros Island, Baja California. Oregon to California; type from Blue Mountains, Oregon.

Shrubby, viscid-pubescent, about 50 cm. high; leaves alternate, the blades thick, toothed, those of the branchlets reduced; heads mostly terminating short branchlets, 10 to 12 mm. high, about 22-flowered; at least the outer phyllaries with short herbaceous spreading tips.

6. **Coleosanthus cylindraceus** (Gray & Engelm.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia cylindracea Gray & Engelm. Proc. Amer. Acad. 1: 46. 1847.

Coahuila. Texas; type from Guadalupe River, near New Braunfels.

Shrubby at base, 0.2 to 1.2 meters high, griseous-puberulous; leaves chiefly opposite, the blades 2 to 6 cm. long, 1.2 to 3 cm. wide, crenate-serrate; heads racemose or thyrsoid-paniced, slender-pedicel, about 12 mm. high, about 10-flowered.

7. *Coleosanthus lemmoni* (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia lemmoni A. Gray, Proc. Amer. Acad. 17: 206. 1882.
 Chihuahua. Southern Arizona; type from Chiricahua Mountains.
 Suffrutescent below, about 50 cm. high, griseous-puberulous; leaf blades elliptic to lance-oblong, 2 to 4.5 cm. long, 1 to 1.4 cm. wide, crenate-serrate, griseous-puberulous; heads racemose or spicate, at length conical-paniculate, slender-pediceled, 11 to 14 mm. high, about 10-flowered.
- 7a. *Coleosanthus lemmoni wootoni* (Greene) Blake.
Coleosanthus wootoni Greene, Bull. Torrey Club 24: 511. 1897.
Coleosanthus densus Greene, Pittonia 4: 126. 1900.
Brickellia lemmoni wootoni Robinson, Mem. Gray Herb. 1: 50. 1917.
 Chihuahua. New Mexico; type from Organ Mountains.
 Heads mostly subsessile, thyrsoïd-panicled.
8. *Coleosanthus venosus* Woot. & Standl. Contr. U. S. Nat. Herb. 16: 177. 1913.
Brickellia venosa Robinson, Mem. Gray Herb. 1: 50. 1917.
 Sonora and Chihuahua. New Mexico and Arizona; type from Mangas Springs, New Mexico.
 Frutescent at base, griseous-puberulous, about 70 cm. high; leaf blades narrowly elliptic or linear-elliptic, 2.5 to 5.5 cm. long, 2 to 9 mm. wide, crenate or subentire, obtuse; heads 1 cm. high, about 24-flowered, on slender pedicels mostly twice as long, forming a narrow loose panicle.
9. *Coleosanthus oliganthes* (Less.) Kuntze, Rev. Gen. Pl. 1: 328. 1891, as *C. oliganthus*.
Eupatorium oliganthes Less. Linnaea 5: 137. 1830.
Bulbostylis oliganthes DC. Prodr. 5: 139. 1836.
Brickellia oliganthes A. Gray, Pl. Wright. 1: 84. 1852.
Coleosanthus polyanthemus Greene, Pittonia 4: 126. 1900.
 Nuevo León to Veracruz; type from Hacienda de La Laguna, Veracruz.
 Herbaceous or suffrutescent, about 60 cm. high, griseous-puberulous; leaf blades oblong to oval, 2.5 to 5.5 cm. long, 1 to 2 cm. wide, crenate-serrulate, coriaceous; heads about 12 mm. high, slender-pediceled or subsessile, in a narrow, often spiciform panicle.
10. *Coleosanthus reticulatus* (DC.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Bulbostylis reticulata DC. Prodr. 7: 268. 1838.
Brickellia reticulata A. Gray, Pl. Wright 1: 84. 1852.
 Mexico; exact locality not known.
 Suffrutescent, griseous-puberulous; leaves oblong, entire, coriaceous; heads pedicellate, about 20-flowered. (Description compiled.)
11. *Coleosanthus verbenaceus* Greene, Pittonia 4: 125. 1900.
Brickellia verbenacea Robinson, Mem. Gray Herb. 1: 53. 1917.
 San Luis Potosí to Morelos and Jalisco; type from San Luis Potosí.
 Suffrutescent or herbaceous, up to 1.2 meters high, scabriusculous; leaf blades oblong-elliptic to ovate-oblong, 3 to 6 cm. long, 1 to 2.8 cm. wide, serrate, very strongly reticulate beneath, coriaceous; heads chiefly sessile in a spikelike panicle, about 14-flowered; phyllaries firm but thin.
12. *Coleosanthus pringlei* (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia pringlei A. Gray, Proc. Amer. Acad. 17: 206. 1882.
 Sonora and Tepic. Southern Arizona; type from Santa Catalina Mountains.
 Suffrutescent or herbaceous, scabrous-puberulous; leaf blades oblong or lance-oblong, 2 to 6 cm. long, 1 to 2 cm. wide, serrate, coriaceous, griseous-tomentellous or scabriusculous beneath; heads sessile or nearly so in the upper axils, sometimes glomerate, 16 to 18 mm. high, 19 to 24-flowered.

13. **Coleosanthus cuspidatus** (A. Gray) Greene, *Erythea* 1: 54. 1893.

Brickellia cuspidata A. Gray in S. Wats. Proc. Amer. Acad. 22: 421. 1887.

Jalisco; type from Río Blanco.

Fruticose or suffrutescent, 40 to 70 cm. high, puberulous; leaf blades broadly ovate, 1 to 3 cm. long, 7 to 20 mm. wide, serrate, coriaceous, nearly glabrous; heads loosely paniced, 12 mm. high, about 11-flowered.

14. **Coleosanthus hastatus** (Benth.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia hastata Benth. Bot. Voy. Sulph. 21. 1844.

Baja California; type from Magdalena Bay.

Fruticose, minutely puberulous; leaf blades 3.5 to 10 cm. long, 1 to 6 cm. wide, hastate-lobed at base, obtuse, thinnish, obscurely puberulous beneath; heads in small terminal panicles, about 11 mm. high, 12 or 13-flowered; phyllaries obtuse or obtusish.

15. **Coleosanthus coulteri** (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia coulteri A. Gray, Pl. Wright. 1: 86. 1852.

Sonora to Puebla, Colima, and Baja California. Arizona; type from Arizona (probably).

Frutescent, up to 90 cm. high, the younger parts puberulous and often glandular; leaf blades triangular or rhombic-ovate, 1.5 to 2.5 (rarely 6.5) cm. long, 1 to 2 (rarely 5) cm. wide, thickish, more or less puberulous; heads slender-pedicel, loosely paniced, 9 to 12 mm. high, about 17-flowered; phyllaries mostly acute to acuminate.

16. **Coleosanthus megalodontus** (Greenm.) Arthur, *Torreya* 21: 12. 1921.

Brickellia megalodonta Greenm. Proc. Amer. Acad. 40: 34. 1904.

Jalisco and Puebla; type from Guadalajara, Jalisco.

Herbaceous or (?) suffrutescent, pilosulous or pubescent; leaf blades triangular-ovate, 4.5 to 7 cm. long, 3 to 5 cm. wide, thin, coarsely hastate-toothed; heads as in *C. coulteri*.

17. **Coleosanthus brachiatus** (A. Gray) Blake.

Brickellia brachiata A. Gray, Proc. Amer. Acad. 21: 385. 1886.

Chihuahua; type from southwestern Chihuahua.

Herbaceous or suffrutescent, griseous-puberulous; leaf blades triangular-ovate, 3 to 4.5 cm. long; petioles 1 to 1.3 cm. long; heads loosely paniced, 12 to 15 mm. high, about 16-flowered.

- 17a. **Coleosanthus brachiatus adenopodus** (Robinson) Blake.

Brickellia brachiata adenopoda Robinson, Mem. Gray Herb. 1: 63. 1917.

Sinaloa; type from San Blas.

Plant puberulous with gland-tipped hairs.

18. **Coleosanthus glabratus** (Rose) Blake.

Brickellia brachiata glabrata Rose, Contr. U. S. Nat. Herb. 1: 132. 1892.

Brickellia glabrata Robinson, Mem. Gray Herb. 1: 63. 1917.

Baja California; type from Carmen Island.

Shrubby, glabrous; leaf blades triangular-ovate, 0.8 to 2.5 cm. long, 0.3 to 2.2 cm. wide, acutish to obtuse; petioles 3 to 7 mm. long.

19. **Coleosanthus cymuliferus** (Robinson) Blake.

Brickellia cymulifera Robinson, Proc. Amer. Acad. 51: 538. 1916.

Known only from the type locality, Minas de San Rafael, San Luis Potosí.

Subherbaceous, 30 to 40 cm. high, crisply puberulous; leaf blades hastate-deltoid, 3 to 5.4 cm. long, 2.5 to 3.8 cm. wide, caudate-acuminate, coarsely toothed, puberulous; petioles 1 to 4 cm. long; heads in slender, loosely 3 to 5-headed, axillary cymes, about 12-flowered. (Description compiled.)

20. *Coleosanthus glutinosus* (A. Gray) Blake.*Brickellia glutinosa* A. Gray, Proc. Amer. Acad. **21**: 385. 1886.

Known only from the type locality, near Jimulco, Coahuila.

Fruticose, glutinous-scabridulous, about 25 cm. high; leaf blades 5 to 8 mm. long and wide, dentate-lobate, punctate, coriaceous; heads about 26-flowered, terminating branchlets; phyllaries thick, stramineous, acute, the outer with short caudate tips.

21. *Coleosanthus laciniatus* (A. Gray) Kuntze, Rev. Gen. Pl. **1: 328. 1891.***Brickellia laciniata* A. Gray, Pl. Wright. **1**: 87. 1852.

Chihuahua to Nuevo León and Zacatecas. Texas and New Mexico; type collected 40 miles east of El Paso, Texas.

White-barked, hispidulous-puberulous, up to 1.2 meters high; leaves alternate, the blades broadly ovate to rhombic-ovate, 6 to 15 mm. long and wide, coarsely and bluntly toothed, coriaceous; heads 9 to 12 mm. high, about 9-flowered, in long narrow leafy inflorescences; phyllaries thinnish, obtuse, scarious-margined.

22. *Coleosanthus californicus* (Torr. & Gray) Kuntze, Rev. Gen. Pl. **1: 328. 1891.***Bulbostylis californica* Torr. & Gray, Fl. N. Amer. **2**: 79. 1841.*Brickellia californica* A. Gray, Mem. Amer. Acad. n. ser. **4**: 64. 1849.*Brickellia wrightii* A. Gray, Pl. Wright. **2**: 72. 1853.*Coleosanthus melissaefolius* Greene, Leaflets **1**: 150. 1905.

Chihuahua, Sonora, and northern Baja California. Colorado to California and Texas; type from California.

Fruticose, up to 1 meter high, griseous-puberulous; leaves alternate, the blades deltoid-ovate, 1 to 5 cm. long and broad, subtruncate or cordate at base, thickish; petioles 4 to 20 mm. long; heads racemosely or spicately arranged.

22a. *Coleosanthus californicus tener* (A. Gray) Blake.*Brickellia tenera* A. Gray, Pl. Wright. **2**: 72. 1853.*Brickellia wrightii tenera* A. Gray, Syn. Fl. **1**²: 106. 1884.*Coleosanthus tener* Kuntze, Rev. Gen. Pl. **1**: 328. 1891.*Coleosanthus axillaris* Greene, Leaflets **1**: 149. 1905.*Brickellia californica tenera* Robinson, Mem. Gray Herb. **1**: 70. 1917.

Sonora; type from Santa Cruz. Utah to Arizona and New Mexico.

Similar; leaves mostly 3.5 to 4.5 cm. long, ovate, thin, abruptly narrowed or rounded at base; heads usually glomerate in the axils.

22b. *Coleosanthus californicus lobulatus* (Robinson) Blake.*Brickellia californica lobulata* Robinson, Mem. Gray Herb. **1**: 71. f. 48, δ . 1917.

Known only from the type locality, near Parras, Coahuila.

Leaves thin, about 4 cm. long and wide, deltoid-ovate, broadly cordate, coarsely crenate-lobulate.

23. *Coleosanthus veronicaefolius* (H. B. K.) Kuntze, Rev. Gen. Pl. **1: 328. 1891, as *C. veronicifolius*.***Eupatorium veronicaefolium* H. B. K. Nov. Gen. & Sp. **4**: 112. pl. 341. 1820.*Bulbostylis veronicaefolia* DC. Prodr. **5**: 139. 1836.*Brickellia galeottii* A. Gray, Pl. Wright. **1**: 85. 1852.*Coleosanthus galeottii* Kuntze, Rev. Gen. Pl. **1**: 328. 1891.

Coahuila to Oaxaca; type from State of Mexico, near Guadalupe.

Shrubby, about 80 cm. high, griseous-puberulous or hispidulous; leaves opposite, the blades 4 to 16 mm. long, 7 to 25 mm. wide, crenate, thick, griseous-puberulous; petioles 3 to 6 mm. long; heads 12 to 17 mm. high, 18 to 25-flowered, paniced or subspicate; outer phyllaries tomentose at tip, obtuse. "Gobernadora," "gobernadora de Puebla" (Hidalgo); "mejorana" (Zacatecas); "peistón," (*Urbina*); "pexto," "pextón" (*Ramírez*); "pestón," "orégano del cerro" (Durango); "orégano del monte," "orégano del campo."

A decoction of the plant is employed locally as a remedy for dyspepsia and other affections of the stomach, as a stimulant, and also in the form of fomentations as a remedy for rheumatism.

23a. *Coleosanthus veronicaefolius senilis* (Robinson) Blake.

Brickellia veronicaefolia senilis Robinson, Mem. Gray Herb. 1: 72. 1917.

Puebla; type from hills above Chalchicomula.

Leaves densely griseous-tomentulose.

23b. *Coleosanthus veronicaefolius petrophilus* (Robinson) Blake.

Brickellia petrophila Robinson, Proc. Amer. Acad. 36: 486. 1901.

Brickellia veronicaefolia petrophila Robinson, Mem. Gray Herb. 1: 72. 1917.

Sonora to Puebla and Guanajuato; type from City of Chihuahua.

Similar to *C. veronicaefolius*; pubescence of longer looser septate hairs, mixed with glands; heads 25 to 35-flowered.

23c. *Coleosanthus veronicaefolius umbratilis* (Robinson) Blake.

Brickellia petrophila umbratilis Robinson, Proc. Amer. Acad. 36: 487. 1901.

Brickellia veronicaefolia umbratilis Robinson, Mem. Gray Herb. 1: 73. 1917.

Coahuila and Durango; type from Parras, Coahuila.

Similar to the last; heads larger, usually 40 to 60-flowered; inflorescence loose, the heads pedicellate.

24. *Coleosanthus palmeri* (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia palmeri A. Gray, Proc. Amer. Acad. 15: 30. 1879.

San Luis Potosí.

Suffruticose, 50 cm. high, densely glandular-puberulous, scabridulous; leaves alternate, the blades ovate, 1.8 to 3.3 cm. long, 1.2 to 3 cm. wide, coriaceous, serrate, reticulate; petioles 3 to 6 mm. long; heads about 19-flowered, slender-pedicel, loosely racemose-paniculate; phyllaries acuminate, stipitate-glandular.

24a. *Coleosanthus palmeri amphothrix* (Robinson) Blake.

Brickellia palmeri amphothrix Robinson, Mem. Gray Herb. 1: 74. f. 51, β . 1917.

Coahuila or Nuevo León to Zacatecas and Aguascalientes; type from Zacatecas.

Leaves often triangular-ovate, larger; stem and under leaf surface tomentulose or hispidulous as well as glandular.

25. *Coleosanthus glomeratus* (Fernald) Blake.

Brickellia glomerata Fernald, Proc. Amer. Acad. 36: 504. 1901.

Guerrero and Morelos to Oaxaca; type from Acapulco, Guerrero.

Frutescent, 1 meter high, scabrous-hispidulous; leaf blades oblong-ovate to ovate, 2 to 6.5 cm. long, 1.5 to 4 cm. wide, thick, finely reticulate-venose, crenate-serrate, griseous-puberulous and glandular; heads 12 mm. high, about 11-flowered; phyllaries arachnoid-ciliate, strongly graduated.

26. *Coleosanthus hebecarpus* (DC.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Bulbostylis hebecarpa DC. Prodr. 5: 138. 1836.

Brickellia hebecarpa A. Gray, Pl. Wright. 1: 85. 1852.

Brickellia colimae Rose, Contr. U. S. Nat. Herb. 1: 333. 1895.

Tepic to Jalisco and Morelos.

Suffruticose, puberulous; leaf blades ovate, 2 to 3 cm. long, 1 to 2 cm. wide, coriaceous, crenate-serrate, reticulate, griseous-tomentellous; heads pedicellate, loosely and dichotomously arranged, the pedicels glandular-puberulous.

27. *Coleosanthus nelsonii* (Robinson) Blake.

Brickellia nelsonii Robinson, Mem. Gray Herb. 1: 79. f. 56. 1917.

Nuevo León and Tamaulipas; type from Jaumave, Tamaulipas.

Herbaceous or suffrutescent below, about 1 meter high, loosely griseous-pubescent; leaf blades ovate or rhombic-ovate, 3 to 6 cm. long, 1.5 to 4 cm. wide, crenate, rather thin, griseous-pilosulous and gland-dotted; heads mostly pedicellate, in a leafy panicle, about 11-flowered.

- 28. *Coleosanthus paniculatus*** (Mill.) Standl. in Standl. & Calderón, *Lista Pl. Salv.* 219. 1925.
Eupatorium paniculatum Mill. Gard. Dict. ed. 8. *Eupatorium* no. 15. 1768.
Eupatorium rigidum Benth. Pl. Hartw. 88. 1841. Not *E. rigidum* Swartz, 1788.
Brickellia hartwegi A. Gray, Pl. Wright. 1: 85. 1852.
Coleosanthus rigidus Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia paniculata Robinson, Proc. Amer. Acad. 42: 48. 1906.
Tepic and Jalisco to Veracruz, south to Costa Rica; type from Veracruz.
Frutescent, 2 meters high, griseous-tomentulose; leaf blades 2.8 to 7.5 cm. long and broad, thick, crenate-serrate, densely canescent-tomentulose beneath; heads 10 to 12 mm. high, pedicellate, in a broad panicle, about 18-flowered; pedicels stipitate-glandular.
- 29. *Coleosanthus secundiflorus*** (Lag.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Eupatorium secundiflorum Lag. Gen. & Sp. Nov. 25. 1816.
Bulbostylis secundiflora DC. Prodr. 5: 138. 1836.
Bulbostylis scorodoniaefolia Kunth, "Ind. Sem. Hort. Berol. 1846: 12. 1847;" Ann. Sci. Nat. III. Bot. 7: 187. 1847.
Brickellia secundiflora A. Gray, Pl. Wright. 1: 85. 1852.
Tamaulipas to Oaxaca.
Fruticose, densely stipitate-glandular, griseous-tomentellous; leaf blades 3 to 7 cm. long, 2 to 5 cm. wide, acute, reticulate, griseous-tomentellous beneath; heads 11 to 16 mm. high, about 20-flowered, in a leafy thyrsoïd panicle; phyllaries all acute or acuminate, usually stipitate-glandular.
- 29a. *Coleosanthus secundiflorus nepetaefolius*** (H. B. K.) Blake.
Eupatorium nepetaefolium H. B. K. Nov. Gen. & Sp. 4: 112. 1820.
Bulbostylis ? nepetaefolia DC. Prodr. 5: 139. 1836.
Brickellia secundiflora nepetaefolia Robinson, Mem. Gray Herb. 1: 82. 1917.
Jalisco to Zacatecas and Guanajuato; type from Santa Rosa Mountains, Guanajuato.
Similar, but the pubescence denser, the glands lacking or obscure.
- *30. *Coleosanthus parryi*** (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia parryi A. Gray, Proc. Amer. Acad. 15: 31. 1879.
San Luis Potosí and Zacatecas; type from east of City of San Luis Potosí.
Suffrutescent or fruticose, similar to *C. secundiflorus nepetaefolius*; heads smaller, 10 to 14 mm. high, 20 to 25-flowered; phyllaries obtuse.
- 30a. *Coleosanthus parryi micaceus*** (Robinson) Blake.
Brickellia parryi micacea Robinson, Mem. Gray Herb. 1: 83. 1917.
Known only from the type locality, near Álvarez, San Luis Potosí.
Leaves beneath merely puberulous on the veins, densely dotted with shining glands.
- 31. *Coleosanthus tomentellus*** (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.
Brickellia tomentella A. Gray, Pl. Wright. 1: 85. 1852.
Puebla and State of Mexico to Oaxaca; type from Mexico, without definite locality.
Suffrutescent (?), 1.5 to 2.5 meters high, softly gray-tomentellous or tomentose; leaf blades 4 to 7 cm. long, 3 to 5 cm. wide, crenate, grayish green above, densely griseous-tomentose beneath; heads 21 to 32-flowered; outer phyllaries tomentose.
- 32. *Coleosanthus lancifolius*** (Robins. & Greenm.) Blake.
Brickellia lancifolia Robins. & Greenm. Amer. Journ. Sci. III. 50: 153. 1895.
Known only from the type locality, Sierra de San Felipe, Oaxaca.
Fruticose, 1.5 to 2.5 meters high, sordid-tomentellous; leaf blades 4.5 to 7 cm. long, 1.4 to 2.5 cm. wide, acuminate, subentire, tomentulose beneath; heads thyrsoïd-panicked, mostly nodding, 17 to 20 mm. high, 10 to 12-flowered; phyllaries purplish, glabrous except for the tips of the outermost.

33. *Coleosanthus orizabaensis* (Klatt) Blake.*Brickellia orizabaensis* Klatt, Ann. Naturh. Hofmus. Wien 9: 358. 1894.

Veracruz, Guerrero, and Oaxaca; type from Orizaba, Veracruz.

Herbaceous, or lignescent at base, 1.5 to 2.5 meters high, sordid-puberulous; leaf blades ovate, 4 to 7 cm. long, 2.5 to 5.3 cm. wide, crenate-serrate, puberulous chiefly on the veins beneath; heads paniced, nodding, 13 mm. high, about 14-flowered; phyllaries thin, greenish, obtuse, ciliate and sparsely villous.

34. *Coleosanthus pendulus* (Schrad.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.*Eupatorium pendulum* Schrad. "Ind. Sem. Hort. Goett. 1830"; Linnaea 6: Litt. Ber. 72. 1831.*Bulbostylis pendula* DC. Prodr. 5: 138. 1836.*Brickellia pendula* A. Gray, Pl. Wright. 1: 85. 1852.

Morelos and Mexico to Oaxaca; type from Mexico, without definite locality.

Fruticose, 2 to 3 meters high, griseous-tomentellous and glandular or scabrid; leaf blades 2.5 to 8 cm. long, thin, crenate-serrate to subentire, reticulate, thinly pilosulous to tomentulose beneath; heads 1.4 to 2 cm. high, about 12-flowered, thyrsoïd-paniculate, more or less secund, pedicellate; phyllaries stipitate-glandular, appressed or the outermost with slightly loose tips.

34a. *Coleosanthus pendulus squarrosus* (Robins. & Seat.) Blake.*Brickellia squarrosa* Robins. & Seat. Proc. Amer. Acad. 28: 108. 1893.*Brickellia pendula squarrosa* Robinson, Mem. Gray Herb. 1: 87. 1917.

Known only from the type locality, near Pátzcuaro, Michoacán.

Similar; middle and outer phyllaries with subherbaceous squarrose tips.

35. *Coleosanthus seemannii* (A. Gray) Blake.*Brickellia seemannii* A. Gray, Proc. Amer. Acad. 15: 30. 1879.

Known only from the type locality, Sierra Madre of northwestern Mexico.

Herbaceous or perhaps lignescent at base, scabrid-puberulous; leaf blades 3 to 4.5 cm. long, crenate-serrate, reticulate beneath; heads in a short secund raceme, nodding, 18 mm. high, about 15-flowered; phyllaries stramineous, very acute, aristate-mucronate. (Description compiled.)

36. *Coleosanthus saltillensis* (Robinson) Blake.*Brickellia saltillensis* Robinson, Proc. Amer. Acad. 43: 37. 1907.

Known only from the type locality, near Saltillo, Coahuila.

Herbaceous or suffrutescent (?) at base, scabrid-pubescent; leaf blades 3.5 to 6 cm. long, reticulate beneath and scabrid-puberulous chiefly along the veins; heads thyrsoïd-panicled, few, nodding, 16 mm. high, 14 to 16-flowered; phyllaries thin, green or purple-tinged, acuminate, sparsely pubescent.

37. *Coleosanthus squarrosus* (Cav.) Blake.*Eupatorium squarrosus* Cav. Icon. Pl. 1: 66. pl. 98. 1791.*Coleosanthus cavanillesii* Cass. Bull. Soc. Philom. 1817: 67. 1817.*Rosalesia glandulosa* Llave in Llav. & Lex. Nov. Veg. Descr. 1: 14. 1824.*Eupatorium rosalesia* DC. Prodr. 5: 183. 1836.*Bulbostylis cavanillesii* DC. Prodr. 5: 138. 1836.*Brickellia cavanillesii* A. Gray, Pl. Wright. 1: 85. 1852.*Brickellia rosalesia* Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 106. 1881.*Coleosanthus glandulosus* Kuntze, Rev. Gen. Pl. 1: 328. 1891.*Brickellia squarrosa* Robinson, Mem. Gray Herb. 1: 90. 1917. Not *B. squarrosa* Robins. & Seat. 1893.

Durango to Michoacán, Puebla, and Mexico; type from Mexico, without definite locality.

Frutescent or fruticose, about 3 meters high, sordid-puberulous, subglabrate; leaf blades triangular-ovate to broadly ovate, 3.5 to 9 cm. long, thin, crenate-serrate, reticulate beneath and puberulous or usually griseous-tomentulose;

heads 17 mm. high, about 25-flowered, nodding, in a loose panicle, on slender pubescent and stipitate-glandular pedicels; phyllaries acuminate, at least the outer glandular. "Gobernadora" (Puebla); "atanasia amarga" (Jalisco, Valley of Mexico); "prodigiosa" (Urbina); "hierba del becerro" (San Luis Potosí, Valley of Mexico); "hierba dulce" (Ramírez); "atanasia" (Oaxaca).

The plant is reported to contain a glucoside, brickelline. It is employed popularly as a vermifuge and febrifuge, and also as a remedy for diarrhea and affections of the stomach.

37a. *Coleosanthus squarrosus oligadenus* (Robinson) Blake.

Brickellia squarrosa oligadena Robinson, Mem. Gray Herb. 1: 92. f. 70, β . 1917.

Known only from the type locality, Hacienda Coahuayula, Michoacán.

Similar; pedicels griseous-pubescent, nearly or quite lacking the stipitate glands; outer phyllaries griseous-pubescent, not glandular.

38. *Coleosanthus botterii* (Robinson) Blake.

Brickellia botterii Robinson, Mem. Gray Herb. 1: 93. f. 72. 1917.

Known only from the type locality, Orizaba, Veracruz.

Fruticose, sordid-tomentulose, glabrescent; leaf blades oblong-ovate or triangular-ovate, 4 to 6 cm. long, crenulate, scarcely reticulate, griseous-tomentulose beneath; heads 13 mm. high, about 16-flowered, in a pyramidal panicle, mostly nodding, on slender stipitate-glandular pedicels; phyllaries pilosulous, the outer glandular.

39. *Coleosanthus adenocarpus* (Robinson) Arthur, Torreya 22: 30. 1922.

Brickellia adenocarpa Robinson, Mem. Gray Herb. 1: 93. f. 73. 1917.

Oaxaca; type from Rancho de Calderón. Guatemala.

Slightly lignescent perennial, crisp-puberulous, glabrescent; leaf blades ovate, 3.5 to 5.4 cm. long; heads 18 mm. high, about 22-flowered, clustered at tips of branches in convex cymes, on griseous-villous or tomentose pedicels; phyllaries attenuate, appressed or somewhat squarrose, the outer villous.

39a. *Coleosanthus adenocarpus glandulipes* (Robinson) Blake.

Brickellia adenocarpa glandulipes Robinson, Mem. Gray Herb. 1: 94. f. 73, β . 1917.

Chiapas. Guatemala; type from Quezaltenango.

Similar; pedicels glandular-puberulous; outer phyllaries sordid-glandular.

40. *Coleosanthus pacayensis* Coulter, Bot. Gaz. 20: 46. 1895.

Brickellia pacayensis Coulter, Bot. Gaz. 16: 98. 1891.

Brickellia hebecarpoides Robinson, Proc. Amer. Acad. 36: 486. 1901.

Michoacán and Morelos to Veracruz and Oaxaca. Guatemala to Nicaragua; type from Pacaya, Guatemala.

Suffrutescent to fruticose, 1 to 3 meters high, from griseous-tomentose to densely stipitate-glandular; leaf blades ovate, 4 to 7 cm. long, reticulate; heads 1 to 1.4 cm. high, 22 to 25-flowered, paniculate, on densely stipitate-glandular pedicels; phyllaries glandular-pubescent.

41. *Coleosanthus floribundus* (A. Gray) Kuntze, Rev. Gen. Pl. 1: 328. 1891.

Brickellia floribunda A. Gray, Pl. Wright. 2: 73. 1853.

Chihuahua and Sonora; type collected near Santa Cruz, Sonora. New Mexico and Arizona.

Suffrutescent, 1 to 1.5 meters high, stipitate-glandular, aromatic; leaf blades triangular-ovate, 4 to 13 cm. long, coarsely dentate-serrate, scarcely reticulate, green, glandular-punctate, subglabrous; heads 1 cm. high, about 15-flowered, panicled; inner phyllaries substramineous, the outer herbaceous, densely stipitate-glandular.

42. *Coleosanthus argutus* (Robinson) Blake.*Brickellia arguta* Robinson, Mem. Gray Herb. 1: 102. f. 79. 1917.

Northern Baja California. Southern California; type locality not definitely stated.

Fruticose, glandular-pubescent; leaf blades ovate, about 1.5 cm. long, coriaceous, reticulate, sharply toothed; heads 13 mm. high, about 15 mm. wide, about 50-flowered, solitary at tips of branches; outer phyllaries coriaceous-herbaceous, lance-ovate.

43. *Coleosanthus brandegei* (Robinson) Blake.*Brickellia brandegei* Robinson, Mem. Gray Herb. 1: 106. f. 82. 1917.

Baja California and Espíritu Santo Island; type from La Paz.

Fruticose, densely glandular-puberulous; leaf blades broadly ovate, 1.4 to 2.5 cm. long, obtuse, subcoriaceous, crenate-dentate, griseous-puberulous, reticulate; panicle terminal, few-headed; heads 1 cm. high, about 28-flowered. (Description compiled.)

44. *Coleosanthus macromerus* (Robinson) Blake.*Brickellia macromera* Robinson, Mem. Gray Herb. 1: 107. f. 83. 1917.

Known only from the type locality, head of Concepción Bay, Baja California.

Fruticose, whitish-barked, hirtellous, with very long internodes; leaf blades 1.5 to 3 cm. long, chartaceous, hirtellous, slightly reticulate beneath; heads 1.4 cm. high, pedicellate, in few-headed terminal umbellate panicles. (Description compiled.)

45. *Coleosanthus peninsularis* (T. S. Brandeg.) Blake.*Brickellia peninsularis* T. S. Brandeg. Zoe 5: 160. 1903.

Baja California and Socorro Island; type from La Chuparosa.

Frutescent, griseous-scabrid-pubescent and glandular, about 2.5 meters high; leaf blades ovate, 3 to 8 cm. long, chartaceous, reticulate, griseous-puberulous; heads corymbose-panicled, 14 mm. high, about 30-flowered; phyllaries acute to acuminate, the outer glandular-puberulous, recurved at tip.

46. *Coleosanthus rhomboideus* Greene, Erythea 1: 54. 1893.*Brickellia rhomboidea* Greene, Pittonia 2: 103. 1890.

Known only from the type locality and vicinity, Guaymas, Sonora.

Fruticose, whitish-barked, puberulous; leaf blades deltoid-ovate to broadly rhombic-ovate, 3 to 6 cm. long, rather thin, entire or bluntly undulate-serrate, slightly puberulous; heads umbellate-panicled, 12 mm. high, about 50-flowered, on stipitate-glandular pedicels 1 to 4 cm. long; phyllaries acute (outer) to obtuse.

47. *Coleosanthus lanatus* (DC.) Kuntze, Rev. Gen. Pl. 1: 328. 1891.*Bulbostylis lanata* DC. Prodr. 7: 268. 1838.*Bulbostylis rigida* Hook. & Arn. Bot. Beechey Voy. 297. 1840.*Brickellia lanata* A. Gray, Pl. Wright. 1: 84. 1852.

Jalisco, Guanajuato, and (?) Tepic; type from vicinity of Guanajuato.

Suffrutescent, canescent-lanate; leaf blades oblong to oval, 2.5 to 5.5 cm. long, coarsely serrate, coriaceous, canescent-lanate and reticulate beneath, narrowed at base, very short-petioled; heads in a narrow panicle, solitary in the upper axils, 1.5 cm. high, about 50-flowered; phyllaries strongly graduate, ovate to oblong, arachnoid-ciliate, chiefly obtuse and mucronulate, usually purplish.

47a. *Coleosanthus lanatus microdontus* (Robinson) Blake.*Brickellia lanata microdonta* Robinson, Mem. Gray Herb. 1: 119. f. 94, β . 1917.

Colima and Jalisco; type from Colima.

Leaves subsessile, cordate at base and more or less amplexicaul, merely denticulate.

21. DYSCRITOTHAMNUS Robinson, Contr. Gray Herb. n. ser. 65: 25. pl. 1. 1922.**1. Dyscritothamnus filifolius** Robinson, Contr. Gray Herb. n. ser. 65: 26. pl. 1. 1922.

Known only from the type locality, between Las Ajuntas and Las Ranas, near boundary between Guanajuato and Hidalgo.

Shrub 30 cm. high, glabrous; leaves alternate, nearly filiform, 2 to 3 cm. long, 0.5 to 0.8 mm. wide, nerveless; heads few, in terminal cymose panicles, 12 to 13 mm. high, about 10-flowered; phyllaries 2 or 3-seriate, somewhat graduate, lanceolate, acuminate, subscarious; receptacle paleaceous; corollas all tubular, very slightly zygomorphous; achenes obovoid, villous-hirsute, 2.5 mm. long; pappus of numerous unequal bristles, plumose below. (Description compiled.)

This genus is perhaps more closely allied to the Asterieae than to the Eupatorieae.

22. SELLOA Spreng. Nov. Prov. Hal. 36. 1819.**1. Selloa glutinosa** Spreng. Nov. Prov. Hal. 36. 1819.

Gymnosperma glutinosum Less. Syn. Gen. Comp. 194. 1832.

Gymnosperma corymbosum DC. Prodr. 5: 312. 1836.

Gymnosperma multiflorum DC. Prodr. 5: 312. 1836.

Gymnosperma scoparium DC. Prodr. 5: 312. 1836.

Chihuahua to Chiapas. Texas to Arizona; type a cultivated plant, wrongly ascribed to Brazil.

Woody below, much branched, 1 meter high or less, glutinous, essentially glabrous; leaves alternate, sessile, often with fascicles in their axils, linear to narrowly elliptic-lanceolate, 2 to 7 cm. long, 2 to 6 mm. wide, triplinerved, punctate, entire; heads yellow, about 4 mm. high, in dense corymbose-panicled cymes; phyllaries pale, subcoriaceous, obtuse, with narrow scarious margin, sometimes obscurely herbaceous-tipped; ligules about 6, not exceeding disk; disk flowers about 6; achenes oblong, puberulous, 4 or 5-ribbed; pappus none. "Jarilla" (Nuevo León); "mota" (Aguascalientes); "mariquita," "tatalencho" (Zacatecas); "motita" (San Luis Potosí); "cola de zorra" (Chihuahua); "xonequitl" (Nahuatl); "hierba pegajosa" (Nuevo León); "yucu ndede" (Oaxaca, Mixtec, *Seler*); "zazal" (Mexico); "pegajosa," "escobilla" (Valley of Mexico).

In popular medicine a decoction of the plant is employed as a remedy for diarrhea, and a solution of the gum is used externally as a remedy for rheumatism, ulcers, etc.

23. GUTIERREZIA Lag. Gen. & Sp. Nov. 30. 1816.

Herbaceous to suffruticose, low, much branched, more or less glutinous; leaves alternate, linear-filiform to oblanceolate, punctate, 1-nerved or rarely triplinerved, entire; heads small or very small, yellow, cymose-panicled; involucre graduate, few-seriate, of coriaceous, often green-tipped phyllaries; achenes turbinate or obconic, silky; pappus of about 10 linear-oblong to linear-lanceolate, scarious-paleaceous, persistent squamellae, as long as the achene or usually shorter, in the ray about half as long as in the disk (in our species).

Heads very small, cylindric; ray flowers 1 or 2, disk flowers 1 to 3.

Heads sessile, fasciculate in glomerules of 2 to 5; rays solitary; disk flowers 1 or 2.....

1. *G. lucida*.

Heads often pediceled, not fasciculate-glomerate; rays 2; disk flowers 2 or 3.

2. *G. digyna*.

Heads turbinate to subglobose; ray flowers 3 to 12, disk flowers 1 to 12.

Involucre 2.5 to 4 mm. high; leaves linear-filiform to narrowly linear, 1.5 mm. (rarely 2.5) wide or less.

Heads slenderly cylindric-turbinate, about 1.5 mm. thick; ray flowers 4 or 5, disk flowers 1 to 3.....

3. *G. microcephala*.

Heads thicker, turbinate to subglobose-turbinate, 1.5 to 3.5 mm. thick; ray flowers 3 to 12, disk flowers 2 to 12.

Leaves (at least the lower) linear-spatulate, 1 to 2.5 mm. wide.

4. *G. argyrocarpa*.

Leaves strictly linear or linear-filiform, 1.5 mm. wide or less.

Heads subglobose-turbinate; flowers of ray and disk each 7 to 12; phyllaries with conspicuous broad and short herbaceous tips.

5. *G. californica*.

Heads turbinate; flowers of ray and disk each 3 to 8; phyllaries with narrower and more obscure herbaceous tips. . . . 6. *G. sarothrae*.

Involucre 5 to 6 mm. high; leaves linear-spatulate or linear-oblongate, 2 to 6 mm. wide. 7. *G. grandis*.

1. *Gutierrezia lucida* Greene, Fl. Franc. 361. 1897.

Xanthocephalum lucidum Greene, Pittonia 2: 282. 1892.

Gutierrezia glomerella Greene, Pittonia 4: 54. 1899.

Chihuahua (?) and Coahuila to Zacatecas. Colorado to Texas, Arizona, and California; type from Mohave Desert, California.

Suffruticose, up to 60 cm. high; leaves linear-filiform to narrowly linear-oblongate, 2 to 5.5 cm. long, 2.5 mm. wide or less, sparsely scabridulous; heads fasciculate-cymose-panicled, 2.5 to 4.5 mm. long, about 1 mm. thick.

2. *Gutierrezia digyna* Blake, Contr. U. S. Nat. Herb. 22: 59. 1924.

Known only from the type locality, San Luis Mountains, Sonora (?), along Arizona boundary line.

Suffrutescent, about 30 cm. high; lower leaves oblongate or spatulate-linear, 1.7 to 3.5 cm. long, 3 to 4.5 mm. wide, the upper linear or very narrowly spatulate-linear; heads corymbosely cymose-panicled.

3. *Gutierrezia microcephala* (DC.) A. Gray, Mem. Amer. Acad. n. ser. 4: 74. 1849.

Brachyris microcephala DC. Prodr. 5: 313. 1836.

?*Gutierrezia haenkei* Schultz Bip. Flora 38: 115. 1855.

Gutierrezia euthamiae microcephala A. Gray, Syn. Fl. 1^a: 115. 1884.

Gutierrezia filifolia Greene, Pittonia 4: 55. 1899.

Chihuahua and Coahuila; type from Saltillo, Coahuila. Idaho to Arizona.

Suffruticose, about 35 cm. high, hirtellous, corymbosely branched above; leaves linear-filiform, 3 cm. long, 1 mm. wide or less; heads often pediceled, about 3.5 mm. high; phyllaries with rather conspicuous narrow greenish tips.

4. *Gutierrezia argyrocarpa* Greenm. Proc. Amer. Acad. 40: 35. 1904.

Known only from the type locality, chalk bluffs of Tula, Hidalgo.

Suffruticose, hirtellous, about 30 cm. high; leaves linear-spatulate or the upper linear, 1 to 1.5 cm. long, scabridulous on margin; heads turbinate, about 3.5 mm. high and 2.5 mm. thick, mostly pediceled, cymose-panicled; rays 5 or 6; disk flowers 8 to 12.

5. *Gutierrezia californica* (DC.) Torr. & Gray, Fl. N. Amer. 2: 193. 1842.

Brachyris californica DC. Prodr. 5: 313. 1836.

Chihuahua. California and Arizona; type from California.

Suffrutescent, the stem glabrous to hirtellous; heads rather few, usually not glomerate, about as thick as long; phyllaries conspicuously green-tipped; ray and disk flowers each 7 to 12.

6. *Gutierrezia sarothrae* (Pursh) Britt. & Rusby, Trans. N. Y. Acad. 7: 10. 1887.

Solidago sarothrae Pursh, Fl. Amer. Sept. 540. 1814.

Brachyris euthamiae Nutt. Gen. Pl. 2: 163. 1818.

Gutierrezia euthamiae Torr. & Gray, Fl. N. Amer. 2: 193. 1842.

Chihuahua to Nuevo León; Baja California. Western North America; type from the plains of the Missouri.

Suffrutescent or suffruticose, hirtellous-puberulent, bushy-branched, 40 cm. high or less; leaves linear-filiform, 2 to 4 cm. long, 1 mm. (rarely 1.5 mm.) wide or less, scaberulous; heads very numerous, corymbosely cymose-panicled, 4 to 6 mm. high, 2 to 3 mm. thick; phyllaries with narrow, often obscure, green tips. "Hierba de San Nicolás" (Nuevo León); "hierba de víbora," "coyaye" (New Mexico).

A decoction of the plant is reported to be used in New Mexico as an emmenagogue and as a remedy for gastric disturbances. In the southwestern United States this and related species are known variously as "yellow-weed," "brown-weed," "sheep-weed," "broom-weed," and "snake-weed." The plants are often very abundant upon the plains, and their abundance usually indicates that the land has been over-grazed, especially by sheep.

7. *Gutierrezia grandis* Blake, Contr. U. S. Nat. Herb. 22: 592. pl. 55. 1924. Coahuila and Nuevo León; type from Icamole, Nuevo León.

Suffruticose, 30 cm. high or more, strongly glutinous, scabridulous; leaves chiefly linear-oblongate, 2.5 to 4.5 cm. long, 2 to 6 mm. wide, triplinerved; heads turbinate or obovoid, larger than in any other of our species, scattered or glomerate; rays 5 to 9; disk flowers 3 to 7.

DOUBTFUL SPECIES.

GUTIERREZIA LINEARIFOLIA Lag. Gen. & Sp. Nov. 30. 1816. This species, the type of the genus, was originally ascribed to Mexico. The description does not well agree with any Mexican species, however, and Gray identifies it with much probability with the Chilean plant later described as *Brachyris paniculata* DC.

24. *APLOPAPPUS* Cass. Dict. Sci. Nat. 56: 168. 1828.

Herbs or shrubs, often glutinous; leaves alternate (in one species opposite), linear-filiform to obovate, entire to pinnatifid or bipinnatifid; heads small or medium, radiate or discoid, yellow, the rays and more rarely the disk sometimes becoming purplish in age; involucre 2 to 7-seriate, scarcely or strongly graduated, the phyllaries dry, usually thin-margined, sometimes with herbaceous tips, not in distinct vertical ranks; achenes usually pubescent, slender, sometimes ribbed; pappus of numerous often unequal bristles.

Leaves all linear or linear-filiform, rarely spatulate-linear, entire, 3 mm. wide or less.

Pappus bright white; heads solitary at tips of branchlets, radiate, comparatively large, the disk 1 cm. wide or more; involucre 7 to 13 mm. high, the phyllaries lanceolate, scarcely graduated, with subherbaceous center and tip.

Leaves 2 to 4 cm. long; ligules 1 to 2 cm. long; involucre 10 to 13 mm. high.

1. *A. linearifolius*.

Leaves 1 to 2 cm. long; ligules 5 to 10 mm. long; involucre 7 to 10 mm. high.

1a. *A. linearifolius interior*.

Pappus brownish or dull whitish; heads mostly corymbosely-panicled or racemose-panicled, sometimes solitary, usually discoid, the disk 8 mm. wide or less (in *A. parrasanus* becoming 11 to 12 mm. wide); involucre 8 mm. high or less, usually strongly graduated.

Heads solitary at tips of short leafy branchlets, these sometimes cymosely arranged.

Leaves not punctate; young growth densely hirtellous.---9. *A. purpusii*.

Leaves strongly glandular-punctate; young growth glabrous.

Leaves linear-filiform, subterete.

Involucre about 6-seriate, 6 to 7 mm. high; rays present.

4. *A. palmeri*.

Involucre about 4-seriate, 5 mm. high or less; rays wanting.

6. *A. propinquus*.

Leaves linear or linear-spatulate, distinctly flattened; phyllaries all linear-lanceolate to oblong, acute to acuminate.

Phyllaries linear-lanceolate or linear-subulate, acuminate; leaves 1 to 1.5 mm. wide.....7. *A. laricifolius*.

Phyllaries oblong or oblong-lanceolate, acute; leaves 0.6 to 0.9 mm. wide.....8. *A. parrasanus*.

Heads distinctly cymose-panicled, rarely racemose-panicled.

Stem densely tomentose.....12. *A. pyramidatus*.

Stem not tomentose.

Leaves linear-filiform, terete or subterete, conspicuously impressed-punctate (less so in no. 4).

Involucre 6 to 7 mm. high, about 6-seriate, the inner phyllaries narrowly linear; rays present.....4. *A. palmeri*.

Involucre 3 to 6 mm. high, about 4-seriate, the inner phyllaries oblong or linear-oblong; rays wanting (rarely solitary in no. 5).

Involucre 3 to 4 mm. high, the phyllaries with short greenish tips; heads subsessile, in close cymose clusters, these paniculately or subracemosely arranged.....5. *A. sonoriensis*.

Involucre 4 to 6 mm. high, the phyllaries without distinct greenish tips; heads pedicellate.

Bracts in distinct vertical ranks; heads 5 to 7-flowered.

(*Chrysothamnus paniculatus*.)

Bracts not in distinct vertical ranks; heads 8 to 12-flowered.

6. *A. propinquus*.

Leaves linear or linear-spatulate, flat, inconspicuously or not punctate (except in nos. 10 and 4).

Leaves 5 to 15 mm. long; heads usually with 1 or 2 rays.

10. *A. monactis*.

Leaves 2 cm. long or more; heads discoid.

At least the middle phyllaries with definite greenish tips.

Middle phyllaries obtuse or rounded; involucre 4 to 5 mm. high.

14. *A. drummondii*.

Middle phyllaries acute; involucre 5 to 7 mm. high.

20. *A. fasciculatus*.

Phyllaries without definite greenish tips, but sometimes obscurely greenish toward tip.

Leaves obscurely or not punctate, 2 mm. wide or more.

15. *A. heterophyllus*.

Leaves strongly punctate, 1.2 mm. wide or less...4. *A. palmeri*.

Leaves more than 3 mm. wide (if rarely less, not entire), usually toothed or pinnatifid.

Leaves opposite throughout; phyllaries about 2-seriate, subequal, the outer broadly oval-oblong, about 2.5 mm. wide.....2. *A. oppositifolius*.

Leaves alternate; phyllaries several-seriate, graduate, much narrower.

Leaves entire.

Plant tomentose.....21. *A. canus*.

Plant not tomentose.

Leaves cuneate to linear-elliptic, 7 times as long as wide or less.

Leaves cuneate to obovate, 2 cm. long or less.

3. *A. cuneatus spathulatus*.

Leaves linear-elliptic to obovate, 2.5 to 6 cm. long.

Heads in a virgate panicle; involucre 7 to 9 mm. high, strongly graduate, many-seriate.....23. *A. orcuttii*.

Heads in a flattish terminal corymbiform panicle; involucre 5 mm. high, few-seriate.....11. *A. parishii*.

Leaves linear to linear-spatulate, more than 8 times as long as wide.

Involucre 5 to 7 mm. high, the middle phyllaries acute and with definite green tips.....20. *A. fasciculatus*.

Involucre 5 mm. high or less, the middle phyllaries obtuse or rarely acute, without definite greenish tips.....15. *A. heterophyllus*.

Leaves toothed or pinnatifid.

Plant tomentose.....21. *A. canus*.

Plant not tomentose.

Involucre 12 to 15 mm. high, the phyllaries oblong-linear, appressed, without loose green tips.

Leaves oval or oblong-obovate, with broad clasping base.

24. *A. berberidis*.

Leaves cuneate-obovate, narrowed to the base.....25. *A. cruentus*.

Involucre 10 mm. high or less.

Heads solitary at tips of stem and branches.

Stem and leaves essentially glabrous, resinous; involucre 4.5 mm. high, the outer phyllaries ciliate, not glandular-granular.

13. *A. vernicosus*.

Stem and leaves glandular-granular or pubescent; involucre 5 to 10 mm. high, the phyllaries not ciliate, densely glandular-granular.

Leaves obovate or cuneate-obovate, merely toothed, obtuse, nearly uniform in shape; phyllaries with spreading or reflexed herbaceous tips 1.5 to 2 mm. long; plant very densely glandular-pubescent.....28. *A. arenarius*.

Leaves linear to obovate, usually acute, at least the lower usually pinnatifid, the upper usually different in shape and toothed from the lower; herbaceous tips of the phyllaries appressed or short and spreading.

Plant dull green or cinereous, densely glandular-pubescent or hispid-pilose; upper and branch leaves mostly oblong-linear or oblanceolate, toothed.

26. *A. spinulosus scabrellus*.

Plant bright light green, sparsely glandular-granular; upper and branch leaves linear, entire or toothed.

27. *A. junceus*.

Heads closely cymose or virgate-panicled.

Heads small, few-flowered, 5.5 mm. high or less; leaves 1 cm. long or less.....13. *A. vernicosus*.

Heads larger, many-flowered; leaves more than 1 cm. long.

Heads in elongate, virgate or pyramidal panicles.

Stem rough-pubescent; leaves sharply toothed.

22. *A. squarrosus*.

Stem essentially glabrous; leaves merely denticulate.

23. *A. orcuttii*

Heads in close cymose clusters at tips of stem and branches.

Phyllaries with acute or acuminate spreading herbaceous tips.

19. *A. tridentatus*.

Phyllaries with appressed tips.

Leaf rachis narrowly linear, of the same breadth as the lobes.

Leaves with one or two short lobes or teeth above.

14. *A. drummondii*.

Leaves regularly pinnatifid.....18. *A. fruticosus*.

Leaf rachis much broader than the breadth of the lobes or teeth.

Leaves chiefly cuneate or cuneate-oblongate, with few short teeth.....16. *A. venetus*.

Leaves chiefly linear-spatulate or spatulate-oblongate, incise-toothed or pinnatifid.....17. *A. hartwegi*.

1. *Aplopappus linearifolius* DC. Prodr. 5: 347. 1836.

Stenotus linearifolius Torr. & Gray, Fl. N. Amer. 2: 238. 1842.

Stenotopsis linearifolia Rydb. Bull. Torrey Club 27: 617. 1900.

Zapato Chino, Baja California (*Brandeggee*, according to Hall). California.

Shrub 1.5 meters high or less, somewhat resinous; leaves crowded, linear, acute, punctate; peduncles short, nearly naked; inner phyllaries with scarious margins; achenes silky-pubescent; pappus soft.

1a. *Aplopappus linearifolius interior* (Coville) Jones, Proc. Calif. Acad. II. 5: 697. 1895.

Aplopappus interior Coville, Proc. Biol. Soc. Washington 7: 65. 1892.

San Pedro Mártir, Baja California (*Brandeggee*, according to Hall). California to Utah and Arizona; type from Inyo County, California.

Similar, but with shorter leaves, rays, and involucre.

2. *Aplopappus oppositifolius* (A. Gray) Blake.

Bigelovia oppositifolia A. Gray, Proc. Amer. Acad. 15: 32. 1879.

Known only from the type locality, San Luis Potosí.

Low shrub, resinous and obscurely puberulous; leaves opposite; petioles 3 to 5 mm. long; blades ovate-elliptic or rhombic-elliptic, 1.5 cm. long, 7 mm. wide, acutish, cuneate at base, thick, about 7-toothed above the middle, dotted; heads solitary at tips of branches, subsessile, discoid, 1 cm. high; involucre 2-seriate, sometimes with one or two small outer bracts, subequal, 8 mm. high, the phyllaries oblong, acute, striate, glandular-granular, ciliolate above, without herbaceous tips; flowers 20 to 25; achenes puberulous.

3. *Aplopappus cuneatus spathulatus* (A. Gray) Blake.

Bigelovia spathulata A. Gray, Proc. Amer. Acad. 11: 74. 1876.

Ericameria cuneata spathulata H. M. Hall, Univ. Calif. Publ. Bot. 3: 352. 1907.

Northern Baja California; type from Cantillas Canyon. California and Arizona.

Spreading shrub, about 30 cm. high, glabrous, densely glandular-punctate; leaves cuneate or obovate, 1 to 2 cm. long, 3 to 10 mm. wide, thick, entire, usually retuse; heads several in terminal cymose panicles, discoid, turbinate; involucre 6 to 8 mm. high, graduate, of acutish, lanceolate or linear-lanceolate phyllaries without herbaceous tips; achenes silky-pubescent; pappus brownish.

4. *Aplopappus palmeri* A. Gray, Proc. Amer. Acad. 11: 74. 1876.

Chrysoma palmeri Greene, Erythea 3: 12. 1895.

Ericameria palmeri H. M. Hall, Univ. Calif. Publ. Bot. 3: 53. 1907.

Northern Baja California; type from Tecate Mountains. California.

Low shrub, about 0.5 meter high, nearly glabrous, densely glandular-punctate; leaves very narrowly linear or linear-filiform, 1 to 3.5 cm. long, 1.2 mm. wide or less, those of the axillary fascicles reduced and often subterete; heads numerous, in an elongate panicle or racemosely arranged, usually pedicellate; involucre 6 to 7 mm. high, strongly graduate, narrowly turbinate; rays several, short; achenes silky.

5. *Aplopappus sonoriensis* (A. Gray) Blake.

Ericameria diffusa Benth. Bot. Voy. Sulph. 23. 1844. Not *Aplopappus diffusus* DC. 1836.

Solidago diffusa A. Gray, Proc. Amer. Acad. 5: 159. 1861.

Linosyris sonoriensis A. Gray, Proc. Amer. Acad. 8: 291. 1870.

Bigelovia diffusa A. Gray, Proc. Amer. Acad. 8: 640. 1873.

Baja California and islands, Sinaloa, and Sonora; type from Yaqui River, Sonora.

Frutescent, 60 cm. high or less, glabrous, punctate, much branched, very leafy; leaves linear-filiform, 3.5 cm. long or less, 1 mm. wide or less, subterete, or the larger sometimes flattish above, those of the branches much reduced; heads numerous, mostly subsessile, cymose-clustered, usually forming broad panicles; involucre 3 to 4 mm. high, few-seriate, the oblong or lance-oblong phyllaries with short greenish tips; rays 0 to 2, small; disk flowers 4 or 5; achenes silky. "Hierba del pasmo" (Sonora, Baja California).

6. *Aplopappus propinquus* Blake, nom. nov.

Bigelovia brachylepis A. Gray, Bot. Calif. 1: 614. 1876.

Chrysoma brachylepis Greene, Erythea 3: 12. 1895.

Ericameria brachylepis H. M. Hall, Univ. Calif. Publ. Bot. 3: 56. 1907.

Haplopappus brachylepis H. M. Hall, Univ. Calif. Publ. Bot. 7: 273. 1919.

Not *H. brachylepis* Phil. 1894.

Northern Baja California. California; type from Larken's Station, northeast of San Diego.

Shrub 2 meters high or less, much branched, densely glandular-punctate; leaves linear-filiform, 1 to 2.5 cm. long, 1.3 mm. wide or less, often with fascicles in their axils, the larger sometimes flattish above; heads narrowly paniced or subracemose, pedicellate, discoid, 8 to 12-flowered; involucre 4 to 6 mm. high, few-seriate, the phyllaries lanceolate or linear-lanceolate, with linear central gland; achenes silky-pilose.

7. *Aplopappus laricifolius* A. Gray, Pl. Wright. 2: 80. 1853.

Chrysoma laricifolia Greene, Erythea 3: 11. 1895.

Bigelovia nelsonii Fernald, Proc. Amer. Acad. 36: 505. 1901.

Ericameria nelsonii Blake, Contr. Gray Herb. n. ser. 52: 26. 1917.

Chihuahua. Arizona to Texas; type from Guadalupe Pass, New Mexico.

Much-branched shrub about 30 cm. high, densely glandular-punctate, densely leafy; leaves linear or narrowly linear-spatulate, 1 to 1.5 cm. long, 2 mm. wide or less, thick, flat; heads turbinate, becoming subhemispheric, solitary at tips of short leafy branches, these usually cymose-clustered at apex of stem and branches; involucre about 5 mm. high, little graduate, the phyllaries linear-lanceolate, acuminate, with a linear dorsal gland; rays 7 or less, exceeding disk; achenes silky.

8. *Aplopappus parrasanus* Blake.

Ericameria parrasana Blake, Contr. Gray Herb. n. ser. 52: 26. 1917.

Known only from the type locality, Sierra de Parras, Coahuila.

Branching shrub, densely glandular-punctate, very leafy; leaves linear, 6 to 9 mm. long, 0.6 to 0.9 mm. wide, flattish above, not fascicled; heads hemispheric, solitary, terminating short leafy branches; involucre 4 mm. high, slightly graduate, the phyllaries narrowly oblong or oblong-lanceolate, acute, with lanceolate appressed subherbaceous tips; rays about 10, oval, 5 mm. long; achenes silky.

9. *Aplopappus purpusii* (T. S. Brandeg.) Blake.*Ericameria purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 191. 1911.

Known only from the type locality, Cerro de Macho, Coahuila.

Low branching shrub, finely hirtellous on the younger parts; larger leaves linear-subulate, 5 to 7 mm. long, 0.6 mm. wide, stiff, spreading, mucronulate, bearing fascicles in their axils, those of the branches appressed or erect, smaller, decurrent, with thick midrib; heads solitary, terminating leafy branchlets, discoid, 8 to 10-flowered, turbinate-hemispheric; involucre 5 mm. high, the phyllaries ovate to oblong, acute; achenes silky.

10. *Aplopappus monactis* A. Gray, Proc. Amer. Acad. 19: 1. 1883.*Ericameria monactis* McClatchie, Erythea 2: 124. 1894.*Tumionella monactis* Greene, Leaflets 1: 173. 1906.

Northern Baja California. California and Nevada; type from borders of Mohave Desert.

Much-branched shrub 1 meter high or less, slightly pubescent, more or less punctate, very leafy; leaves linear or linear-oblong, 5 to 15 mm. long, 1.5 mm. wide or less, even the reduced leaves of the branches distinctly flattened above; heads pediceled, cymose-panicled at tips of branches; involucre 4 mm. high, the phyllaries very few, oblong or lance-oblong, obtuse or acute; rays 0 to 2; disk flowers 5 to 8; achenes silky.

11. *Aplopappus parishii* (Greene) Blake.*Bigelovia parishii* Greene, Bull. Torrey Club 9: 62. 1882.*Chrysoma parishii* Greene, Erythea 3: 10. 1895.*Ericameria parishii* H. M. Hall, Univ. Calif. Publ. Bot 3: 55. 1907.

San Pedro Mártir, Baja California. California; type from Waterman Canyon, San Bernardino Mountains.

Shrub 2 to 5 meters high, very resinous, densely leafy; leaves linear-elliptic or elliptic-lanceolate, 2 to 6 cm. long, 3 to 10 mm. wide, entire, acute, densely punctate, sessile; heads numerous, discoid, about 10-flowered, forming terminal flattish cymose panicles; involucre 5 mm. high, the phyllaries lanceolate or lance-oblong, acute or obtusish; achenes minutely silky.

12. *Aplopappus pyramidatus* (Robins. & Greenm.) Blake.*Bigelovia pyramidata* Robins. & Greenm. Proc. Amer. Acad. 32: 43. 1896.

Known only from the type locality and vicinity, Oaxaca City, Oaxaca.

Frutescent, 1 meter high or less; stem densely cinereous-tomentose, in age glabrescent; leaves linear, 1 to 2.8 cm. long, 1.5 mm. wide or less, mucronulate, revolute-margined, tomentose, glabrate above; heads discoid, 9-flowered, subsessile, mostly solitary in the axils of leafy bracts 1 cm. long or less, forming long spikelike panicles; involucre 5 mm. high, about 3-seriate, the phyllaries lanceolate to linear-lanceolate, acute to acuminate, somewhat glandular and sparsely pilose, without herbaceous tips; achenes silky.

13. *Aplopappus vernicosus* T. S. Brandeg. Proc. Calif. Acad. II. 2: 168. 1889.

Known only from the type locality, El Rosario, Baja California.

Shrubby, intricately branched, essentially glabrous, resinous, about 45 cm. high; leaves cuneate-obovate or rhombic-obovate, 6 to 9 mm. long, 3 to 4 mm. wide, with 2 to 6 spinulose-tipped teeth, narrowed into a petioliform entire base, coriaceous, not distinctly dotted, sometimes with fascicles in the axils; heads 1 to 3 at tips of short branchlets toward apex of stem and branches, leafy-bracted; involucre 5 mm. high, the phyllaries few, oblong or linear-oblong, obtuse, the outer ciliate below, with conspicuous green tips, the inner with obscure tips; rays 5; disk flowers 6; achenes silky.

14. *Aplopappus drummondii* (Torr. & Gray) Blake.*Linosyris drummondii* Torr. & Gray, Fl. N. Amer. 2: 233. 1842.*Bigelovia drummondii* A. Gray, Proc. Amer. Acad. 8: 639. 1873.

Isocoma drummondii Greene, *Erythea* 2: 111. 1894.

Coahuila or Nuevo León. Texas; type from Texas.

Suffruticose, about 30 cm. high, slender, resinous; leaves linear or very narrowly linear-spatulate, 2 to 5 cm. long, 1 to 2.5 mm. wide, entire or rarely with one or two teeth or short lobes; heads discoid, 18 to 30-flowered, in close terminal paniced cymes; involucre 4 to 5 mm. high, about 5-seriate, graduate, the oblong or linear-oblong, obtuse to acute phyllaries with distinct short greenish tips; achenes silky; pappus brownish.

15. *Aplopappus heterophyllus* (A. Gray) Blake in Tidestrom, Contr. U. S. Nat. Herb. 25: 546. 1925.

Linosyris heterophylla A. Gray, Pl. Wright. 1: 95. 1852.

Linosyris wrightii A. Gray, Pl. Wright. 1: 95. 1852.

Linosyris hirtella A. Gray, Pl. Wright. 1: 95. 1852.

Bigelovia wrightii A. Gray, Proc. Amer. Acad. 8: 639. 1873.

Isocoma heterophylla Greene, *Erythea* 2: 111. 1894.

Isocoma hirtella Heller, *Muhlenbergia* 1: 6. 1900.

Isocoma wrightii Rydb. Bull. Torrey Club 33: 152. 1906.

Isocoma limitanea Rose & Standl. Contr. U. S. Nat. Herb. 16: 18. pl. 14. 1912.

Isocoma oxylepis Woot. & Standl. Contr. U. S. Nat. Herb. 16: 180. 1913.

Chihuahua and Sonora. Colorado to Texas and Arizona; type from valley of the Rio Grande, Texas.

Suffrutescent below or suffruticose, about 60 cm. high, hirtellous to subglabrous; leaves linear to linear-oblong, 2 to 6 cm. long, 2 to 5 mm. wide, usually hispidulous along margin, entire or the lower sometimes laciniate-dentate; heads numerous, sessile or pedicellate, in terminal paniculate cymes; involucre 4 to 5 mm. high, the phyllaries about 5-seriate, strongly graduate, narrowly oblong to lance-oblong, obtuse or sometimes acute, with obscurely greenish tips; heads discoid, 7 to 15-flowered; achenes silky.

16. *Aplopappus venetus* (H. B. K.) Blake.

Baccharis veneta H. B. K. Nov. Gen. & Sp. 4: 68. 1820.

Aplopappus discoideus DC. Prodr. 5: 350. 1836.

Linosyris mexicana Schlecht. "Ind. Sem. Hort. Halens. 1839: 9. 1839;"

Linnaea 14: Litt.-Ber. 128. 1840.

Bigelovia veneta A. Gray, Proc. Amer. Acad. 8: 638. 1873.

Isocoma veneta Greene, *Erythea* 2: 111. 1894.

Coahuila (or Nuevo León) to Morelos; type from Cuernavaca, Morelos.

Frutescent, about 30 cm. high, more or less hirtellous; leaves cuneate or cuneate-oblong, 1 to 2.8 cm. long, 3.5 to 10 mm. wide, denticulate to laciniate-toothed with 1 to 6 pairs of spinulose-tipped teeth, usually entire below the middle, dotted; heads discoid, 23 to 30-flowered, several or numerous, mostly pedicellate, in close, usually paniced, terminal cymes; involucre 5 to 7 mm. high, the phyllaries lance-oblong to ovate or oblong, with distinctly greenish, usually acute or acutish tips; achenes densely silky. "Damiana," "falsa damiana;" "boxosdá" (San Luis Potosí).

A decoction of the plant is sometimes used in the form of baths as a remedy for rheumatism. The plant has sometimes been confused with the true damiana, *Turnera diffusa* (see page 848), and aphrodisiac properties have been wrongly ascribed to it.

17. *Aplopappus hartwegi* (A. Gray) Blake.

Bigelovia hartwegi A. Gray (Hemsl. Biol. Centr. Amer. Bot. 2: 115. 1881, nomen nudum), Syn. Fl. 12: 123. 1884.

Isocoma hartwegi Greene, *Erythea* 2: 111. 1894.

Aguascalientes and San Luis Potosí to Puebla; type from Lagos, Jalisco

Similar to the last species, and doubtfully distinct from it; leaves narrowly oblanceolate or spatulate-oblanceolate, deeply laciniate-toothed or lobed, the lobes lanceolate or oblong-linear, 2 to 5 pairs, 1.5 to 4 mm. long.

18. *Aplopappus fruticosus* (Rose & Standl.) Blake.

Linosyris coronopifolia A. Gray, Pl. Wright. 1: 96. 1852. Not *Aplopappus coronopifolius* DC. 1836.

Bigelovia coronopifolia A. Gray, Proc. Amer. Acad. 8: 638. 1873.

Isocoma coronopifolia Greene, Erythea 2: 111. 1894.

Isocoma fruticosa Rose & Standl. Contr. U. S. Nat. Herb. 16: 18. pl. 13. 1912

Sonora. Arizona and Texas; type collected along the Rio Grande, Texas.

Suffrutescent or fruticose, 60 cm. high or less, resinous, hirtellous to glabrous; leaves linear to oblong-ovate in outline, 1.2 to 4 cm. long, 0.3 to 3 cm. wide, pinnately divided, the lobes 2 to 6 pairs, linear or linear-filiform, of the same breadth as the leaf rachis; heads discoid, about 12-flowered, crowded in terminal, usually paniced cymes; involucre 4 to 5 mm. high, the phyllaries with distinct or indistinct, obtuse, greenish tips; achenes silky.

19. *Aplopappus tridentatus* (Greene) Blake.

?*Linosyris dentata* Kellogg, Proc. Calif. Acad. 2: 16. 1863.

Bigelovia tridentata Greene, Bull. Torrey Club 10: 126. 1883.

Isocoma tridentata Greene, Erythea 2: 111. 1894.

Cedros Island and Rosalía Bay, Baja California; type from Cedros Island.

Suffruticose, branched, 30 cm. high or more, resinous, essentially glabrous; leaves cuneate to linear-spatulate, 1.5 to 2.8 cm. long, 3 to 17 mm. wide, tridentate (rarely entire) to pinnatifid, the lobes 1 or 2 pairs, spinulose-tipped, triangular or oblong-lanceolate, shorter than or exceeding the breadth of the leaf rachis; heads discoid, about 19-flowered, pedicellate, cymose at tips of stem and branches; involucre 7 to 9 mm. high, the phyllaries lanceolate to linear-lanceolate, with conspicuous, acute or acuminate, mostly spreading, greenish tips; achenes silky.

20. *Aplopappus fasciculatus* Vasey & Rose, Proc. U. S. Nat. Mus. 11: 530. 1889.

Known only from the vicinity of the type locality, San Quintín, Baja California.

Suffrutescent, 30 cm. high and more, apparently branched only at apex, glutinous, essentially glabrous, very leafy; leaves narrowly linear-spatulate, about 2.5 cm. long, 2 to 3 mm. wide, entire, acute, bearing fascicles in their axils; heads numerous, discoid, 15 to 25-flowered, mostly pediceled, in paniced cymes; involucre 6.5 to 9 mm. high, the phyllaries oblong or ovate-oblong, acute, greenish-tipped, appressed or rarely slightly spreading at apex.

21. *Aplopappus canus* (A. Gray) Blake, Contr. U. S. Nat. Herb. 24: 86. 1922

Diplostephium canum A. Gray, Proc. Amer. Acad. 11: 75. 1876.

Corethrogyne detonsa Greene, Bull. Torrey Club 10: 41. 1883.

Corethrogyne cana Greene, Bull. Calif. Acad. 1: 223. 1885.

Hazardia cana Greene, Pittonia 1: 29. 1887.

Hazardia detonsa Greene, Pittonia 1: 29. 1887.

Hazardia serrata Greene, Pittonia 1: 30. 1887.

Guadalupe Island, Baja California (type locality). Santa Barbara Islands, California.

Shrub about 1.3 meters high, densely tomentose, the foliage sometimes glabrate on one or both sides; leaves obovate to oblanceolate or elliptic-obovate, 3 to 10 cm. long, 1 to 3 cm. wide, entire to sharply serrate, the larger often petiolate; heads numerous, paniced, sessile or pedicellate; involucre 1 to 1.5 cm. high, many-seriate, strongly graduate, more or less lanate-tomentose, the phyllaries linear-lanceolate or linear, with thick, greenish, usually appressed, acutish tips;

rays inconspicuous, yellow, changing to purple, perhaps sometimes wanting; disk flowers yellow, becoming brownish purple; achenes pubescent; pappus brown.

22. *Aplopappus squarrosus* Hook. & Arn. Bot. Beechey Voy. 146. 1833.

Hazardia squarrosa Greene, Erythea 2: 112. 1894.

Baja California (according to Greene). California.

Suffruticose at base, 1 meter high or less, the stems rough-pubescent; leaves cuneate to oblong-obovate or obovate, 1.5 to 4 cm. long, 7 to 20 mm. wide, obtuse, sessile and somewhat clasping, sharply serrate throughout with mucronulate teeth; heads racemose to pyramidal-panicled, discoid, about 20-flowered; involucre turbinate, many-seriate, 10 to 12 mm. high, the phyllaries granular, greenish-tipped, at least the outer spreading at apex; achenes nearly or quite glabrous; pappus deep brown.

23. *Aplopappus orcuttii* A. Gray, Proc. Amer. Acad. 20: 297. 1885.

Hazardia orcuttii Greene, Erythea 2: 112. 1894.

Known only from the vicinity of the type locality, Ensenada de Todos Santos, Baja California.

Suffruticose, 30 cm. high and more, resinous, essentially glabrous; leaves elliptic to obovate, 2.5 to 4.5 cm. long, 7 to 15 mm. wide, mucronulate-pointed, narrowed to the sessile base, entire or rarely slightly serrulate, impressed-glandular; heads turbinate, in narrow virgate panicles; involucre 7 to 10 mm. high, many-seriate, the phyllaries linear, with short, obtuse or acutish, greenish, densely glandular, appressed or slightly spreading tips; rays small, not exceeding disk; achenes sparsely pilose.

24. *Aplopappus berberidis* A. Gray, Syn. Fl. 1²: 126. 1884.

Hazardia berberidis Greene, Erythea 2: 112. 1894.

Coronados Islands and northern Baja California; type from Todos Santos Bay.

Suffruticose, about 0.5 meter high, the stem loosely hispid-pilose; leaves cuneate-obovate or oval-obovate, 1.8 to 4 cm. long, 8 to 17 mm. wide, obtuse, sessile and clasping, sharply serrate throughout; heads racemed or capitate-clustered at apex of stem, rarely solitary, campanulate, chiefly sessile; involucre 13 to 15 mm. high, many-seriate, the phyllaries linear-oblong, rounded, appressed, greenish and granular toward apex; rays numerous, about 6 mm. long; achenes striate, glabrous.

25. *Aplopappus cruentus* Greene, Pittonia 2: 17. 1889.

Hazardia cruenta Greene, Erythea 2: 112. 1894.

Known only from the type locality, Coronados Islands, Baja California.

Low, shrubby, loosely villous; leaves obovate or spatulate-obovate, 2 to 2.5 cm. long, 7 to 10 mm. wide, obtuse, narrowed to base, sharply spinulose-serrate above the base, thin-coriaceous; heads solitary at tips of branches, subglobose-campanulate; involucre 1.5 cm. high, the phyllaries linear or oblong-linear, obtuse, obscurely greenish and glutinous toward tip, appressed, somewhat purplish-tinged; rays numerous, yellow becoming saffron-red, the lamina about 8 mm. long.

26. *Aplopappus spinulosus scabrellus* (Greene) Blake, Contr. Gray Herb. n. ser. 52: 24. 1917.

Eriocarpum scabrellum Greene, Erythea 2: 108. 1894.

Baja California; Sonora to Guanajuato; type from Los Angeles Bay, Baja California. Colorado to New Mexico.

Herbaceous to suffruticose, 30 cm. high and more, subglabrous to densely hispid-pilose, often glandular; leaves obovate or cuneate to (upper) linear or linear-oblong, the lowest sometimes bipinnatifid, the middle and upper mostly oblanceolate or oblong-linear, toothed to pinnatifid, the teeth spinulose-tipped;

heads few to numerous, solitary at tips of stem and branches; involucre 5 to 8 mm. high, densely glandular-granular, strongly graduate, the phyllaries linear or linear-lanceolate, spinulose-tipped, with usually appressed greenish tips; rays numerous, pale yellow, the lamina about 6 mm. long; achenes densely silky. "Hierba de víbora."

This plant is sold in the markets of Coahuila as a blood purifier.

27. *Aplopappus junceus* Greene, Bull. Calif. Acad. 1: 190. 1885.

Eriocarpum junceum Greene, Erythea 2: 108. 1894.

Sideranthus viridis Rose & Standl. Contr. U. S. Nat. Herb. 16: 19. pl. 15. 1912.

Sonora and northern Baja California. Southern California and Arizona; type from San Diego County, California.

Suffrutescent below, up to 1 meter high, the stems slender, finely glandular-granular; lower leaves linear, about 2.5 cm. long, pinnatifid with few short lobes, the others linear, entire or few-toothed, obtuse, spinulose-mucronate, about 8 mm. long, 1 mm. wide; heads as in the last species, the involucre 5 to 8 mm. high.

28. *Aplopappus arenarius* Benth. Bot. Voy. Sulph. 24. 1844.

Aplopappus arenarius incisifolius I. M. Johnston, Proc. Calif. Acad. IV. 12: 1190. 1924.

?*Aplopappus arenarius rossii* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1191. 1924.

Southern Baja California; type from Cape San Lucas.

Suffruticose or herbaceous, low, spreading, densely pubescent all over with mostly gland-tipped hairs; leaves cuneate to cuneate-obovate, 1 to (lowest) 3 cm. long, 4 to 12 mm. wide, usually obtuse or rounded, denticulate to laciniate-lobed with sometimes spinulose-tipped teeth; involucre larger than in the last two species, about 1 cm. high, the phyllaries densely glandular and with loose herbaceous tips.

25. *CHRYSOTHAMNUS* Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 323. 1840.

Shrubs or undershrubs; leaves alternate, narrow, entire; heads yellow, corymbose-panicked, discoid and 5-flowered (in ours); involucre 3 to 5-seriate, graduated, the dry, sometimes herbaceous-tipped phyllaries arranged in distinct vertical rows; achenes slender, terete or angled; pappus of numerous soft or stiffish, white or brownish-tinged, slender bristles.

Plants of this genus are abundant and characteristic shrubs of the Rocky Mountain region, where they are commonly known as "rabbit-brush." The stems contain a certain percentage of rubber, but probably too little to be of commercial importance.

Branches not tomentose.

Involucre 9 to 12 mm. high; phyllaries acuminate; leaves linear or linear-spatulate, flattish, not glandular-punctate..... 1. *C. pulchellus*.

Involucre 6 to 7 mm. high; phyllaries obtuse; leaves involute-filiform, subterete, densely glandular-punctate..... 2. *C. paniculatus*.

Branches densely tomentose..... 3. *C. latisquameus*.

1. *Chrysothamnus pulchellus* (A. Gray) Greene, Erythea 3: 107. 1895.

Linosyris pulchella A. Gray, Pl. Wright. 1: 96. 1852.

Bigelovia pulchella A. Gray, Proc. Amer. Acad. 8: 643. 1873.

Chihuahua. Kansas to Utah, south to Texas and Arizona; type from western Texas.

Shrub 1 meter high or less, glabrous, white-barked; leaves cuspidate-apiculate, 1 to 2.5 cm. long, 1 to 2.5 mm. wide; phyllaries strongly keeled, with lanceolate greenish tips; achenes glabrous; pappus stiffish, about 1.2 cm. long.

2. Chrysothamnus paniculatus (A. Gray) H. M. Hall, Univ. Calif. Publ. Bot. 3: 58. 1907.*Linosyris viscidiflora paniculata* A. Gray in Torr. U. S. & Mex. Bound. Bot. 80. 1859, nomen nudum.*Bigelovia paniculata* A. Gray, Proc. Amer. Acad. 8: 644. 1873.*Ericameria paniculata* Rydb. Fl. Rocky Mount. 853. 1917.

Sonora. Utah and California to Arizona; type from "California."

Shrubby, 2 meters high or less, essentially glabrous, densely glandular-punctate; leaves 2 cm. long or less; phyllaries few, in 3 or 4 ranks, without green tips, not keeled; achenes densely pubescent; pappus brownish, about 6 mm. long.

3. Chrysothamnus latisquameus (A. Gray) Greene, Pittonia 4: 42. 1899.*Bigelovia graveolens latisquamea* A. Gray, Proc. Amer. Acad. 8: 645. 1873.

Sonora. New Mexico and Arizona; type from New Mexico.

Shrub, densely and compactly whitish-tomentose; leaves linear-filiform or linear, 2 to 5 cm. long, less than 1 mm. wide; involucre 7 to 9 mm. high, the phyllaries obtuse, the outer tomentulose, the inner glabrous; achenes densely pubescent; pappus whitish, about 7 mm. long.

26. GREENELLA A. Gray, Proc. Amer. Acad. 16: 81. 1880.**1. Greenella ramulosa** Greene, Pittonia 1: 302. 1889.

Central western Baja California; type from San Bartolomé Bay.

Suffrutescent perennial, about 30 cm. high, densely and intricately branched, finely glandular-viscid; leaves linear-elliptic or narrowly oblanceolate, 2.5 cm. long or less, 3.5 mm. wide or less, acute, 1-nerved, impressed-punctate, spinulose-ciliolate, deciduous, the upper ones reduced to minute bracts; heads pedicellate, solitary at tips of branchlets, about 4 mm. high; involucre 2 or 3-seriate, graduate, the oblong obtuse glandular-granular thin-margined phyllaries greenish above, arranged in distinct vertical ranks; rays about 3, fertile, white, "changing to rose-purple," the lamina 3 mm. long; disk flowers about 6, white, "changing to rose-purple;" achenes oblong-turbinate, 10-striate, densely pubescent; pappus of the ray achenes of about 15 lanceolate squamellae 0.5 mm. long, that of the disk achenes of about 30 linear-lanceolate acuminate paleaceous awns about 1.3 mm. long.

27. ASTER L. Sp. Pl. 872. 1753.

Herbaceous, rarely suffrutescent or shrubby; leaves alternate, usually entire or slightly toothed; heads small to large, solitary to paniced, radiate or rarely discoid, the rays white to violet, never yellow, the disk whitish or yellow, often changing to purplish; involucre usually distinctly graduate, the phyllaries usually narrow and herbaceous-tipped; style branches acute or acuminate; pappus of numerous slender subequal bristles.

Plants glabrous throughout, glaucous or glaucescent.

Plant unarmed; heads discoid..... 5. **A. carnosus.**Plant spine-bearing; heads radiate..... 6. **A. spinosus.**

Plants pubescent or glandular, at least on the involucres, not glaucous or glaucescent.

Leaves subulate to spatulate, entire, 1 cm. long or less; plants 15 cm. high or less, many-stemmed..... 8. **A. leucelene.**

Leaves linear to lanceolate or rhombic, much more than 1 cm. long, or else plants much more than 15 cm. high.

Leaves rhombic or cuneate, spiny-toothed, strongly reticulate.

7. **A. frutescens.**

Leaves linear to lanceolate, not spiny-toothed or reticulate.

Plant finely granular-glandular, not pubescent; branches sharply angled.

4. **A. palmeri.**

Plant strigose, hirsute, or hirsutulous, at least in lines; branches not angled.

Involucre about 5-seriate; leaves thick, the middle and upper chiefly subulate or linear, 2 cm. long or less.....1. *A. lima*.

Involucre about 3-seriate; leaves thin, the middle ones lanceolate or linear-lanceolate, 3 to 9.5 cm. long.

Leaves 3 to 5 cm. long; involucre 5 mm. high.....2. *A. jalapensis*.

Leaves 5 to 9.5 cm. long; involucre 6 to 7 mm. high.....3. *A. bullatus*.

1. *Aster lima* Lindl. in DC. Prodr. 5: 230. 1836.

?*Aster moranensis* H. B. K. Nov. Gen. & Sp. 4: 93. 1820.

Aster lindenbergii Schultz Bip. in Seem. Bot. Voy. Herald 302. 1856.

Aster ehrenbergii Schultz Bip. in Seem. Bot. Voy. Herald 302. 1856.

?*Aster purpurascens* Schultz Bip. in Seem. Bot. Voy. Herald 303. 1856.

San Luis Potosí to Chiapas; type from Mexico, without definite locality.

Slender, herbaceous or suffrutescent below, up to 60 cm. high, the stem strigose or sometimes hirsute; lower leaves linear to lanceolate, about 3 cm. long, 3 to 7 mm. wide, entire, usually deciduous, the upper linear to subulate or lance-subulate, often reduced to awl-shaped bracts on the peduncles, rough-margined; heads solitary at tips of stem and branches, 1.5 to 2.5 cm. wide; involucre 5 to 8 mm. high, strongly graduate, the phyllaries linear or linear-lanceolate, with conspicuous rhombic green tips, whitish and indurate below, somewhat pubescent; rays "white."

2. *Aster jalapensis* Fernald, Proc. Amer. Acad. 35: 572. 1900.

Veracruz; type from Barranca de Chavarrillo.

Herbaceous or suffrutescent, decumbent at base, about 25 cm. high, hirsute in lines; leaves narrowly lanceolate or oblanceolate, 3 to 10 mm. wide, narrowed into a petioliform base, few-serrulate, hirsute-ciliate toward base; heads few, about 1 cm. wide; involucre graduate, the linear obtusish phyllaries slightly ciliate, appressed; rays white.

3. *Aster bullatus* Klatt, Ann. Naturhist. Hofmus. Wien 9: 359. 1894.

Mexico; type from "Inquila." Guatemala.

Herbaceous or suffrutescent, decumbent at base, about 35 cm. high, hirsutulous above in lines; leaves lanceolate or linear-lanceolate, 5 to 8 mm. wide, narrowed to a petioliform, hirsute-ciliate base, sharply serrulate above; heads paniced, about 1.5 cm. wide.

4. *Aster palmeri* A. Gray, Proc. Amer. Acad. 17: 209. 1882.

Tamaulipas and San Luis Potosí. Texas; type from Corpus Christi Bay.

Frutescent, up to 1.3 meters high, somewhat viscid, much branched; leaves linear, 2 cm. long or less, 1.5 mm. wide or less, thick, 1-nerved, entire; heads solitary at tips of bracteate peduncles, turbinate, 7 to 11 mm. wide; involucre about 5-seriate, graduate, the oblong, obtuse or acutish phyllaries indurate, appressed, with scarious lacerate margins and obscurely greenish, granular-viscid apex; rays 8 to 10, short, white. Plant with the aspect of a *Baccharis*.

5. *Aster carnosus* A. Gray, Syn. Fl. 12: 202. 1884.

Linosyris ? *carnosa* A. Gray, Pl. Wright. 2: 80. 1853.

Bigelovia intricata A. Gray, Proc. Amer. Acad. 17: 208. 1882.

Leucosyris carnosus Greene, Fl. Franc. 384. 1897.

California and Nevada to Arizona; type from west of the Chiricahua Mountains, Arizona. Apparently not yet collected within the limits of Mexico.

Rigidly much branched, frutescent, 1 meter high or less, pale and glaucescent; leaves linear, fleshy, mostly 1 cm. long or less, nerveless, the upper reduced to scales; involucre 5 to 7 mm. high, graduate, the linear, cuspidate-acute or acuminate phyllaries appressed, without herbaceous tips.

6. *Aster spinosus* Benth. Pl. Hartw. 20. 1839.*Leucosyris spinosa* Greene, Pittonia **3**: 244. 1897.*Aster spinosus spinosissimus* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 375. 1917.

Baja California and northern Mexico to Oaxaca; type from Aguascalientes. Texas to Arizona and California; Guatemala, Costa Rica.

Woody below, up to 2.5 meters high, much branched; stem and branches striate-angled, usually bearing stout, subterete or flattened, axillary or supra-axillary spines up to 5 cm. long; leaves subulate to linear, 4 cm. long or usually much less, deciduous; heads 1 to 1.5 cm. wide, solitary at tips of branchlets; involucre 3 to 5 mm. high, of lanceolate narrowly thin-margined phyllaries; rays white; achenes glabrous.

7. *Aster frutescens* S. Wats. Proc. Amer. Acad. **24: 55. 1889.**

Central western Baja California and adjacent islands; type from Los Angeles Bay.

Shrub about 90 cm. high, white-barked; young parts hirtellous-glandular; leaves sessile, 1.5 to 2.5 cm. long, 5 to 12 mm. wide, repandly spiny-toothed, sessile; heads 1.5 to 2 cm. wide, solitary at tips of branchlets; involucre 7 to 10 mm. high, graduate, of lanceolate glandular phyllaries with attenuate greenish tips; rays lilac.

8. *Aster leucelene* Blake in Tidestrom, Contr. U. S. Nat. Herb. **25: 562. 1925.***Inula ericoides* Torr. Ann. Lyc. N. Y. **2**: 212. 1828. Not *Aster ericoides* L. 1753.*Aster ericaefolius* Rothr. Bot. Gaz. **2**: 70. 1877. Not *A. ericaefolius* Forsk. 1775.*Aster ericaefolius tenuis* A. Gray, Syn. Fl. **12**: 198. 1884.*Leucelene ericoides* Greene, Pittonia **3**: 148. 1896.

Chihuahua to San Luis Potosí. Kansas to Texas and Utah; type collected "on the Canadian"?

Slender, many-stemmed, suffruticulose, the stem strigose; lowest leaves usually spatulate, strigose and often hirtellous-ciliate, the upper subulate to linear, 2 to 10 mm. long; heads about 1.5 cm. wide; involucre 5 to 7 mm. high, graduate, the appressed, linear or linear-lanceolate phyllaries acute, scarious-margined, strigose to subglabrous; rays white, often turning purplish red.

28. ERIGERON L. Sp. Pl. 863. 1753.Characters of *Aster*, but involucre obscurely or not at all graduate, rays usually more numerous and narrow, and style branches with short obtuse tips.

The English names "fleabane" and "daisy" are frequently applied to the species of this genus occurring in the United States.

Rays 1 to 1.5 mm. long; involucre 2 to 3 mm. high..... **1. *E. socorrensis*.**

Rays 3 to 6 mm. long; involucre 3 to 5 mm. high.

Involucre finely glandular-puberulous, otherwise essentially glabrous.

2. *E. exilis*.

Involucre sparsely or densely strigose or hirsute, sometimes also glandular-puberulous.

Stem and peduncles pubescent with spreading or reflexed hairs.

3. *E. calcicola*.

Stem and peduncles strigose or pubescent with ascending hairs.

Involucre more or less densely glandular-puberulous as well as hirsute.

4. *E. ervendbergii*.

Involucre sparsely or densely strigose or strigillose, not glandular-puberulous.....

5. *E. karvinskianus*.

1. **Erigeron socorrensis** T. S. Brandeg. *Erythea* 7: 4. 1899.

Socorro and San Benedicto Islands, Baja California; type from Socorro Island.

Frutescent, hirsutulous; leaves crowded, linear-oblongate to obovate, 2.5 to 7 cm. long, 3 to 15 mm. wide, entire, crenate, serrate, or few-lobed, thickish, narrowed into a petioliform base; heads tiny, white, in terminal panicles; involucre hirsutulous, slightly graduate.

2. **Erigeron exilis** A. Gray in S. Wats. *Proc. Amer. Acad.* 22: 422. 1887.

Jalisco; type from Río Blanco.

Suffrutescent, slender, about 25 cm. high, granular-puberulous, at least above, and somewhat hirsute or strigillose; leaves linear-oblongate, 1 to 2.5 cm. long, 1 to 2.5 mm. wide, acute, entire; heads white, 1.5 cm. wide, solitary at tips of branchlets; phyllaries somewhat graduate, linear-lanceolate, acuminate, the inner usually purplish above and subscarios.

3. **Erigeron calcicola** Greenm. *Proc. Amer. Acad.* 41: 256. 1905.

Coahuila to Hidalgo; type from Tula, Hidalgo.

Suffrutescent, 15 to 30 cm. high; leaves oblongate to spatulate-linear, 2.5 cm. long or less, 1 to 5 mm. wide, entire or the lower few-toothed; heads long-pedunculate, 1.5 to 2 cm. wide; phyllaries hirsutulous; rays white or purple-tinged; pappus double.

4. **Erigeron ervendbergii** A. Gray, *Proc. Amer. Acad.* 8: 650. 1873.

San Luis Potosí to Puebla and Veracruz; type from Wartenberg, Veracruz.

Suffrutescent, decumbent at base, with several slender stems, about 30 cm. high; leaves linear to oblongate, usually 2.5 cm. long or less, the lower sometimes 6 cm. long, coarsely few-toothed, narrowed into a slender petiole; heads long-peduncled, 2 cm. wide; involucre subequal; rays purplish-tinged; pappus double.

5. **Erigeron karvinskianus** DC. *Prodr.* 5: 285. 1836.

Erigeron mucronatus DC. *Prodr.* 5: 285. 1836.

Erigeron trilobus Sonder, *Hamb. Gart. Zeit.* 12: 78. 1856, excluding synonym.

Erigeron karvinskianus mucronatus Hieron. *Bot. Jahrb. Engler* 28: 585. 1901.

Vittadinia triloba Auct., not DC.

San Luis Potosí to Chiapas. Guatemala; South America.

Suffrutescent, slender, decumbent, 60 cm. long or less; lower leaves usually cuneate or obovate, few-toothed or lobed, 3 cm. long or less, mucronate, the upper or sometimes all linear-lanceolate, entire; heads long-peduncled, 2 cm. wide; involucre subequal, the linear acuminate phyllaries usually sparsely strigose; rays white or purplish-tinged; pappus double.

DOUBTFUL SPECIES.

ERIGERON DIPLOPAPPOIDES Schauer, *Linnaea* 19: 722. 1847.

29. **BACCHARIS** L. *Sp. Pl.* 860. 1753.

Shrubs, rarely only suffrutescent, dioecious; leaves alternate, entire or toothed; heads small or medium, discoid, whitish, cymose or paniced, rarely subsolitary; involucre graduate, the phyllaries dry, sometimes with green midrib, narrowly scarious-margined; receptacle naked, very rarely paleaceous; pistillate heads with tubular-filiform corollas; staminate heads with the flowers hermaphrodite but sterile, with tubular 5-toothed corollas; achenes small, 5 to 10-nerved; pistillate pappus of soft capillary bristles, 1 to several-seriate, persistent; staminate pappus stiffer, the bristles often somewhat dilated above.—The descriptions of achenes and pappus in the following treatment refer only to the pistillate heads.

The name "chamicillo" is reported for a Mexican species of uncertain specific position. *Baccharis coridifolia* DC. of South America is notorious as being poisonous to sheep and cattle. An alkaloid, baccharine, has been separated from it. *B. halimifolia* L., of the United States, is used in domestic medicine as a remedy for affections of the respiratory system, like some of the Mexican species.

Leaves closely serrulate or serrate (teeth 5 to 10 per cm.).

Heads in long spikelike or raceme-like panicles on the branches.

3. *B. ramulosa*.

Heads in rounded terminal cymose panicles.

Stem and branches glabrous or merely glandular-granular.

Leaves linear to narrowly oblanceolate or linear-oblanceolate.

22. *B. thesioides*.

Leaves lanceolate (distinctly broadest near the base) to cuneate-oblong or oval.

Leaves lanceolate, acuminate; pistillate heads tiny, about 3 mm. high.

21. *B. alamosana*.

Leaves cuneate-oblong or cuneate to oval.

Leaves regularly oval or oblong-oval, finely toothed—19. *B. elegans*.

Leaves cuneate or cuneate-oblong, rather coarsely toothed.

20. *B. bigelovii*.

Stem and branches sordid-pubescent or sordid-puberulous.

Phyllaries (of both staminate and pistillate heads) with green, densely and sordidly glandular-puberulous midline and densely arachnoid-ciliate margin.....23. *B. sordescens*.

Phyllaries not densely arachnoid-ciliate, often subglabrous.

Phyllaries rather densely ciliate, often purplish; staminate heads 4 to 6 mm. high; pistillate heads in fruit 7 to 10 mm. high.

24. *B. multiflora*.

Phyllaries obscurely ciliate, not purplish; staminate heads 3 to 4 mm. high; pistillate heads in fruit 5 to 6 mm. high—25. *B. serraefolia*.

Leaves entire to serrate, the teeth remote (1 to 3 per cm.).

Leaves linear-lanceolate or lanceolate to elliptic-ovate, triplinerved, 5 to 10 cm. long.

Heads few (about 3), long-peduncled17. *B. squarrosa*.

Heads numerous, paniced or cymose.

Leaves elliptic, oblong-elliptic, or oval, entire, strongly triplinerved; branches usually sordid-pubescent or puberulous—27. *B. trinervis*.

Leaves lanceolate, linear-lanceolate, or narrowly oblanceolate, nearly always toothed; branches glabrous or merely glandular-granular.

Leaves chiefly oblanceolate, not acuminate, irregularly few-toothed above; pappus at maturity about 1 cm. long-----4. *B. neglecta*.

Leaves lanceolate or linear-lanceolate, acuminate, usually regularly serrate or serrulate; pappus at maturity about 4 mm. long.

26. *B. glutinosa*.

Leaves linear to cuneate, oblanceolate, or obovate, usually 1-nerved and less than 5 cm. long, sometimes longer.

Leaves cuneate to broadly oblanceolate or obovate, less than five times as long as wide.

Heads large, 8 to 12 mm. high, solitary at tips of short, very leafy branches, these often arranged in long virgate racemes.

Larger leaves cuneate-oblanceolate, sharply serrate or serrulate.

3. *B. ramulosa*.

Larger leaves oblanceolate, entire.....13. *B. macrocephala*

Heads (at least the staminate) smaller, several to many, glomerulate or paniced, rarely solitary at tips of branchlets, these arranged in virgate racemes on the branches.

Heads solitary at tips of short branchlets, these arranged in virgate racemes on the branches.....3. *B. ramulosa*.

Heads otherwise.

Heads paniced, very numerous, usually not overtopped by the leaves.

Pappus about 1 cm. long; receptacle naked.....5. *B. emoryi*.

Pappus about 3 mm. long; pistillate receptacle paleaceous.

11. *B. sergiloides*.

Heads glomerulate at tips of branches or on short subterminal axillary peduncles, usually overtopped by the leaves; pappus in fruit 6 mm. long or less.

Leaves broadly cuneate or rhombic, 3 to 5-toothed, rarely entire, 2 cm. long or less.....7. *B. conferta*.

Leaves elliptic, oval, obovate, or oblanceolate, the larger usually more than 2 cm. long.

Leaves oblanceolate to cuneate-obovate, toothed or entire.

8. *B. heterophylla*.

Leaves elliptic or oval, entire.

Leaves 1.5 to 2.5 cm. long; lateral veins obsolete.

9. *B. vaccinioides*.

Leaves 3 to 6 cm. long; lateral veins finely prominulous beneath.

10. *B. lancifolia*.

Leaves linear to narrowly oblanceolate, more than five times as long as wide.

Heads solitary at tips of densely foliose or bracteate branchlets, these sometimes paniculately arranged.

Larger leaves sharply toothed.....3. *B. ramulosa*.

Larger leaves entire.

Floriferous branchlets covered with linear-oblanceolate or linear-spatulate leaves 1 mm. wide or less; staminate heads 3 to 5 mm. thick12. *B. ramiflora*.

Floriferous branchlets densely crowded with elliptic or oblanceolate leaves 2 to 4 mm. wide; staminate heads 8 to 10 mm. thick.

13. *B. macrocephala*.

Heads usually paniculate or cymose, if solitary at tips of branches then on nearly or quite naked peduncles.

Heads very numerous, in often elongate leafy panicles; pappus in fruit about 1 cm. long; leaves linear-oblanceolate to cuneate-oblanceolate, usually coarsely toothed.

Main stem leaves linear-oblanceolate or narrowly oblanceolate, mostly 1-nerved.....4. *B. neglecta*.

Main stem leaves cuneate-oblanceolate or oblong-oblanceolate, mostly triplinerved.....5. *B. emoryi*.

Heads solitary at tips of nearly naked branchlets or few and long-peduncled, or in nearly naked cymes or panicles.

Heads 1 to 3, long-peduncled at tip of the subsimple stems.

17. *B. squarrosa*.

Heads several to very many; stems usually much branched.

Plants finely and densely hirtellous or puberulous.

18. *B. brachyphylla*.

Plants glabrous or glandular-granular.

Stems broomlike, at flowering time usually essentially naked or with minute scale-like leaves; plants fastigiately much branched.

Pappus in fruit about 12 mm. long-----6. **B. sarothroides.**

Pappus in fruit 3 mm. long-----11. **B. sergiloides.**

Stems not broomlike, normally leafy; plants rarely fastigiate-branched.

Heads mostly in clusters of 3 to 5 at tips of branches, short-pedicelled; leaves chiefly oblanceolate or elliptic-oblong, entire, the larger about 2.5 cm. long, 7 mm. wide.

14. **B. palmeri.**

Heads solitary at tips of branches or cymose-panicled; leaves chiefly linear or very narrowly linear-oblanceolate.

Heads several or numerous, loosely or rarely rather densely cymose-panicled; pappus 4 to 8 mm. long.

Pistillate heads 6 to 7 mm. high, their pedicels 2.3 cm. long or less; pappus 4 mm. long; plant suffrutescent.

15. **B. potosina.**

Pistillate heads 9 to 10 mm. high, their pedicels 1.5 to 7 cm. long; pappus 7 mm. long; plants herbaceous nearly throughout-----16. **B. occidentalis.**

Heads solitary at tips of the numerous branches; stems usually less than 60 cm. high; pappus 10 to 15 mm. long.

Stems much branched throughout, the leaves scattered, the lower oblanceolate, the upper reduced.

. 1. **B. wrightii.**

Stems simple or subsimple at least below, densely leafy throughout, the leaves linear or linear-oblanceolate.

2. **B. texana.**

1. **Baccharis wrightii** A. Gray, Pl. Wright. 1: 101. 1852.

Baccharis wrightii pyrrhopappa A. Gray, Pl. Wright. 2: 84. 1853.

Chihuahua and Durango. Kansas to Texas and Arizona; type from Valley of the Limpio, western Texas.

Herbaceous from a suffrutescent base, 50 cm. high or less, glabrous, pale green, the stems striate, much branched, sparsely leafy above; lower leaves oblanceolate, entire, 2 cm. long or less, the upper chiefly linear-subulate; involucre 7 to 12 mm. high, the phyllaries with conspicuous greenish center, acute or acuminate; achenes 8 to 10-nerved, glandular-scabridulous; pappus rufescent, 1 cm. long or more.

2. **Baccharis texana** (Torr. & Gray) A. Gray, Mem. Amer. Acad. n. ser. 4: 75. 1849.

Linosyris texana Torr. & Gray, Fl. N. Amer. 2: 232. 1842.

Tamaulipas. Texas; type from Texas.

Stems several, mostly herbaceous from a suffrutescent base, nearly simple, leafy throughout; leaves linear to narrowly linear-oblanceolate, the larger 2 to 4.8 cm. long, 1 to 3 mm. wide, 1-nerved, wavy-margined; involucre 4 to 8 mm. long, the phyllaries with greenish midline; achenes about 8-nerved, glandular-scabridulous; pappus rufescent, 1 cm. long or more.

3. **Baccharis ramulosa** (DC.) A. Gray, Mem. Amer. Acad. n. ser. 5: 301. 1854.

Aplopappus ramulosus DC. Prodr. 5: 350. 1836.

Baccharis pteronioides DC. Prodr. 5: 410. 1836.

Linosyris ramulosa A. Gray, Pl. Wright. 2: 80. 1853.

Baccharis fasciculata Klatt, Leopoldina 20: 91. 1884, nomen nudum.

Chihuahua and Tamaulipas to Puebla; type from Tlapuajahua. New Mexico and Arizona.

Diffusely branched, low shrub, glandular-roughened, white-barked; larger leaves cuneate-oblongate, about 1.5 cm. long, 3 to 5 mm. wide, sharply serrulate or serrate-dentate, chiefly deciduous at flowering time, those of the branches fascicled, linear or linear-oblongate, mostly entire and 5 mm. long or less; involucre 3 to 6 mm. high, the phyllaries with greenish midline; achenes about 8-nerved, glandular-scabridulous; pappus somewhat straw-colored, 8 to 10 mm. long. "Hierba del pasmo" (Coahuila); "popotillo" (Nayarit); "boshi" (Otomí, Urbina); "jaral blanco," "tepopote" (Jalisco); "tepopotl" (Nahuatl).

In Coahuila the dried and powdered plant is employed as a dressing for sores.

4. *Baccharis neglecta* Britton in Britt. & Brown, Illustr. Fl. 3: 394. f. 3835. 1898.

Baccharis angustifolia A. Gray, Journ. Bost. Soc. Nat. Hist. 6: 224. 1850.

Not *B. angustifolia* Michx. 1803.

Chihuahua to Coahuila and Durango. Nebraska to Texas.

Shrubby, about 1 meter high, glandular-glutinous, with numerous erect or ascending, striate, leafy branches; leaves linear to oblongate, the larger 4 to 8 cm. long, 3 to 8 mm. wide, coarsely few-toothed or entire, weakly triplinerved; heads very numerous, in usually broad leafy panicles; involucre 3 to 4 mm. high; achenes about 8-nerved, glabrous; pappus brownish-tinged, 1 cm. long. "Jarilla común," "jarilla del río" (Durango).

5. *Baccharis emoryi* A. Gray in Torr. U. S. & Mex. Bound. Bot. 83. 1859.

Northern Mexico (according to Hemsley). Utah to California and Arizona; type from the Gila River, Arizona.

Glutinous shrub, up to 4.5 meters high; leaves oblongate or oblong-elliptic, 2 to 6.5 cm. long, 3 to 18 mm. wide, coarsely few-toothed or entire, triplinerved; involucre 4 to 8 mm. long; achenes glabrous, about 8-nerved; pappus brownish white, about 1 cm. long.

6. *Baccharis sarothroides* A. Gray, Proc. Amer. Acad. 17: 211. 1882.

Sonora, Sinaloa, and Baja California and its islands. California; type from San Diego County.

Glutinous shrub, up to 4.5 meters high, with densely fastigate, striate-angled branchlets; larger leaves linear, 2 cm. long or less, entire, deciduous, those of the branchlets minute, scale-like; involucre 2 (staminate) to 8 mm. high; achenes glabrous, about 8-nerved; pappus brownish-tinged, about 1 cm. long. "Hierba del pasmo" (Baja California).

The twigs are chewed as a remedy for toothache (*Palmer*).

7. *Baccharis conferta* H. B. K. Nov. Gen. & Sp. 4: 55. 1820.

Baccharis zalapensis H. B. K. Nov. Gen. & Sp. 4: 56. 1820.

Baccharis philippensis Less. in Schlecht. & Cham. Linnaea 5: 147. 1830. Not

B. philipensis H. B. K. 1820.

Baccharis cuneata DC. Prodr. 5: 408. 1836.

?*Baccharis orizabaensis* Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 130. 1881, nomen nudum.

San Luis Potosí to Puebla and Veracruz; type from Cuernavaca, Morelos.

Much-branched glutinous shrub, up to 2 meters high, very leafy; leaves cuneate or rhombic-cuneate, 1 to 2 cm. long, 4 to 15 mm. wide, usually 3 or 5-dentate, rarely entire, 1-nerved; heads sessile in close clusters 1 to 2.5 cm. wide at tips of branches; involucre 3 mm. high; achenes glabrous, about 10-nerved, the brownish-tinged pappus about 5 mm. long. "Escobilla" (Morelos); "tepopote" (Urbina); "escoba del monte" (Veracruz); "hierba del carbonero" (Valley of Mexico).

8. *Baccharis heterophylla* H. B. K. Nov. Gen. & Sp. 4: 62. 1820.

San Luis Potosí and Tepic to Oaxaca and Yucatán; type from Guanajuato, Guatemala.

Much-branched glutinous shrub, 0.6 to 2.5 meters high, densely leafy; leaves oblanceolate or elliptic-oblanceolate to cuneate-obovate, mostly 2 to 5.5 cm. long, 3 to 20 mm. wide, few-toothed or sometimes entire, 1-nerved or faintly triplinerved; other characters as in *B. conferta*. "Jara" (Langlassé); "escobilla" (Valley of Mexico).

9. *Baccharis vaccinioides* H. B. K. Nov. Gen. & Sp. 4: 50. 1820.

Southern Mexico; type from Morán. Guatemala.

Similar to *B. heterophylla*; leaves elliptic or oval, 1 to 2.5 cm. long, 6 to 10 mm. wide, acute, entire or "rarely 1-toothed on each side," 1-nerved.

10. *Baccharis lancifolia* Schlecht. Linnaea 9: 266. 1834.

Veracruz and Puebla; type from Jalapa, Veracruz.

Similar to *B. vaccinioides*; leaves elliptic, 3.5 to 6 cm. long, 1 to 2 cm. wide, 1-nerved. "Mesté" (Chiapas, Seler).

11. *Baccharis sergiloides* A. Gray in Torr. U. S. & Mex. Bound. Bot. 83. 1859.

Sonora. California and Nevada to Arizona; type from the Gila or Colorado River, Arizona.

Suffrutescent, glutinous, up to 1.6 meters high, the very numerous erect branches strongly striate-angled; larger leaves cuneate or cuneate-obovate, about 2.5 cm. long, 3 to 8 mm. wide, entire, somewhat venose, mostly deciduous, those of the branchlets mostly linear or scale-like; heads very numerous, naked-paniculate; achenes glabrous, 10-nerved; pappus about 3 mm. long; receptacle paleaceous, at least in the pistillate heads.

12. *Baccharis ramiflora* A. Gray, Proc. Amer. Acad. 15: 33. 1879.

Baccharis ramiflora squarrulosa A. Gray, Proc. Amer. Acad. 15: 33. 1879.

San Luis Potosí.

Glutinous shrub, 1 meter high or less; stem leaves oblanceolate or linear-oblanceolate, 1.8 to 7.5 cm. long (including the petioliform base), 2 to 5 mm. wide, entire, obscurely triplinerved, those of the branchlets chiefly narrowly linear-spatulate, crowded; branchlets 1-headed, sometimes racemosely arranged on the branches; involucre 3 to 6 mm. high, the phyllaries obtuse or acutish; achenes 8-nerved, obscurely glandular-scabridulous; pappus brownish-tinged, 5 mm. long.

13. *Baccharis macrocephala* Schultz Bip.; Greenm. Proc. Amer. Acad. 35: 575. 1899.

Distrito Federal to Veracruz; type from Veracruz.

Glutinous shrub, about 60 cm. high; stem leaves oblanceolate or elliptic, 2 to 3 cm. long, 3 to 6 mm. wide, with usually reflexed apex, 1-nerved, entire, deciduous, those of the flowering branchlets smaller, densely crowded; branchlets monocephalous, virgately arranged; heads subglobose, 9 to 14 mm. high, 10 to 17 mm. thick; achenes 8-nerved, somewhat glandular; pappus 1 cm. long, slightly exceeding the styles.

14. *Baccharis palmeri* Greenm. Proc. Amer. Acad. 41: 259. 1905.

Known only from the type locality, vicinity of Durango, Durango.

Suffruticose, 20 to 30 cm. high, several-stemmed, glandular-viscid, very leafy; larger leaves oblanceolate or oblong-elliptic, 1.5 to 2.8 cm. long, 3 to 8 mm. wide, 1-nerved or weakly triplinerved, entire; heads in clusters of 3 to 5 at tips of branchlets, short-pediceled or subsessile; involucre about 3-seriate, 6 to 7 mm. long, the phyllaries acute; achenes essentially glabrous, about 8-nerved; pappus 12 mm. long.

15. *Baccharis potosina* A. Gray, Proc. Amer. Acad. **15**: 33. 1879.

Coahuila and San Luis Potosí; type from San Luis Potosí.

Suffrutescent, glutinous, much branched, 50 cm. high or more, the slender erect branches striate; leaves linear to narrowly linear-ob lanceolate or linear-lanceolate, 2 to 4.5 cm. long, 1 to 3 mm. wide, 1-nerved, acute or acuminate, entire or sometimes with a few small acute teeth above; heads from solitary at tips of the numerous branches to loosely cymose-panicled or rather closely panicled, always rather numerous, 3 to 7 mm. high; achenes 5-nerved, glabrous; pappus 4 mm. long.

16. *Baccharis occidentalis* Blake, Contr. U. S. Nat. Herb. **22**: 595. 1924.

Tepic and Jalisco; type from Guadalajara, Jalisco.

Stems numerous, 60 to 80 cm. high, slender, junciform, glabrous, striate, not distinctly viscid, herbaceous almost throughout; leaves chiefly below the middle of stem, linear to very narrowly linear-lanceolate or oblanceolate, 2.5 to 5 cm. long, 1.5 to 4 mm. wide, entire or with a few slender acute teeth above, weakly triplinerved; achenes glandular, 5-nerved; pappus about 7 mm. long.

17. *Baccharis squarrosa* H. B. K. Nov. Gen. & Sp. **4**: 67. 1820.

Baccharis seemanni A. Gray, Proc. Amer. Acad. **15**: 33. 1879.

Sierra Madre of northwestern Mexico, Guanajuato, and San Luis Potosí; type collected near Guanajuato.

Stems subsimple, about 40 cm. high, striate, somewhat glutinous, herbaceous nearly to base; leaves linear-lanceolate or linear, 2 to 5.5 cm. long, 2 to 4 mm. wide, entire, weakly triplinerved; heads 1 to 4, 1 to 1.2 cm. high, long-peduncled; involucre 7 to 9 mm. high, the phyllaries with broad green midline; achenes glandular, 5-ribbed; pappus (immature) 7 mm. long, scarcely exceeding the styles.

18. *Baccharis brachyphylla* A. Gray, Pl. Wright. **2**: 83. 1853.

Sonora. California and Arizona; type collected between Conde's Camp and the Chiricahua Mountains, Arizona.

Suffrutescent, 1 meter high or less, much branched, densely and finely puberulous; leaves linear or oblong-linear, entire, 1.5 cm. long or less; heads numerous, in rather open panicles; involucre 3 to 6 mm. high; achenes 5-nerved, glandular-pilosulous; pappus about 7 mm. long.

19. *Baccharis elegans* H. B. K. Nov. Gen. & Sp. **4**: 60. *pl.* 324. 1820.

Baccharis oligantha Schultz Bip.; Klatt, Leopoldina **20**: 91. 1884, as synonym.

Puebla and Oaxaca; type locality unknown.

Glutinous shrub 1 meter high or less; leaves oval or oblong, 1.3 to 3 cm. long, 6 to 18 mm. wide, short-petioled, closely sharp-serrate or serrulate, veiny, barely triplinerved; panicles rounded, many-headed; involucre 2.5 to 5 mm. high; achenes 5-nerved, essentially glabrous; pappus 5 mm. long.

20. *Baccharis bigelovii* A. Gray in Torr. U. S. & Mex. Bound. Bot. **84**. 1859.

Sonora to Coahuila; type from Puerto de Paysano, Sonora. Texas and New Mexico.

Similar to *B. elegans*; leaves cuneate or cuneate-oblong to oblong-ob lanceolate, 1.5 to 3.5 cm. long, 4 to 15 mm. wide, 1-nerved or obscurely triplinerved, not venose, rather coarsely toothed.

21. *Baccharis alamosana* Blake, Contr. U. S. Nat. Herb. **22**: 595. 1924.

Known only from the type locality, Sierra de Alamos, Sonora.

Frutescent, somewhat glutinous, slender, 40 cm. high and more; leaves lanceolate, 1.8 to 3.5 cm. long, 4 to 9 mm. wide, petioled, finely serrulate, acuminate; pistillate heads tiny, in small cymose panicles; involucre about 2.5 mm. high; achenes 5-angled, glabrous; pappus 2.5 mm. long.

22. *Baccharis thesioides* H. B. K. Nov. Gen. & Sp. 4: 61. 1820.*Baccharis ptarmicaefolia* DC. Prodr. 5: 419. 1836.*Baccharis sulcata* DC. Prodr. 5: 419. 1836.

Sonora to Jalisco and Mexico; type from Santa Rosa (Guanajuato?). Arizona and New Mexico.

Shrubby, scarcely glutinous, 2 meters high or less; leaves linear to narrowly oblanceolate, 2 to 8.5 cm. long, 1.5 to 8 mm. wide, usually acute, closely sharp-serrulate, 1-nerved or weakly triplinerved; heads 4 to 6 mm. high, numerous in rounded panicles; achenes 5-nerved, glabrous or glandular; pappus about 3.5 mm. long.

23. *Baccharis sordescens* DC. Prodr. 5: 405. 1836.

San Luis Potosí to Oaxaca; type from Mexico, without definite locality.

Shrub, up to 3 meters high, densely sordid-tomentulose or puberulous; leaves oblong, elliptic-oblong, or elliptic, 1.5 to 5.5 cm. long, 5 to 18 mm. wide, closely sharp-serrulate, triplinerved, usually obtuse; panicles rounded, many-headed; involucre 4 to 7 mm. high, strongly graduate, the obtuse green-centered phyllaries densely arachnoid-pilose-ciliate, more or less glandular and tomentulose; achenes 5-nerved, subglabrous; pappus whitish, 6 mm. long.

24. *Baccharis multiflora* H. B. K. Nov. Gen. & Sp. 4: 59. 1820.

State of Mexico to Chiapas; type from Tianguillo and Toluca, State of Mexico.

Shrub, up to 3 meters high, rufescent or sordid-tomentulose at least on the younger parts; leaves elliptic to obovate, 2 to 9 cm. long, 0.8 to 3 cm. wide, closely sharp-serrulate, scarcely triplinerved; panicles rounded; achenes and pappus as in *B. sordescens*. "Hierba del carbonero," "hierbabuena del carbonero," "escobilla," "tepopote," "tepopotl," "limpia-tuna" (Valley of Mexico).

An infusion of the leaves is much used in the Valley of Mexico as a remedy for nasal catarrh.

25. *Baccharis serraefolia* DC. Prodr. 5: 403. 1836.

?*Baccharis parviflora* Less. in Schlecht. & Cham. Linnaea 5: 146. 1830.

Durango to Veraacruz; type from Santa Rosa and Los Ioares, Guanajuato. Guatemala.

Similar to *B. multiflora*; heads smaller; phyllaries obscurely ciliate; pappus 4 mm. long.

26. *Baccharis glutinosa* Pers. Syn. Pl. 2: 425. 1807.

Molina viscosa Ruiz & Pav. Syst. Veg. Peruv. Chil. 207. 1798. Not *Baccharis viscosa* Lam. 1783.

Baccharis farinosa Spreng. in Ersch & Gruber, Allg. Encycl. 7: 27. 1821.

Baccharis coerulescens DC. Prodr. 5: 402. 1836.

Baccharis alamani DC. Prodr. 5: 402. 1836.

Baccharis longifolia DC. Prodr. 5: 402. 1836.

Sonora to Tamaulipas, south to Oaxaca; Baja California. California to Colorado and Texas; central and western South America; type from South America.

Woody below, glutinous, up to 4 meters high, very leafy; leaves linear to lanceolate, 5 to 12 cm. long, 4 to 18 mm. wide, acuminate at each end, usually remotely but regularly serrate or serratulate, sometimes entire, somewhat triplinerved; panicles terminal, rounded, many-headed; involucre stramineous, 3 to 5 mm. high; achenes 5-angled; pappus whitish, about 4 mm. long. "Jarilla" (Sinaloa, Chihuahua); "jara" (Guanajuato, Texas); "hierba del carbonero" (Valley of Mexico); "jaral" (Tamaulipas, Guanajuato); "jarilla común," "jarilla del río" (Durango); "jara dulce" (Texas); "chilca," "sauce" (El Salvador).

This species is a common shrub along river valleys in the drier parts of Mexico, often forming dense and extensive thickets. The branches are employed for covering the rafters of houses before the tiles or thatch are placed upon them. A decoction of the leaves is used as an eye wash, and the leaves are applied as poultices to sores. The branches are often utilized for making coarse brooms.

27. *Baccharis trinervis* (Lam.) Pers. Syn. Pl. 2: 423. 1807.

?*Conyza trinervia* Mill. Gard. Diet. ed. 8. *Conyza* no. 12. 1768.

Conyza trinervis Lam. Encycl. 2: 85. 1786.

Veracruz. Central and South America; type from Brazil.

Shrubby, about 4 meters high, subscandent, the stem striate-angled, glabrous; leaves elliptic or oblong-elliptic to lance-elliptic or ovate-elliptic, the larger 5 to 9.5 cm. long, 1.5 to 3.5 cm. wide, entire, acute or acuminate, strongly triplinerved; panicles terminating stem and branches, rounded or narrow, many-headed; involucre about 4 mm. high; achenes 5-nerved, sparsely hispidulous; pappus brownish-tinged, 4 mm. long. "Canutillo," "hierba de Santo Domingo" (El Salvador).

27a. *Baccharis trinervis rhexioides* (H. B. K.) Baker in Mart. Fl. Bras. 6³: 73. 1882.

Baccharis rhexioides H. B. K. Nov. Gen. & Sp. 4: 66. 1820.

Baccharis trichoclada DC. Prodr. 5: 400. 1836.

San Luis Potosí and Tepic to Tabasco and Chiapas. Central and South America; type from Montán, Peru.

Stem and sometimes veins of lower leaf surface more or less densely sordid-tomentulose or puberulous; otherwise as in the typical form. "Barba fina" (Guatemala); "tapabarranco" (El Salvador); "Santo Domingo" (Costa Rica); "huichín prieto" (San Luis Potosí, *Seler*).

DOUBTFUL SPECIES.

BACCHARIS ASPERULA Schauer, Linnaea 19: 725. 1847. Said to be allied to *B. xalapensis* H. B. K.; the type is *Aschenborn* 464, from Zimapán, Hidalgo.

BACCHARIS LINIFOLIA DC. Prodr. 5: 420. 1836. Based on specimens collected by Haenke at Real del Monte, Hidalgo.

BACCHARIS POLYGALAEFOLIA H. B. K. Nov. Gen. & Sp. 4: 49. 1820. Based on specimens collected at Morán, Mexico, and in the Andes of Popayán, Colombia.

BACCHARIS SPATHULATA Schauer, Linnaea 19: 724. 1847. Collected in Mexico, without definite locality, by *Aschenborn* (no. 107). Said to be near *B. polygalaefolia* H. B. K.

BACCHARIS TRICHOTOMA Klatt, Leopoldina 20: 91. 1884. Based on material collected in Mexico by *Liebmann*.

30. *ARCHIBACCHARIS* Heering, Jahrb. Hamb. Wiss. Anst. 21: Beih. 3: 40. 1904.

REFERENCE: Blake, *Hemibaccharis*, a new genus of Baccharidinae, Contr. U. S. Nat. Herb. 20: 543-554. pl. 48-51. 1924.

Characters of *Baccharis*, but plants polygamo-dioecious; staminate plants as in *Baccharis*; pistillate heads with 1 to 15 central hermaphrodite sterile flowers. Leaves amplexicaul; heads larger, the pistillate 10 mm. high, the staminate 5 to 8 mm. high.

Stem densely pubescent with spreading gland-tipped hairs... 1. *A. oaxacana*.

Stem not glandular-pubescent..... 2. *A. pringlei*.

Leaves not amplexicaul; heads smaller, not over 5.5 mm. high.

Plants scandent or subscandent, the branches usually conspicuously zigzag; heads in usually small rounded panicles terminating the numerous wide-spreading branchlets.

Heads tiny, 2 to 3.5 mm. high; leaves chiefly ovate or elliptic.

3. *A. hirtella*.

Heads 4 to 5.5 mm. high; leaves chiefly oval or oval-ovate... 4. *A. torquis*.

Plants erect, not scandent, the branches straight; heads in large terminal panicles.

Stem densely cinereous- or griseous-puberulous or hirtellous, sometimes tomentose.....5. **A. mucronata.**

Stem glabrous or essentially so, at least below, and often glaucous, rarely sparsely arachnoid.

Leaves oval or ovate-oval, the larger 3 to 6 cm. wide...6. **A. sescenticeps.**

Leaves narrowly lanceolate to elliptic or oblong, the larger 1 to 3.5 cm. wide.

Leaves narrowly lanceolate, glabrous.....7. **A. androgyna.**

Leaves chiefly elliptic, pubescent at least on the veins beneath.

8. **A. asperifolia.**

1. **Archibaccharis oaxacana** (Greenm.) Blake.

Baccharis oaxacana Greenm. Proc. Amer. Acad. 40: 37. 1904.

Hemibaccharis oaxacana Blake, Contr. U. S. Nat. Herb. 20: 546. 1924.

Known only from the type locality, Sierra de San Felipe, Oaxaca.

Suffrutescent at the procumbent base, 20 to 50 cm. high; leaves chiefly obovate or oval, 4 to 8 cm. long, 1.5 to 3.5 cm. wide, including the rather abruptly contracted, petioliform, marginate and amplexicaul basal portion, shallowly mucronate-dentate; heads few in a terminal cymose panicle, the pistillate 1 cm. high, the staminate about 8 mm. high.

2. **Archibaccharis pringlei** (Greenm.) Blake.

Baccharis pringlei Greenm. Proc. Amer. Acad. 41: 225. 1905.

Hemibaccharis pringlei Blake, Contr. U. S. Nat. Herb. 20: 547. pl. 48. 1924.

Known only from the type locality, Sierra de San Felipe, Oaxaca.

Similar to *B. oaxacana*; leaves ovate, 4 to 12 cm. long, 2 to 5.5 cm. wide; inflorescence a terminal many-headed panicle; staminate heads 5 mm. high; pistillate heads unknown.

3. **Archibaccharis hirtella** (DC.) Heering, Jahrb. Hamb. Wiss. Anst. 21: Beih. 3: 41. 1904.

Baccharis scandens Less. Linnaea 5: 146. 1830. Not *B. scandens* Pers. 1807.

Baccharis hirtella DC. Prodr. 5: 418. 1836.

Baccharis schiedeana Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 83. 1852.

Baccharis thomasi Klatt, Abh. Naturf. Ges. Halle 15: 326. 1882.

Hemibaccharis hirtella Blake, Contr. U. S. Nat. Herb. 20: 549. 1924.

Tepic to Veracruz and Oaxaca; type from Mexico, without definite locality. Guatemala.

Suffrutescent, scandent, up to 5 meters high; stem slender, sordidly glandular-puberulous or sometimes sordid-pilose; leaves short-petioled, the blades 2 to 6.5 cm. long, 1 to 2.5 cm. wide, acuminate, serrulate, pubescent or puberulous at least beneath.

4. **Archibaccharis torquis** Blake.

Hemibaccharis torquis Blake, Contr. U. S. Nat. Herb. 20: 550. pl. 51. 1924.

Veracruz and Oaxaca. Guatemala to Costa Rica; type from San José, Costa Rica.

Stouter than *A. hirtella*; leaves oval or oval-ovate, the blades 3 to 8 cm. long, 1.8 to 5 cm. wide, acute; panicles and heads larger.

5. **Archibaccharis mucronata** (H. B. K.) Blake.

Baccharis mucronata H. B. K. Nov. Gen. & Sp. 4: 60. 1820.

Pluchea floribunda Hemsl. Diag. Pl. Mex. 32. 1879.

Hemibaccharis mucronata Blake, Contr. U. S. Nat. Herb. 20: 550. 1924.

Chihuahua to Oaxaca; type collected between Santa Rosa and Los Ioares, Guanajuato.

Suffrutescent below, up to 2.5 meters high; stem densely and harshly griseous-puberulous; leaves chiefly ovate, petioled, the blades 4 to 11 cm. long, 1.5 to 5 cm. wide, serrate, very harsh above, puberulous beneath; heads very numerous, about 4 mm. high. "Hierba del carbonero" (Valley of Mexico).

A decoction of the flowers is reported to be used as a remedy for catarrh.

5a. *Archibaccharis mucronata paniculata* (Donn. Smith) Blake.

Diplostephium paniculatum Donn. Smith, Bot. Gaz. **23**: 8. 1897.

Hemibaccharis mucronata paniculata Blake, Contr. U. S. Nat. Herb. **20**: 551. 1924.

Veracruz to Oaxaca and Chiapas. Guatemala; type collected between San Martín and Todos Santos, Guatemala.

Pubescence soft; lower leaf surface and often the stem densely tomentose.

6. *Archibaccharis sescenticeps* Blake.

Hemibaccharis sescenticeps Blake, Contr. U. S. Nat. Herb. **20**: 552. 1924.

Jalisco to Mexico and Guerrero; type from Mount Ixtaccihuatl, State of Mexico.

Suffrutescent (?), stout, glabrous and glaucescent below or thinly arachnoid; leaves petioled, the blades 6 to 13 cm. long, 3 to 6 cm. wide, serrate, short-acuminate, smoothish above; heads 3.5 to 4.5 mm. high.

7. *Archibaccharis androgyna* (T. S. Brandeg.) Blake.

Baccharis androgyna T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 77. 1914.

Hemibaccharis androgyna Blake, Contr. U. S. Nat. Herb. **20**: 552. 1924.

Known only from the type locality, Cerro de Boquerón, Chiapas.

Slender, suffrutescent, glabrous throughout; leaves on short but slender petioles, the blades narrowly lanceolate, 5.5 to 9.5 cm. long, 1 to 1.8 cm. wide, falcate-attenuate, serrulate; panicles many-headed, terminal, 5 to 8 cm. wide; pistillate heads 3 to 4 mm. high.

8. *Archibaccharis asperifolia* (Benth.) Blake.

Baccharis asperifolia Benth. Pl. Hartw. 86. 1841.

Conyza asperifolia Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 126. 1881.

Baccharis scabridula T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 77. 1914.

Hemibaccharis asperifolia Blake, Contr. U. S. Nat. Herb. **20**: 552. 1924.

Mexico to Chiapas. Guatemala to Nicaragua; type from Mixco, Guatemala.

Suffrutescent below, up to 3 meters high, essentially glabrous and usually glaucescent below; leaves chiefly elliptic, 4 to 11 cm. long, 1 to 3.5 cm. wide, acuminate, subentire or serrate; panicles large, with innumerable heads, these 2.5 to 5 mm. high.

DOUBTFUL SPECIES.

BACCHARIS ELEGANS SEEMANNII Schultz Bip. in Seem. Bot. Voy. Herald 303. 1856. This variety, described from the Sierra Madre, may belong in this genus. The description is very brief, and no specimens have been examined by the writer.

31. *PLUCHEA* Cass. Bull. Soc. Philom. Paris 1817: 31. 1817.

Shrubby or herbaceous; leaves alternate, entire or toothed; heads disciform, medium-sized, cymose or cymose-panicled, purplish or whitish; involucre several-seriate, of dry, often purplish phyllaries; outer flowers pistillate, several-seriate, with filiform corollas; inner flowers hermaphrodite; anthers sagittate at base, with caudate auricles; achenes small, 4 or 5-angled; pappus 1-seriate, setose.

Stem winged by the decurrent leaf bases.....1. *P. adnata*.

Stem wingless.

Leaves narrowly elliptic, silky-pubescent, sessile, 5 cm. long or less.

2. *P. sericea*.

Leaves broadly elliptic or oval, not silky-pubescent, petioled, 10 cm. long or

more.....3. *P. odorata*.

1. **Pluchea adnata** (Humb. & Bonpl.) Mohr, Contr. U. S. Nat. Herb. 6: 790. 1901.

Baccharis adnata Humb. & Bonpl.; Willd. Enum. Pl. 2: 870. 1809.

Conyza adnata H. B. K. Nov. Gen. & Sp. 4: 74. 1820.

Pluchea subdecurrens Cass. Dict. Sci. Nat. 42: 4. 1826.

Sonora to Michoacán and Puebla. Guatemala; type from "America meridionali."

Suffrutescent, about 1 meter high, glandular and loosely pilose; leaves linear to lanceolate, 3.5 to 11 cm. long, 4 to 22 mm. wide, entire to sharply toothed, conspicuously decurrent; panicles 4 to 13 cm. wide, rounded; heads 4 to 8 mm. thick; involucre 3 to 5 mm. high; inner phyllaries caudate-attenuate. "Jara" (Michoacán or Guerrero).

- 1a. **Pluchea adnata canescens** (A. Gray) Blake.

Pluchea subdecurrens canescens A. Gray, Proc. Amer. Acad. 5: 182. 1861.

Sinaloa to Coahuila, Tamaulipas, and Guerrero; type from Tantoyuca, Veracruz.

Plant more or less densely canescent-tomentose. "Santa Isabel" (Tamaulipas).

- 1b. **Pluchea adnata parvifolia** (A. Gray) Blake.

Pluchea subdecurrens parvifolia A. Gray, Proc. Amer. Acad. 5: 160. 1861.

Southern Baja California; type from vicinity of Cape San Lucas.

Very densely viscid-glandular, with few or no long hairs; heads 7 to 12 mm. thick; involucre 5 to 6 mm. high.

2. **Pluchea sericea** (Nutt.) Coville, Contr. U. S. Nat. Herb. 4: 128. 1893.

Polypappus sericeus Nutt. Journ. Acad. Phila. II. 1: 178. 1848.

Tessaria borealis "DC.;" Torr. & Gray in Emory, Mil. Recon. 143. 1848, nomen nudum.

Pluchea borealis A. Gray, Proc. Amer. Acad. 17: 212. 1882.

Berthelotia sericea Rydb. Bull. Torrey Club 33: 154. 1906.

Sonora, Chihuahua, and Baja California. Southwestern United States; type from California.

Shrub up to 5 meters high, silky-canescant, very leafy; leaves narrowly elliptic or lance-elliptic, entire; corymbs small, terminating branches and branchlets; phyllaries ovate to oblong, obtuse to acute. "Cachanilla," "cachimilla" (California, Texas, New Mexico).

The shrub is abundant in many places in the alluvial soil of river valleys, often forming dense and pure stands. By the Indians the slender straight stems were used for the shafts of arrows and for making bird cages, storage bins, and baskets. An infusion of the stems was employed by the Pimas as a remedy for sore eyes.

3. **Pluchea odorata** Nat. (L.) Cass. Dict. Sci. Nat. 42: 3. 1826.

Conyza odorata L. Syst. Nat. ed. 10. 2: 1213. 1759.

?*Conyza cortesii* H. B. K. Nov. Gen. & Sp. 4: 75. 1820.

?*Pluchea cortesii* DC. Prodr. 5: 452. 1836.

Baja California and Sinaloa to Tamaulipas, south to Yucatán. Florida, Central and South America, West Indies; type from Jamaica.

Shrubby, 2.5 meters high or less, the stem cinereous-tomentose or sordid-tomentose, glabrescent below; petioles 1 to 2.5 cm. long; leaf blades elliptic to oval or oblong-ovate, 6 to 20 cm. long, 2.5 to 10 cm. wide, entire or sometimes repand-denticulate, paler and sordid-tomentulose beneath; panicles usually 10 to 20 cm. wide. "Santa María" (Tamaulipas, Yucatán); "alinanche" (Sinaloa); "hierba de Santa María" (Nuevo León); "chalché" (Yucatán, Guatemala, Maya); "canela," "canelón" (Baja California); "chalchay" (Yucatán); "su-

quinay" (Guatemala, El Salvador); "ciguapate" (El Salvador); "salvia" (Porto Rico, Nicaragua); "salvia de playa," "salvia cimarrona," "salvia del país" (Cuba); "nahuapate," "suquinayo," "suquinay," "siguapete" (El Salvador).

In the Bahamas the shrub is called "sour-bush." The flowers are said to be a source of honey. In Tamaulipas an infusion of the leaves in alcohol is applied externally to relieve neuralgia and rheumatism. Seler reports that in Yucatán the leaves are heated and applied hot as a hemostatic, while in the same State the plant is employed as a febrifuge and emmenagogue. Descourtilz states that in the West Indies the plant was used as a remedy for the bites of venomous animals and that a decoction of the leaves was taken as a remedy for stomach affections.

32. **ACHYROCLINE** (Less.) DC. Prodr. 6: 219. 1837.

1. **Achyrocline ventosa** Klatt, Linnaea 42: 112. 1878.

Gnaphalium ventosum Schultz Bip.; Klatt, Linnaea 42: 112. 1878, as synonym.

Known only from the type locality, Cerro Ventoso, Mexico.

"Suffruticose," the ascending stems about 15 cm. high, white-lanate; leaves lanceolate, 2.5 to 4 cm. long, about 4 mm. wide, acuminate, undulate, amplexicaul-decurrent, densely lanate, subglabrescent above; heads about 4 mm. long, cylindric, crowded in dense glomerules; involucre lanate at base, the phyllaries acute, ochraceous; pistillate flowers 3, hermaphrodite 1.

Only a fragment of the type, accompanied by sketches, has been examined, and the status of the species is uncertain.

33. **GNAPHALIUM** L. Sp. Pl. 850. 1753.

Herbaceous, rarely suffrutescent, tomentose; leaves alternate, entire; heads small, cymose or paniced, often glomerate; involucre graduate, of scarious phyllaries; heads many-flowered, disciform, the outer flowers pistillate, with filiform corollas, the inner flowers hermaphrodite, tubular, all whitish or purplish red (in the following species); anthers caudate at base; pappus setose, the bristles in the hermaphrodite flowers sometimes clavellate.

Larger leaves 3 to 7.5 cm. long.

Leaves obovate, about 12 mm. wide; outer phyllaries ochroleucous at base.

1. **G. eleagnoides**.

Leaves linear or lance-linear, 6 mm. wide or less; phyllaries brown or greenish brown at base.

Pappus bristles of the hermaphrodite flowers obscurely thickened toward tip; leaves arachnoid-tomentose above.....2. **G. rhodanthum**.

Pappus bristles of the hermaphrodite flowers strongly thickened toward tip; leaves soon glabrate above.....3. **G. seemannii**.

Larger leaves 2 cm. long or less.

Leaves obovate, 3 to 8 mm. wide.....4. **G. concinnum**.

Leaves linear, 2 mm. wide or less.

Heads distinctly pedicellate.....5. **G. sartorii**.

Heads sessile or subsessile.....6. **G. lavandulaceum**.

1. **Gnaphalium eleagnoides** (Klatt) Blake.

Chionolaena eleagnoides Klatt, Leopoldina 23: 88. 1887.

Gnaphalium hypochionaeum Schultz Bip.; Klatt, Leopoldina 23: 88. 1887, as synonym.

Known only from the type locality, Pelado, Mexico.

Densely leafy, white-corticate; leaves obovate, 3 to 4.5 cm. long, about 12 mm. wide, acute, callous-apiculate, narrowed to the "amplexicaul" base, entire, arachnoid above glabrate, beneath densely and canescently lanate-tomentose;

heads 4 to 5 mm. high, in small dense cymose glomerules, short-pedicellate; phyllaries obovate, the lower ochroleucous, the upper white; pistillate flowers 16, hermaphrodite 18.

2. *Gnaphalium rhodanthum* Schultz Bip. in Seem. Bot. Voy. Herald 310. 1856.

Hidalgo to Oaxaca and Chiapas; type from Jitotole, Chiapas. Guatemala.

Suffrutescent, 40 cm. high or less, densely leafy; stem cinereous or canescent-tomentose; leaves linear or narrowly linear-lanceolate, the larger 3 to 7.5 cm. long, 1.5 to 5 mm. wide, usually greenish above, densely tomentose beneath, the older deflexed, marcescent; heads in small rounded cymose panicles; outer phyllaries oblong or linear-oblong, the inner linear, obtuse, with white or reddish purple tips.

3. *Gnaphalium seemannii* Schultz Bip. in Seem. Bot. Voy. Herald 309. 1856.
Chionolaena corymbosa Hemsl. Diagn. Pl. Mex. 32. 1879.

Known only from the type locality, Sierra Madre of northern Mexico.

Suffrutescent, about 17 cm. high, the stem closely and when young canescently lanate-tomentose; leaves elliptic-linear or linear-oblong, 1.8 to 4.5 cm. long (including the petioliform base), 3 to 5 mm. wide, quickly glabrate and green above, densely and canescently silky-pannose-tomentose beneath; heads cymose-panicled, short-pedicled, about 8 mm. high; outer phyllaries suborbicular-ovate, with a brown spot, the inner oblong-linear, rounded, whitish, with a brownish spot near middle.

4. *Gnaphalium concinnum* A. Gray, Proc. Amer. Acad. 15: 34. 1879.

San Luis Potosí; type from highest mountains southeast of City of San Luis Potosí.

Suffrutescent, 20 to 35 cm. high, several-stemmed; stems densely and subcanescently tomentose, very leafy; leaves obovate, 10 to 20 mm. long, 3 to 8 mm. wide, above arachnoid-tomentose, glabrescent, densely griseous- or ochroleucous-lanate beneath; heads in a nearly leafless cymose panicle, about 6 mm. high; phyllaries pink-purple below, the white tips of the middle and outer ones reflexed at maturity.

5. *Gnaphalium sartorii* (Klatt) Schultz Bip.

Chionolaena sartorii Klatt, Leopoldina 23: 89. 1887.

Gnaphalium sartorii Schultz Bip.; Klatt, Leopoldina 23: 89. 1887, as synonym.

Known only from the type locality, Sempoaltepec, Mexico.

Low, suffruticose, gray-tomentose; leaves linear, 9 to 18 mm. long, 1 mm. wide, arachnoid above, griseous-tomentose beneath; heads pedicellate, ternate, campanulate; phyllaries fuscous, lanceolate. (Description mostly compiled.)

6. *Gnaphalium lavandulaeum* DC. Prodr. 5: 227. 1837.

Elychrysum lavandulaefolium H. B. K. Nov. Gen. & Sp. 4: 86. 1820.

Chionolaena lavandulaeum Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 134. 1881.

Gnaphalium lavandulaefolium Blake, Contr. Gray Herb. n. ser. 52: 21. 1917.

Not *G. lavandulaefolium* Willd. 1804.

Highest mountains of Mexico and Veracruz; type from Mount Nauhcampa-teple, near Perote, Mexico.

Suffrutescent, 30 cm. long or less, griseous- or cinereous-tomentose; leaves very crowded, linear-spatulate to linear, obtuse; heads campanulate, 1 to 3 at tips of branchlets, 7 to 9 mm. long; phyllaries fuscous at base, with whitish tips.

34. PELUCHA S. Wats. Proc. Amer. Acad. 24: 55. 1889.

1. *Pelucha trifida* S. Wats. Proc. Amer. Acad. 24: 55. 1889.

Central Baja California and islands in the Gulf of California; type from San Pedro Mártir Island, Gulf of California.

Heavy-scented shrub about 1 meter high, much branched, thinly gray-tomentose, glabrescent; leaves alternate, 5 to 18 mm. long, 3-toothed or 3-cleft, with linear lobes, fleshy; heads 8 to 10 mm. high, in small terminal cymose panicles, about 21-flowered; involucre 2-seriate, subequal, 4 to 5 mm. high, the phyllaries lanceolate, obtuse, appressed, subherbaceous, tomentulose; flowers all hermaphrodite, tubular; anthers sagittate-caudate; achenes oblong-turbinate, densely silky-pubescent, 2 mm. long; pappus 4 mm. long, stiff, of about 10 longer barbelate bristles and about three times as many irregularly somewhat connate shorter bristles.

35. NOCCA Cav. Icon. Pl. 3: 12. pl. 224. 1795.

REFERENCE: Robinson, Synopsis of the genus *Nocca*, Proc. Amer. Acad. 36: 467-471. 1901.

Shrubs or herbs; leaves mostly opposite; heads 1 or 2-flowered, densely crowded at tips of stem and branches in campanulate or globose glomerules, these subtended by herbaceous bracts; proper involucre tubular, gamophyllous, 5 or 6-toothed; corollas tubular, yellow, white, or purple, exserted; achene columnar; pappus a short cup, usually with awns or squamellae added.

Involucres 2-flowered.....1. *N. biflora*.

Involucres 1-flowered.

Leaves sessile, cordate-clasping.

Inflorescence short, leafy-bracted; leaves all with broadly clasping base.

2. *N. helianthifolia*.

Inflorescence elongate, the bracts small; lower leaves sessile, not clasping.

3. *N. media*.

Leaves petiolate (the petiole rarely leafy-margined), not cordate-clasping.

Glomerules campanulate, sessile or subsessile.

Leaves densely silvery-silky beneath at maturity.

4. *N. heteropappus*.

Leaves not densely silvery-silky beneath at maturity, sometimes slightly so when young in no. 7.

Leaves finely serrulate with purple-glandular teeth (about 10 per cm.).

5. *N. mocinniana*.

Leaves coarsely serrate (teeth 2 to 4 per cm.) to subentire.

Stem finely puberulous with appressed hairs, also more or less glandular, without long spreading hairs.....6. *N. rigida*.

Stem pubescent with long wide-spreading hairs, at least in the inflorescence, as well as glandular.

Leaves elliptic to lance-oblong, three to five times as long as wide.

7. *N. angustifolia*.

Leaves ovate or lance-ovate, two and one-half times as long as wide, or less.

Leaves green beneath; petioles usually winged.

8. *N. pteropoda*.

Leaves griseous-pubescent beneath; petioles naked.

Leaves broadly ovate, 5.5 to 7 cm. long; branches of inflorescence elongate, divergent.....9. *N. pringlei*.

Leaves lance-ovate, 7.5 to 12.5 cm. long; inflorescence contracted, its branches suppressed.....10. *N. tomentosa*.

Glomerules globose or subglobose, slender-peduncled.

Teeth of the proper involucre lance-subulate.

Leaves subsericeous-pilose beneath with appressed hairs; proper involucre silky-villous.....11. *N. decipiens*.

Leaves rather harshly pubescent beneath; proper involucre usually hirsute.....12. *N. glandulosa*.

Teeth of the proper involucre ovate to triangular-lanceolate (rarely lanceolate in no. 14).

Stem and branches of inflorescence pubescent.....13. *N. liebmannii*.

Stem and branches of inflorescence essentially glabrous.

14. *N. palmeri*.

1. *Nocca biflora* (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 354. 1891, as *Noccaea*.

Lagascea biflora Hemsl. Diag. Pl. Mex. 33. 1879.

Oaxaca; type from Mexico, without definite locality.

Shrubby, pubescent; leaves petioled, ovate-lanceolate, 2.5 to 5 cm. long, denticulate; involucre villous; corollas glabrous; achenes hirsute; paleae of pappus subequal. (Description compiled.)

2. *Nocca helianthifolia* (H. B. K.) Cass. Dict. Sci. Nat. 25: 104. 1822, as *Noccaea*.

Lagascea helianthifolia H. B. K. Nov. Gen. & Sp. 4: 25. 1820.

Jalisco to Oaxaca; type from Acapulco, Guerrero.

Suffrutescent (?), about 2.5 meters high, very leafy, branching in the inflorescence; stem glandular-puberulous, and spreading-hispid-pilose with mostly deciduous hairs; leaves ovate or oblong-ovate, 6 to 21 cm. long, serrate, scabrous above, scabrous or scabrid beneath; glomerules large, leafy-bracted; involucre silky-villous, unequally dentate; corollas about 1.5 cm. long, "yellowish white."

2a. *Nocca helianthifolia suaveolens* (H. B. K.) Robinson, Proc. Amer. Acad. 36: 468. 1901.

Lagascea suaveolens H. B. K. Nov. Gen. & Sp. 4: 25. 1820.

Noccaea suaveolens Cass. Dict. Sci. Nat. 25: 105. 1822.

Nocca latifolia Cerv. in Llave & Lex. Nov. Veg. Descr. 1: 31. 1824.

Lagascea latifolia DC. Prodr. 5: 92. 1836.

Lagascea helianthifolia suaveolens Robinson, Proc. Amer. Acad. 43: 38. 1907.

Sinaloa to Veracruz and Oaxaca; type collected between Río Papagallo and Venta Colorada, Mexico. Guatemala and El Salvador.

Similar; leaves often broader, softly pubescent beneath. "Lengua de vaca" (El Salvador).

2b. *Nocca helianthifolia adenocaulis* (Robinson) Blake.

Lagascea helianthifolia adenocaulis Robinson, Proc. Amer. Acad. 43: 38. 1907.

Known only from the type locality, Uruapan, Michoacán.

Stem densely glandular-puberulous, without long hairs; leaves scabrous above, tomentellous beneath.

2c. *Nocca helianthifolia levior* Robinson, Proc. Amer. Acad. 36: 468. 1901.

Lagascea helianthifolia levior Robinson, Proc. Amer. Acad. 43: 38. 1907.

Tepic to Michoacán or Guerrero; type from Colima.

Stem finely and densely puberulent, without long hairs or glands; leaves puberulent beneath.

3. *Nocca media* Blake, Contr. U. S. Nat. Herb. 22: 596. 1924.

Known only from the type locality, between Tixila and Chilpancingo, Guerrero.

Herbaceous, at least above, finely hirtellous and sparsely hispid-pilose; leaves ovate, 6 to 8 cm. long, the upper clasping, the lower narrowed to a subsessile, not clasping base, scabrid on both sides; proper involucre silky-villous; corolla about 10 mm. long.

4. *Nocca heteropappus* (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 354. 1891, as *Noccaea*.

Lagascea heteropappus Hemsl. Diag. Pl. Mex. 33. 1879.

Michoacán; type from Mexico, without definite locality.

Shrub 1 meter high; leaves ovate to elliptic, 4 to 7.5 cm. long, green above; proper involucre silky-villous, with slender subulate teeth; pappus of 2 awns and several squamellae.

5. **Nocca mocinniana** (DC.) Kuntze, Rev. Gen. Pl. 1: 354. 1891, as *Noccaea mociniana*.

Lagascea mocinniana DC. Prodr. 5: 92. 1836.

Mexico, without definite locality.

Leaves ovate, acute, green on both sides, finely serrulate. (Description compiled.)

A dubious species. The names "casanaca" and "zazanaca" have been reported for this species, but perhaps relate to some other one.

6. **Nocca rigida** Cav. Icon. Pl. 3: 12. pl. 224. 1795.

Lagascea rubra H. B. K. Nov. Gen. & Sp. 4: 24. pl. 311. 1820.

Noccaea rubra Cass. Dict. Sci. Nat. 25: 104. 1822.

Mexico to Puebla; type from Mexico, without definite locality.

Suffrutescent, about 2.5 meters high; leaves ovate or elliptic-ovate, 5 to 8.5 cm. long, green and scabrid on both sides; proper involucres silky-villous, with lance-subulate, unequal teeth; corollas "red."

7. **Nocca angustifolia** (DC.) Kuntze, Rev. Gen. Pl. 1: 354. 1891, as *Noccaea*.

Lagascea angustifolia DC. Prodr. 5: 92. 1836.

Durango to Jalisco; type from León, Guanajuato.

Shrubby; leaves 3.5 to 10.5 cm. long, subsericeous beneath when young, in age usually scabrid; proper involucres densely silky-villous.

8. **Nocca pteropoda** Blake, Contr. U. S. Nat. Herb. 22: 597. 1924.

Known only from the type locality, Cuyamecala, Cuicatlán, Oaxaca.

Suffrutescent(?), densely spreading-villous and stipitate-glandular on the branchlets, glabrate; leaf blades rhombic-ovate or oval, 4.5 to 10 cm. long, subsessile by a contracted cuneate-winged base or short-petioled, rough above, rather sparsely pilosulous beneath, serrate; inflorescence ternately divided, broad and short, the glomerules large, leafy-bracted.

9. **Nocca pringlei** Robinson, Proc. Amer. Acad. 36: 469. 1901.

Lagascea pringlei Robinson, Proc. Amer. Acad. 43: 38. 1907.

Known only from the type locality, Iguala, Guerrero.

Suffrutescent, 1 to 2 meters high, puberulous and villous; leaves densely cinereous-pilose beneath; teeth of the silky-villous proper involucres lanceolate, very unequal; corollas 12 mm. long, purple.

10. **Nocca tomentosa** (Robins. & Greenm.) Robinson, Proc. Amer. Acad. 36: 470. 1901.

Lagascea tomentosa Robins. & Greenm. Proc. Amer. Acad. 32: 43. 1896.

Known only from the type locality, between Ayusinapa and Petatlán, Guerrero.

Stem pilose and densely glandular-puberulous; leaves lance-ovate, 7.5 to 12.5 cm. long, gray-tomentose on both sides; bracts ovate-lanceolate; proper involucres villous, 6 mm. long, the teeth lanceolate, unequal; corollas 12 mm. long.

11. **Nocca decipiens** (Hemsl.) Kuntze, Rev. Gen. Pl. 1: 354. 1891, as *Noccaea*.

Lagascea decipiens Hemsl. Diag. Pl. Mex. 33. 1879.

Sonora to Chihuahua and Jalisco; type from the Sierra Madre of northern Mexico.

Shrubby; leaves ovate, 3 to 6.5 cm. long, acuminate; peduncles terminal and subterminal, up to 5.5 cm. long; corollas apparently whitish, 7.5 mm. long.

12. **Nocca glandulosa** (Fernald) Robinson, Proc. Amer. Acad. 36: 470. 1901.

Lagascea glandulosa Fernald, Bot. Gaz. 20: 534. 1895.

Sinaloa and Chihuahua; type from head of Mazatlán River, Sinaloa.

This species is said to be scandent.

- 13. *Nocca liebmannii*** (Schultz Bip.) Robinson, Proc. Amer. Acad. **36**: 470. 1901.

Lagascea liebmannii Schultz Bip.; Klatt, Leopoldina **20**: 91. 1884.

Known only from the type locality, Pochutla, Oaxaca.

Suffruticose; leaves elliptic, 5 cm. long, soft-pubescent beneath; proper involucres finely villous. (Description compiled.)

- 14. *Nocca palmeri*** Robinson, Proc. Amer. Acad. **36**: 471. 1901.

Lagascea palmeri Robinson, Proc. Amer. Acad. **43**: 38. 1907.

Known only from the type locality, Colima.

Slender shrub; leaves ovate, 1.5 to 4 cm. long, scabrous on both sides, subentire; proper involucres sparsely villous chiefly at base; corollas 6 mm. long, apparently white.

DOUBTFUL SPECIES.

- Nocca robinsonii*** (A. Nels.) Blake.

"*Nocca* n. sp. [?]" Robinson, Proc. Amer. Acad. **36**: 468. 1901.

Calhounia robinsonii A. Nels. Univ. Wyo. Publ. Bot. **1**: 59. 1924.

Mexico, without definite locality.

Pubescence of the branches fine, spreading, the hairs partly glandular, all of equal length; leaves elliptic, obtuse or short-acuminate, scabrous, gray-pubescent beneath, remotely denticulate, short-petioled. (Description compiled.)

- 36. COULTERELLA** Vasey & Rose, Contr. U. S. Nat. Herb. **1**: 71. *pl. 1*. 1890.

- 1. *Coulterella capitata*** Vasey & Rose, Contr. U. S. Nat. Herb. **1**: 71. *pl. 1*. 1890.

Vicinity of La Paz, Baja California.

Much-branched glabrous shrub, about 1.3 meters high, lemon-scented; leaves opposite or alternate, rhombic-ovate to elliptic-oblong, 2.5 cm. long or less, sessile and clasping, coarsely few-toothed to entire, very fleshy; proper involucres gamophyllous, at maturity obovoid, 3-winged and corky, shortly 3-toothed at the contracted apex, 7 to 10 mm. long, glomerate at tips of branches, subtended by minute bracts, 1-flowered (very rarely 2-flowered); corollas yellow, the throat very short, the teeth lance-linear, 3-veined, exceeding the tube and throat; anthers sagittate-mucronate; styles branches slender, with very short obscure appendages, merely papillose outside; achenes columnar, multistriate, glabrous, 3.8 mm. long, epappose, crowned with a detergible cup left by the base of the corolla.

- 37. DESMANTHODIUM** Benth. in Hook. Icon. Pl. **12**: 14. *pl. 1116*. 1873.

Shrubs or herbs; leaves opposite, thickish, serrate; heads few-flowered, small, numerous, glomerulate in cymose panicles; phyllaries few, subscarious; pistillate flowers 1 to 3, loosely inclosed in sac-shaped membranaceous phyllaries with short tubular apex, their corollas tubular-cylindric, subtruncate, white; paleae of receptacle few; hermaphrodite flowers 4 to 6, regular, 5-toothed, sterile; achenes inclosed in the sac-shaped phyllaries, epappose.

Stem densely villous-tomentose, glabrescent; leaves broadly ovate, 5 to 7 cm. wide.....

1. ***D. tomentosum***.

Stem glabrous or puberulous in lines; leaves elliptic to obovate, 4.5 cm. wide or less.

Leaves short-petioled.....

2. ***D. fruticosum***.

Leaves connate-perfoliate.....

3. ***D. perfoliatum***.

- 1. *Desmanthodium tomentosum*** T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 73. 1914.

Known only from the type locality, Cerro del Boquerón, Chiapas.

Shrub; leaf blades 9 to 13 cm. long, acuminate, cuneate at base, petiolate, villous-tomentose beneath, particularly on the veins; heads about 4 mm. high, in dense glomerules.

2. *Desmanthodium fruticosum* Greenm. Proc. Amer. Acad. **40**: 37. 1904.

Jalisco and Michoacán or Guerrero; type from Zapotlán, Jalisco.

Shrubby below, 1.5 meters high; leaves elliptic or ovate, 4 to 9 cm. long, quintuplinerved above the base, sordid-puberulous on the veins beneath; heads tiny, 3 to 4 mm. high.

3. *Desmanthodium perfoliatum* Benth. in Hook. Icon. Pl. **12**: 15. *pl.* 1116. 1873.

Flaveria perfoliata Klatt, Leopoldina **23**: 146. 1887.

Oaxaca.

Shrubby, with herbaceous branches, glaucescent, 3 to 6 meters high; leaves rhombic-lanceolate to obovate, 6 to 12.5 cm. long, penninerved or weakly trip-linerved, glabrous or with a few minute hairs along costa beneath; heads 5 to 7 mm. high.

38. CLIBADIUM Allamand; L. Mant. Pl. 161. 1771.

REFERENCE: O. E. Schulz, Beiträge zur Kenntnis der Gattung *Clibadium*, Bot. Jahrb. Engl. **46**: 613-628. 1912.

Shrubby; leaves opposite, serrate; heads numerous, small, disciform, whitish, cymose-panicled; phyllaries few, dryish; pistillate flowers subtended by pales, their corollas slender-tubular, denticulate; disk flowers hermaphrodite, sterile, without pales (in ours), their corollas 5-toothed; achenes abovoid, obcompressed, epappose.

Some species of this genus are used in tropical America as fish poisons.

Heads 5 to 6 mm. high; phyllaries ciliate, densely strigillose at least above achenes 2.8 to 3 mm. long-----**1. *C. arboreum*.**
Heads 3.5 to 4 mm. high; phyllaries ciliate, otherwise essentially glabrous; achenes 1.8 to 2 mm. long-----**2. *C. pueblanum*.**

1. *Clibadium arboreum* Donn. Smith, Bot. Gaz. **14**: 26. 1889.

Clibadium asperum Hemsl. Biol. Centr. Amer. Bot. **2**: 142. 1881, in part.

Not *C. asperum* DC. 1836.

Clibadium donnell-smithii Coulter, Bot. Gaz. **16**: 98. 1891.

Veracruz. Guatemala; type from Pansamalá, Guatemala.

Shrubby, 3 meters high; stem densely pubescent; leaf blades ovate or broad-ovate, 10 to 23 cm. long, 5 to 19 cm. wide, long-petioled; pistillate flowers 3 to 6, hermaphrodite 9 to 11.

2. *Clibadium pueblanum* Blake, Contr. U. S. Nat. Herb. **22**: 601. 1924.

Known only from the type locality, Pahuatlán, Puebla.

Similar; leaf blades 10.5 to 14.5 cm. long; pistillate flowers 6 or 7, hermaphrodite 7 or 8.

39. GUARDIOLA Cerv.; Humb. & Bonpl. "Pl. Aequin. **1**: 143. *pl.* 41. 1808."

REFERENCE: Robinson, Revision of the genus *Guardiola*, Bull. Torrey Club **26**: 232-235. 1899.

Suffrutescent or herbaceous, with opposite leaves and small, terminal, solitary to cymose-panicled, yellow heads; involucre cylindric to campanulate, of few subequal subherbaceous thin-margined many-nerved phyllaries; rays small, fertile, the disk sterile; achenes columnar or columnar-obovoid, epappose.

Phyllaries carinate, about 12 mm. high; leaves deltoid-ovate---**1. *G. carinata*.**

Phyllaries not carinate, 7 to 9 mm. high; leaves narrowly lanceolate.

Leaves cuneate at base-----**2. *G. angustifolia*.**

Leaves hastate at base-----**3. *G. stenodonta*.**

1. **Guardiola carinata** Robinson, Bull. Torrey Club **26**: 233. 1899.

Known only from the type locality, Acaponeta, Tepic.

Suffrutescent, glabrous and glaucous; petioles about 1.2 cm. long; leaf blades 3 to 4 cm. long, 2 to 3 cm. wide, cordate-hastate, serrulate, obtusish; heads few or solitary.

2. **Guardiola angustifolia** (A. Gray) Robinson, Bull. Torrey Club **26**: 235. 1899.

Guardiola tulocarpus angustifolia A. Gray in S. Wats. Proc. Amer. Acad. **22**: 423. 1887, hyponym.

Jalisco; type from Tequila.

Suffrutescent, about 60 cm. high, essentially glabrous; petioles 6 to 14 mm. long; leaf blades 5 to 10 cm. long, 4 to 23 mm. wide, acuminate, sharply serrate or serrulate; heads numerous in small cymose panicles.

3. **Guardiola stenodonta** Blake, Proc. Biol. Soc. Washington **37**: 56. 1924.

Known only from the type locality, Balboa, Sinaloa.

Suffrutescent, practically glabrous; leaves slender-petioled, the blades 5 to 8 cm. long, 1.5 to 2.2 cm. wide at base across the very narrow spreading lobes, abruptly contracted above them and then widened to middle, serrate; heads in small terminal clusters.

40. **MELAMPODIUM** L. Sp. Pl. 921. 1753.

REFERENCE: Robinson, Synopsis of the genus *Melampodium*, Proc. Amer. Acad. **36**: 455-466. 1901.

Herbs, or sometimes suffrutescent; leaves opposite; heads radiate, the rays fertile, yellow or white, the disk sterile; outer phyllaries usually 5, subherbaceous; receptacle paleaceous; ray achenes tightly enveloped in the subtending indurate phyllaries, these often provided with a hood or horn at apex; pappus none.

Rays white; leaves not silky-pubescent.

Stem and leaves densely cinereous-tomentose..... 1. **M. argophyllum**.

Stem and leaves green or cinereous-pubescent, not tomentose.

Lamina of the rays 5 to 8 mm. long, not prominently venose.

2. **M. cinereum**.

Lamina of the rays 1 to 1.3 cm. long, prominently venose.

3. **M. leucanthum**.

Rays yellow; leaves silky-pubescent beneath, at least when young.

Fruiting phyllaries with well-developed hood..... 4. **M. nelsonii**.

Fruiting phyllaries with obsolete hood..... 5. **M. heterophyllum**.

1. **Melampodium argophyllum** (A. Gray) Blake, Contr. U. S. Nat. Herb. **22**: 606. 1924.

Melampodium cinereum argophyllum A. Gray; Robinson, Proc. Amer. Acad. **36**: 458. 1901.

Coahuila and Nuevo León; type from the Sierra Madre south of Saltillo, Coahuila.

Suffruticulose, about 20 cm. high; similar to *M. cinereum* except for its cinereous-tomentose pubescence.

2. **Melampodium cinereum** DC. Prodr. **5**: 518. 1836.

Coahuila; type from "near San Fernando, Mexico."¹ Texas.

Suffruticulose, several-stemmed, much branched, about 20 cm. high, cinereous-pubescent; leaves linear to lance-oblong, 2.5 to 4 cm. long, entire to deeply sinuate-lobed; fruiting phyllaries with muticous hood.

¹ According to Gray, Syn. Fl. **1**²: 239. 1884, the habitats and numbers of specimens cited under *M. cinereum* and *M. ramosissimum* were interchanged in De Candolle's Prodrusus.

- 2a. *Melampodium cinereum ramosissimum* (DC.) A. Gray, Syn. Fl. 1²: 239. 1884.

Melampodium ramosissimum DC. Prodr. 5: 518. 1836.

Coahuila. Texas; type from "Texas."

Hood of the fruiting phyllaries mucronate; otherwise as in the typical form.

3. *Melampodium leucanthum* Torr. & Gray, Fl. N. Amer. 2: 271. 1842.

Chihuahua. Kansas to Texas and Arizona; type from Texas.

Similar to *M. cinereum*; usually about 30 cm. high; leaves often entire; heads much larger; hood of the fruiting phyllaries muticous.

4. *Melampodium nelsonii* Greenm. Proc. Amer. Acad. 41: 260. 1905.

Definitely known only from the type locality, Volcán de Jorullo, Michoacán.

Suffruticulose, hirsute; leaves linear or linear-lanceolate, entire or pinnately 3-lobed; heads 1 to 1.5 cm. wide; hood of the fruiting phyllaries sometimes with caudate apex.

5. *Melampodium heterophyllum* Lag. Gen. & Sp. Nov. 33. 1816.

Tamaulipas to Oaxaca; type from Mexico.

Herbaceous or suffruticulose, up to 40 cm. high; leaves linear to lanceolate, entire or with long narrow lobes toward base; heads about 12 mm. wide.

41. *PARTHENIUM* L. Sp. Pl. 988. 1753.

REFERENCES: J. M. Hillier, Guayule rubber (*Parthenium argentatum*, A. Gray), Kew Bull. 1907: 285-294. 1907; F. E. Lloyd, Guayule (*Parthenium argentatum* Gray), a rubber-plant of the Chihuahuan desert, Carnegie Inst. Washington Publ. 139. 1911; C. Patoni, El guayule (*Parthenium argentatum* A. Gray). Mexico, 1916.

Shrubs or herbs; leaves alternate; heads small, radiate, white, in terminal cymes or panicles; phyllaries usually 2-seriate, suborbicular, dry; rays short, erect, fertile, the disk sterile; ray achenes obcompressed, their nerviform margins adnate at base to the involute paleae of the two opposed outer disk flowers and at maturity separating from the body of the achene nearly to apex, the whole falling together; pappus 2 or 3 short awns or none.

Leaves silvery-canescant on both sides.....1. *P. argentatum*.

Leaves not silvery-canescant, usually tomentose or velutinous beneath.

Leaves ovate, subentire to repand or crenate, not lobed.

Leaves harshly hispidulous above with tuberculate-based hairs.

Pappus wanting.....2. *P. parviceps*.

Pappus present.

Leaves densely cinereous-tomentulose beneath.....3. *P. fruticosum*.

Leaves green or greenish and merely strigillose or puberulous beneath.

4. *P. schottii*.

Leaves smooth or only slightly asperulous above.

Pappus present.....4. *P. schottii*.

Pappus wanting.

Leaves conspicuously crenate; involucre 2.5 to 3.5 mm. high.

5. *P. tomentosum*.

Leaves rather obscurely repand or crenulate; involucre 1.5 to 2 mm. high.....6. *P. stramonium*.

Leaves triangular to obovate, hastately or lyrate-lobed or pinnatifid; pappus present.

Leaves triangular to obovate, lyrate-pinnatifid or lobed, usually gray and floccose-tomentose above.....7. *P. incanum*.

Leaves deltoid-ovate, coarsely lobed, green and somewhat harshly pubescent above.....8. *P. lozanianum*.

1. **Parthenium argentatum** A. Gray in Torr. U. S. & Mex. Bound. Bot. 86. 1859.

Parthenium lloydii Bartlett, *Torreyia* 16: 46. 1916.

Coahuila and Durango to Zacatecas and San Luis Potosí. Texas; type from Escondido Creek.

Shrubby, up to 1 meter high, much branched; branches silvery-strigillose; petioles 0.5 to 2.5 cm. long; blades lanceolate to lance-ovate, 1 to 4.5 cm. long, 0.3 to 2.5 cm. wide, acute or acuminate, acute at base, coarsely few-lobed to entire, silvery-canescenscent; heads several, in small long-peduncled cymes or cymose panicles, short-pedicel, about 6 mm. wide; pappus of 2 divergent or erectish awns about 1 mm. long. "Guayule" (the most common and widely distributed name); "hierba del hule" (Durango); "tatanini" (Otomí); "hierba blanca," "hierba ceniza" (Querétaro); "hule" (Zacatecas, Chihuahua); "copallín," "afinador" (*Lloyd*); "xihuite," "jihuite" (Zacatecas).

According to Patoni, the name "guayul" or "guauiyul," of which guayule is a variant, belongs properly to *Vauquelinia corymbosa* (see page 323), and became applied through some error to this plant.

The guayule rubber plant is one of the most important members of the Mexican flora. Its stems yield a high percentage of rubber, a fact well known to the early inhabitants. From the plant was obtained the rubber for making the large balls used in the game of *pelota*, a game of very ancient origin.

Attempts at industrial exploitation of the plant began in Zacatecas as early as 1892 or 1893, and shortly afterward in San Luis Potosí, but these were not successful financially on account of the lack of suitable apparatus for the extraction of the rubber, and because of the absence of a market. About 1904, when much capital from the United States had been invested in the industry, it became of importance and large factories were established for the treatment of the plant. The raw plant rose to a price of \$75 per ton. In 1911 the outlay of North American capital alone in the industry was said to be \$30,000,000, and between July 1, 1905, and July 1, 1909, about 32,000,000 pounds of guayule rubber were imported into the United States, this being about 80 per cent of the total export. Later the industry declined, partly because of a failure in supply, but chiefly on account of the competition of East Indian rubber.

The following references may be mentioned here: F. Altamirano, Datos para la historia y explotación del "Guayule," Boletín de la Secretaría de Fomento de México II. 5: 1098-1123. 1906; Rómulo Escobar, El guayule y su propagación, Boletín de la Secretaría de Fomento 24. 1910; J. E. Kirkwood, Propagation of guayule by seeds, Amer. Rev. Trop. Agr. 1: 34-43. 1910; Kirkwood, The life-history of *Parthenium argentatum* (guayule), Amer. Rev. Trop. Agr. 1: 193-205. 1910.

2. **Parthenium parviceps** Blake, Contr. U. S. Nat. Herb. 22: 607. 1924.

Known only from the type locality, Barranca de Tenampá, Zacuapan, Veracruz. Suffrutescent or frutescent; stem arachnoid-tomentose; leaf blades triangular-ovate, 5.5 to 9 cm. long, 3.5 to 6 cm. wide, acute, canescently arachnoid-tomentose beneath.

3. **Parthenium fruticosum** Less. in Schlecht. & Cham. Linnaea 5: 152. 1830.

Chiapas and Veracruz (?); type from Plan del Río, Veracruz (?).

Apparently suffrutescent and tall; stem sordidly pilose-tomentose; leaf blades triangular-ovate, about 10 cm. long, 7.5 cm. wide, obtuse, truncate-rounded at base, green above, cinereous-tomentulose beneath, on narrowly margined petioles 1.5 cm. long.

4. **Parthenium schottii** Greenm. in Millsp. & Chase, Field Mus. Bot. 3: 109. 1904.

Yucatán; type from Progreso.

Shrub; stem tuberculate-hispidulous or tuberculate-pilose; leaf blades triangular-ovate, 5 to 9.5 cm. long, 2 to 5.5 cm. wide, acute or obtuse, repand, finely tuberculate above, beneath finely strigillose, hispidulous, or rarely rather densely puberulous, on margined petioles 1 to 2 cm. long; awns 2 or 3, short, erect or recurved. "Santa María," "chalcha."

5. *Parthenium tomentosum* DC. Prodr. 5: 532. 1836.

Puebla and Oaxaca; type collected between Oaxaca and Mitla.

Shrub 3 meters high; stem tomentose, glabrescent; leaf blades triangular-ovate, 2.5 to 10 cm. long, 1.6 to 6.5 cm. wide, cordate or subtruncate at base, green or cinereous above, cinereous-tomentulose and veiny beneath, on nearly marginless petioles 0.6 to 3 cm. long.

6. *Parthenium stramonium* Greene, Pittonia 4: 240. 1901.

Parthenium arctium Bartlett, Proc. Amer. Acad. 44: 635. 1909.

Sonora and Chihuahua; type from Chuichupa, Chihuahua.

Shrub about 3.5 meters high; stem cinereous-tomentulose, glabrescent; leaf blades triangular-ovate, 10 to 30 cm. long, 3 to 10 cm. wide, subcordate and usually unequal at base, weakly repand to crenulate, green or at first finely cinereous-tomentulose above, finely cinereous-tomentulose beneath.

7. *Parthenium incanum* H. B. K. Nov. Gen. & Sp. 4: 260. pl. 391. 1820.

Parthenium ramosissimum DC. Prodr. 5: 532. 1836.

Sonora to Coahuila, south to Hidalgo; type from Botanic Garden of Mexico. Texas to Arizona.

Low shrub; stem cinereous-tomentose, glabrescent; leaf blades 1.5 to 6 cm. long, usually cinereous but sometimes green above, cinereous-tomentulose beneath; pappus awns 2, divergent, about 1 mm. long. "Mariola" (the usual and most widely dispersed name); "hembra de guayule" (so called because it often grows with the true guayule); "tananiñí" (Querétaro); sometimes known erroneously as "guayule."

This plant furnishes rubber like that of guayule, but in smaller amounts. It has been employed extensively in Mexico for the extraction of commercial rubber, and was known also to the aboriginal inhabitants. Children sometimes chew the stems to obtain the rubber for making balls. In Coahuila the plant is reported to be used as a domestic remedy for affections of the liver.

8. *Parthenium lozanianum* Bartlett, Proc. Amer. Acad. 44: 636. 1909.

Known only from the type locality, Hacienda El Carrizo, Sierra Madre, above Monterrey, Nuevo León.

About 2.5 meters high; leaf blades 4 to 9 cm. long, 2 to 4.5 cm. wide, deltoid-ovate, somewhat trilobate, coarsely repand-dentate with blunt teeth, usually with a pair of small lobes below base of blade.

42. IVA L. Sp. Pl. 988. 1753.

REFERENCE: Rydberg, N. Amer. Fl. 33: 4-7. 1922.

1. *Iva hayesiana* A. Gray, Proc. Amer. Acad. 11: 78. 1876.

Northern Baja California and Cedros Island. California; type from San Diego County, California.

Frutescent, under 1 meter high; branches erectish, strigillose and glandular; leaves opposite, oblong-obovate, elliptic-oblong, or spatulate, 5 cm. long or less, usually obtuse, entire, short-petioled, thick, triplinerved; heads small, disciform, nodding, yellowish, 3 to 6 mm. wide, in virgate racemes or racemiform panicles, bracted with small leaves; phyllaries few, obovate, obtuse, herbaceous, punctate; pistillate flowers with short tubulose corolla; hermaphrodite flowers sterile; anthers free, with inflexed appendages; achenes obovoid, obcompressed, epappose. 1.8 mm. long.

43. HYMENOCLEA Torr. & Gray, Mem. Amer. Acad. n. ser. 4: 79. 1849.REFERENCE: Rydberg, N. Amer. Fl. **33**: 13-15. 1922.

Slender much-branched shrubs; leaves alternate, linear-filiform, entire or pinnately trisect; heads monoecious, glomerate-spicate, leafy-bracted; phyllaries of the staminate involucre few, united to middle; involucre of the pistillate heads gamophyllous, fusiform, beaked, inclosing a single flower, and bearing transverse, orbicular or obovate, scarious, spreading wings.

Wings of the fruit spirally arranged, suborbicular, the lower 6 to 8 mm. wide.

1. **H. salsola.**

Wings of the fruit in a single whorl, much narrower.

Wings 7 to 12; body of fruit about 4 mm. long-----2. **H. monogyra.**

Wings usually 5; body of fruit about 6 mm. long-----3. **H. pentalepis.**

1. Hymenoclea salsola Torr. & Gray, Mem. Amer. Acad. n. ser. 4: 79. 1849.

Northern Baja California and Sonora. Utah to Arizona and California; type from the Mohave River, California.

About 1 meter high; leaves few, mostly 3 cm. long or less; pistillate involucre in fruit about 6 mm. long.

2. Hymenoclea monogyra Torr. & Gray, Mem. Amer. Acad. n. ser. 4: 79. 1849.

Sonora, Sinaloa, Chihuahua, and Baja California. California to Texas; type from the Valley of the Gila.

Up to 4 meters high; leaves usually about 4 cm. long; wings of fruit narrowly obovate. "Romerillo" (Sinaloa).

A characteristic shrub of sandy arroyos, where it often forms dense thickets. It is employed locally as a remedy for pains in the abdomen.

3. Hymenoclea pentalepis Rydb. N. Amer. Fl. **33**: 14. 1922.

Sonora and Baja California. Arizona and California; type from Pima Canyon, Arizona.

Similar to *H. monogyra*; fruit larger, with broadly obovate-flabelliform wings.

44. FRANSERIA Cav. Icon. Pl. **2**: 78. pl. 200. 1793.REFERENCE: Rydberg, N. Amer. Fl. **33**: 22-37. 1922.

Herbs or shrubs, monoecious; leaves chiefly alternate; heads spicate, racemose, or paniculate, discoid; phyllaries of staminate involucre 1-seriate, united to middle; fertile involucre bur-like, 1 to 8-celled, 1 to 8-flowered, beaked, armed with 2 to many series of often hooked spines.

Leaves simply or doubly dentate, rarely 3 or 5-lobed.

Leaves coarsely spinose-toothed-----15. **F. ilicifolia.**

Leaves not spinose-toothed.

Leaves elongate-triangular, 3 to 5 times as long as wide; fruiting involucre densely covered with strongly hooked spines, these not flattened at base.

14. **F. ambrosioides.**

Leaves broader; spines of fruit flattened at base, usually not hooked.

Leaves doubly dentate or 3 or 5-lobed, green beneath (sometimes tomentose when young in *F. cordifolia*).

Leaves not trilobed to middle (except sometimes on sucker shoots), pubescent or puberulous beneath with more or less spreading hairs; spines and body of fruiting involucre densely stipitate-glandular-----7. **F. cordifolia.**

Leaves 3 or 5-lobed to middle, strigillose on both sides; spines of fruiting involucre sparsely pilosulous, obscurely glandular.

8. **F. divaricata.**

Leaves simply (rarely somewhat doubly) serrate or serrulate, densely whitish-tomentulose at least beneath.

Body of the fruiting involucre puberulous or pilose; leaf blades chiefly lanceolate or lance-ovate.....12. **F. deltoidea**.

Body of the fruiting involucre densely lanate-tomentose; leaf blades chiefly deltoid-ovate or ovate.....13. **F. chenopodiifolia**.

Leaves sinuate-lobed to tripinnatifid.

Leaves green and sparsely strigillose to hispid beneath.

Spines of the fruiting involucre 1.5 to 3.5 cm. long.....1. **F. bryantii**.

Spines of the fruiting involucre 1 to 3.5 mm. long.

Leaves bipinnately lobed.

Spines of the fruit 6 to 9, not hooked, very short.....4. **F. hispida**.

Spines of the fruit numerous, hooked, about 3 mm. long.

6. **F. magdalenae**.

Leaves pinnately lobed or shallowly pinnatifid.

Leaves deeply lobed, with narrow divisions; fruit merely glandular.

2. **F. acuminata**.

Leaves shallowly lobed, with broad teeth or lobes; fruit densely pilose.

10. **F. sanctae-gertrudis**.

Leaves whitish or cinereous-pubescent or tomentulose beneath, at least when young.

Spines of the fruiting involucre few (about 4 to 16).

Leaves bipinnatifid or tripinnatifid.....3. **F. camphorata**.

Leaves pinnately lobed or deeply sinuate-toothed.

Leaf blades up to 15 cm. long, the lobes coarsely serrate.

9. **F. arborescens**.

Leaf blades 3 to 5 cm. long, the lobes spinulose-toothed.

11. **F. flexuosa**.

Spines of the fruiting involucre numerous.

Leaves small, 3 cm. long or less, 1 to 3-pinnatisect, the tips of the primary lobes rounded; spines of the fruiting involucre strongly flattened at base, not hooked.....5. **F. dumosa**.

Leaves usually 3 to 5 cm. long, the tips of the primary lobes usually acutish; spines subterete or somewhat grooved above at base, hooked.

6. **F. magdalenae**.

1. **Franseria bryantii** Curran, Proc. Calif. Acad. II. 1: 232. 1888.

Acanthambrosia bryantii Rydb. N. Amer. Fl. 33: 22. 1922.

Baja California; type from Magdalena Bay.

Shrub 30 to 90 cm. high, with white-barked branchlets; leaves 1 to 4 cm. long; pistillate involucres solitary or paired, long-persistent, appearing axillary; spines of the involucre wide-spreading, not hooked, in 1 or 2 series.

2. **Franseria acuminata** T. S. Brandeg. Proc. Calif. Acad. II. 2: 171. 1889.

Known only from the type locality, Purísima, Baja California.

Shrubby, about 60 cm. high, the branches brown, essentially glabrous; leaves 3.5 to 7.5 cm. long, long-acuminate; fruiting involucre "5 mm. long," with very short incurved spines.

3. **Franseria camphorata** Greene, Bull. Calif. Acad. 1: 192. 1885.

Northern Baja California and Guadalupe Island; type from Guadalupe Island.

Sufrutescent, tomentulose on the younger parts, camphory-resinous; primary lobes of the leaves lanceolate or triangular in outline, laciniately toothed to nearly bipinnatifid; fruiting involucres about 7 mm. long.

3a. **Franseria camphorata leptophylla** A. Gray, Proc. Amer. Acad. 22: 309. 1887.

Franseria leptophylla Rydb. N. Amer. Fl. **33**: 32. 1922.

Northern Baja California and Cedros Island; Sonora; type from San Fernando, Baja California.

Similar; leaves more deeply lobed, with finer divisions.

4. *Franseria hispida* Benth. Bot. Voy. Sulph. 25. 1844.

Gaertnera hispida Kuntze, Rev. Gen. Pl. **1**: 339. 1891.

Known only from the type locality, Magdalena Bay, Baja California.

Low shrub; stem white-hispid; leaves bipinnatifid, 5 to 7 cm. long and wide, glandular and hispid; fruit 4 mm. long, the spines 6 to 9, subulate, 2-seriate. (Description compiled.)

5. *Franseria dumosa* A. Gray in Frém. Rep. Exped. Rocky Mount. 316. 1845.

Franseria albicaulis Torr. Pl. Frém. 16. 1853.

Franseria dumosa albicaulis A. Gray in Torr. U. S. & Mex. Bound. Bot. 87. 1859.

Gaertnera dumosa Kuntze, Rev. Gen. Pl. **1**: 339. 1891.

Northern Baja California and Sonora. California to Utah and Arizona; type from the Mohave River.

Low shrub, white-barked, finely cinereous-tomentulose, including both sides of the leaves; fruiting involucre about 6 mm. long; spines strongly flattened toward base, not hooked.

6. *Franseria magdalenae* T. S. Brandeg. Proc. Calif. Acad. II. **2: 170. 1889.**

Franseria intricata Rydb. N. Amer. Fl. **33**: 33. 1922.

Baja California; type from Magdalena Island.

Shrubby, about 60 cm. high, much branched; inflorescence usually branched; leaves green or cinereous above, once or twice pinnatisect; fruiting involucre about 6 mm. long, densely armed with spreading hooked spines.

7. *Franseria cordifolia* A. Gray, Syn. Fl. **1²: 445. 1884.**

Gaertnera cordifolia Kuntze, Rev. Gen. Pl. **1**: 339. 1891.

Franseria malvacea Rydb. N. Amer. Fl. **33**: 34. 1922.

Sonora, Sinaloa, and San Luis Potosí. Arizona; type from Tucson.

Slender, suffrutescent, puberulous; leaf blades deltoid-ovate, 2.5 to 8.5 cm. long, green above, pale beneath, doubly dentate, usually shallowly cordate at base, sometimes 3-lobed; fruiting involucre 5 to 6 mm. long, its spines hooked.

8. *Franseria divaricata* T. S. Brandeg. Proc. Calif. Acad. II. **2: 171. 1889.**

Known only from the type locality, San Gregorio, Baja California.

Shrubby, divaricately much branched, 30 cm. high or more, cinereous-puberulous on the young growth; leaf blades suborbicular-ovate in outline, 2 to 2.5 cm. long, 3 or 5-lobed about to middle, with cuneate-obovate doubly dentate lobes; fruiting involucre about 7 mm. long, the spines stout, about 2 mm. long, grooved but scarcely flattened at base.

9. *Franseria arborescens* T. S. Brandeg. Zoe **5: 162. 1903.**

Franseria carduacea Greene, Leaflets **2**: 156. 1911.

Baja California.

Arborescent, 3 to 5 meters high; stem hispidulous; leaves ovate in outline, 5 to 7-lobed about halfway to middle, the lobes broad, canescent-pilosulous beneath; fruiting involucre densely pubescent, with 7 or 8 stout hooked spines.

10. *Franseria sanctae-gertrudis* Rydb. N. Amer. Fl. **33: 35. 1922.**

Known only from the type locality, Santa Gertrudis, Baja California.

Shrub; leaves petioled, ovate to lance-ovate, 6 to 8 cm. long, 2.5 to 4 cm. wide, shallowly sinuate-lobed or toothed, green and hispidulous on both sides; fruit as in *F. arborescens*.

11. **Franseria flexuosa** A. Gray, Proc. Amer. Acad. 20: 298. 1885.

Northern Baja California; type from Cantillas Canyon.

Low shrub; leaves short-petioled, deltoid-lanceolate, coriaceous, sinuate-lobed or -toothed, acuminate, canescent-puberulent on both sides; fruit 7 mm. long, glandular and villous, the spines not hooked. (Description compiled.)

12. **Franseria deltoidea** Torr. Pl. Frém. 15. 1853.

Gaertnera deltoidea Kuntze, Rev. Gen. Pl. 1: 339. 1891.

Sonora. Arizona; type from the Gila River.

Low, shrubby, canescent-tomentulose; leaf blades 1 to 3.8 cm. long, slender-petioled, cuneate at base, venose beneath; fruiting involucre about 7 mm. long, its spines straight, flattened at base.

13. **Franseria chenopodiifolia** Benth. Bot. Voy. Sulph. 26. 1844.

Gaertnera chenopodiifolia Abrams, Bull. N. Y. Bot. Gard. 6: 461. 1910.

Franseria lancifolia Rydb. N. Amer. Fl. 33: 36. 1922.

Baja California and Cedros Island; type from Magdalena Bay. Southern California.

Suffrutescent, low, the branches cinereous-tomentulose, glabrate; leaf blades 2 to 3 cm. long, usually about as wide; spines of the fruiting involucre hook-tipped, usually strongly flattened at base.

Franseria lancifolia Rydb. is a form of this species with less pubescent fruits.

14. **Franseria ambrosioides** Cav. Icon. Pl. 2: 79. pl. 200. 1793.

Xanthidium ambrosioides Delpino, "Studi Lign. Anem. 63. 1871."

Gaertnera ambrosioides Kuntze, Rev. Gen. Pl. 1: 339. 1891.

Sonora, Sinaloa, Durango, and Baja California; type from Mexico, without definite locality. Arizona.

Suffrutescent, hirsute and glandular, about 1.5 meters high; leaf blades 8 to 18 cm. long, 1 to 4.5 cm. wide, acuminate, coarsely serrate-dentate, slender-petioled; fruiting involucre 1 to 1.2 cm. long, *Xanthium*-like. "Chicura" (Sinaloa, Baja California.)

15. **Franseria ilicifolia** A. Gray, Proc. Amer. Acad. 11: 77. 1876.

Gaertnera ilicifolia Kuntze, Rev. Gen. Pl. 1: 339. 1891.

Northern Baja California and islands; type from Cantillas Canyon. California and Arizona.

Shrubby, 30 to 60 cm. high, spreading-hirsute, densely leafy; leaves ovate or rhombic-ovate, 3 to 10 cm. long, 1.8 to 9.5 cm. wide, sessile, cordate-clasping, coriaceous; fruiting involucre 1.5 to 2.3 cm. long, densely covered with hooked spines, glandular-hairy.

45. **PHILACTIS** Schrad. "Ind. Sem. Hort. Goett. 1831;" Linnaea 8: Litt.-Ber. 24. 1833.

1. **Philactis zinnioides** Schrad. "Ind. Sem. Hort. Goett. 1831;" Linnaea 8: Litt.-Ber. 24. 1833.

Mexico, without definite locality.

Suffruticulose, dichotomous, the young branches villous; leaves opposite, petioled, broadly ovate, acuminate, serrulate, appressed-villous; peduncles in the forks, monocephalous, shorter than the leaves; involucre 2-seriate, appressed; receptacle elongate-conic; heads yellow; rays fertile, sessile, persistent, their achenes trigonous, glabrous, with an awn on the inner angle; disk flowers sterile, the achenes subtetragonous, with a pappus of 4 basally connate awns. (Description compiled.)

46. **ZINNIA** L. Syst. Nat. ed. 10. 1221. 1759.

REFERENCE: Robinson & Greenman, A revision of the genus *Zinnia*, Proc. Amer. Acad. 32: 14-20. 1896

Herbs or undershrubs with opposite entire leaves (in ours), and yellow, orange, white, or rarely liver-colored, usually solitary, terminal heads; involucre several-seriate, of strongly graduate, dry, subherbaceous-tipped phyllaries; rays fertile, the ligules sessile, persistent, the achenes awnless or with 1 to 3 short awns; disk fertile, the achenes strongly compressed, 2-toothed, 1 or 2-awned or awnless.

The cultivated zinnias or youth-and-old-age of the gardens are Mexican and South American species of this genus.

Rays bright orange-----1. *Z. juniperifolia*.

Rays white, yellow, or liver-colored.

Rays much shorter than the involucre, sometimes wanting---2. *Z. anomala*.

Rays longer than the involucre.

Leaves triplinerved; ligules 8 to 16 mm. long-----3. *Z. grandiflora*.

Leaves 1-nerved; ligules 12 mm. long or less.

Body of disk achenes 3 to 3.5 mm. long-----4. *Z. acerosa*.

Body of disk achenes 2 mm. long-----5. *Z. pumila*.

1. *Zinnia juniperifolia* (DC.) A. Gray, Pl. Wright. 1: 105. 1852.

Diplothrrix juniperifolia DC. Prodr. 5: 612. 1836.

Crassina juniperifolia Kuntze, Rev. Gen. Pl. 1: 331. 1891.

Coahuila, Zacatecas, and San Luis Potosí; type from San Luis Potosí.

Suffrutescent, much branched, 30 cm. high or less, puberulous; leaves linear, 1.5 to 4 cm. long, 1 to 1.8 mm. wide, 3-nerved; peduncles usually elongate; heads 2 to 3.8 cm. wide.

2. *Zinnia anomala* A. Gray, Pl. Wright. 1: 106. 1852.

Crassina anomala Kuntze, Rev. Gen. Pl. 1: 331. 1891.

Coahuila and Zacatecas. Texas; type from prairies beyond the Pecos.

Suffrutescent, about 12 cm. high; leaves linear or linear-lanceolate, about 2 cm. long, 3-nerved; phyllaries densely ciliate; heads 1.5 cm. wide or less; ligules "yellow" (?), apparently liver-colored; disk deep orange.

3. *Zinnia grandiflora* Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 348. 1840.

Crassina grandiflora Kuntze, Rev. Gen. Pl. 1: 331. 1891.

Sonora to Chihuahua and Durango. Colorado to Arizona and Texas; type from the Rocky Mountains.

Suffrutescent, much branched, 20 cm. high or less; leaves linear, 2.5 cm. long or less, 1 to 1.5 mm. wide; heads 2 to 3.2 cm. wide; rays bright yellow, very showy, suborbicular; disk orange.

4. *Zinnia acerosa* (DC.) A. Gray, Pl. Wright. 1: 106. 1852.

Diplothrrix acerosa DC. Prodr. 5: 611. 1836.

Crassina acerosa Kuntze, Rev. Gen. Pl. 1: 331. 1891.

Coahuila and San Luis Potosí; type from San Luis Potosí. Texas.

Similar to *Z. grandiflora* but smaller; leaves 1 to 2.5 cm. long, 1 mm. wide or less; heads 1 to 2.5 cm. wide; rays pale yellow or white (?).

5. *Zinnia pumila* A. Gray, Mem. Amer. Acad. n. ser. 4: 81. 1849.

Crassina pumila Kuntze, Rev. Gen. Pl. 1: 331. 1891.

Sonora to Coahuila and San Luis Potosí; type from San Juan de la Vequería and Castaniola, Mexico. Texas to Arizona.

Similar to *Z. acerosa*; leaves shorter, 16 mm. long or less; heads 1.2 to 1.8 cm. wide; rays white or "pale yellow" (?); achenes smaller. "Hierba de burro" (Zacatecas.)

17. **SANVITALIA** Gualt. in Lam. "Journ. Nat. Hist. 2: 176. pl. 33. 1792."

1. *Sanvitalia fruticosa* Hemsl. Biol. Centr. Amer. Bot. 2: 155. 1881.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Suffruticulose, about 15 cm. high, much branched, cinereous-strigose throughout; leaves opposite, short-petioled, the blades lanceolate, 1 to 2.4 cm. long, 3 to 6 mm. wide, few-toothed or entire; heads solitary at tips of branches, 1.5 cm. wide, often leafy-bracted; rays yellow, sessile, persistent; disk purple-brown; ray achenes trigonous, stiffly 3-awned; disk achenes compressed, usually with crustaceous margins and 2 short awns.

48. HELIOPSIS Pers. Syn. Pl. 2: 473. 1807.

1. Heliopsis longipes (A. Gray) Blake, Contr. U. S. Nat. Herb. 22: 608. 1924.

Philactis longipes A. Gray, Proc. Amer. Acad. 15: 35. 1879.

San Luis Potosí.

Suffrutescent, 30 to 50 cm. high, hirtellous; leaves opposite, remote, short-petioled, the blades ovate, about 2 cm. long, dentate-serrate; peduncles terminal, elongate, 1-headed; involucre 2-seriate, about 7 mm. high, of subherbaceous, ovate or lance-ovate phyllaries; receptacle columnar; flowers yellow; rays fertile, the lamina sessile, about 1 cm. long, the achenes trigonous-obcompressed, epappose; disk flowers fertile, quadrangular and few-ribbed, epappose or with 2 or 4 minute teeth.

49. GRYPOCARPHA Greenm. in Sarg. Trees & Shrubs 1: 145. pl. 73. 1903.

REFERENCE: Blake, Contr. Gray Herb. n. ser. 52: 34-36. 1917.

Shrubs with opposite triplinerved ovate leaves; heads yellow, radiate, solitary in the axils or in cymes of 3 or 5 at tips of branches; involucre 2 or 3-seriate, the phyllaries indurate, lance-ovate or oblong, with narrow, spreading or reflexed, herbaceous tips; pales stiff, acuminate, usually incurved-hooked at apex; ray corollas sessile, persistent; ray achenes trigonous, 1-awned; disk achenes fertile, quadrangular, with 1 or 2 awns and sometimes 1 or 2 very short squamellae.

The genus includes only the three following species.

Branchlets densely pubescent; involucre villous-----1. *G. hebeclada*.

Branchlets very sparsely strigillose or glabrous; phyllaries ciliate, on back sparsely pubescent or subglabrous.

Veins of the leaves beneath spreading-pubescent-----2. *G. liebmannii*.

Veins of the leaves beneath glabrous-----3. *G. nelsonii*.

1. Grypocarpa hebeclada Blake, Contr. Gray Herb. n. ser. 52: 35. 1917.

Oaxaca; type from Tula.

Leaf blades ovate, 4 to 6.5 cm. long, strigose above, in youth densely pubescent beneath, on petioles 1 cm. long; heads 1.5 to 3 cm. wide.

2. Grypocarpa liebmannii (Klatt) Blake, Contr. Gray Herb. n. ser. 52: 35. 1917.

Zinnia liebmannii Klatt, Leopoldina 23: 89. 1887.

Sanvitaliopsis liebmannii Schultz Bip.; Klatt, Leopoldina 23: 89. 1887, as synonym.

Melanthera fruticosa T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 421. 1924.

Oaxaca (?) and Chiapas; type from Río Taba, Oaxaca (?). Guatemala.

Leaf blades ovate, 7.5 to 10.5 cm. long, acuminate, smooth above; heads 2 cm. wide.

3. Grypocarpa nelsonii Greenm. in Sarg. Trees & Shrubs 1: 145. pl. 73. 1903.

Sanvitaliopsis nelsonii Greenm. Proc. Amer. Acad. 41: 261. 1905.

Known only from the type locality, on ridge back of Tonalá, Chiapas.

Leaf blades ovate, 6 to 7 cm. long, glabrous on both sides; heads about 2.2 cm. wide.

50. RUMFORDIA DC. Prodr. 5: 549. 1836.

REFERENCE: Robinson, A revision of the genus *Rumfordia*, Proc. Amer. Acad. 44: 592-596. 1909.

Shrubs or herbs, with broad opposite leaves; heads yellow, radiate, several to very numerous in terminal cymose panicles; involucre double, the outer phyllaries herbaceous, loose, the inner much smaller, embracing the ray achenes; ray and disk fertile; achenes obovoid, thickened, epappose.

Leaves broadly ovate, regularly toothed, not lobed or angulate.

1. R. floribunda.

Leaves rhombic-ovate or triangular-ovate, coarsely 1 or 2-lobed or toothed on the angles.

Outer phyllaries granular-puberulous chiefly on margin; stem essentially glabrous.....

2. R. attenuata.

Outer phyllaries glandular-pilose; stem crisped-pilosulous....

3. R. oreopola.**1. Rumfordia floribunda** DC. Prodr. 5: 550. 1836.

Rumfordia floribunda pubescens Greenm. Proc. Amer. Acad. 41: 261. 1905.

Tepic to Oaxaca; type from Mexico, without definite locality.

Shrubby below, 2 to 4 meters high; leaf blades 8 to 19 cm. long, decurrent on the petioles nearly or usually quite to the base, usually pilose beneath in the axils of the main veins and along costa; panicle 10 to 22 cm. wide, very many-headed; heads 1.8 to 3.5 cm. wide; ray corollas provided with a slender tube, persistent, yellow becoming white. "Tacote amarillo" (Tepic).

2. Rumfordia attenuata Robinson, Proc. Amer. Acad. 44: 594. 1909.

Known only from the type locality, Sierra Madre of Michoacán or Guerrero.

Suffrutescent (?), 2.5 meters high; leaves rhombic-ovate, or the upper lanceolate, the larger 23 cm. long, 12 cm. wide, thin, acuminate, bearing one or two large spreading teeth on each angle, narrowed to a sessile base or short-petioled; phyllaries 8 to 10 mm. long.

3. Rumfordia oreopola Robinson, Proc. Amer. Acad. 44: 595. 1909.

Known only from the type locality, crest of the Sierra Madre, Michoacán or Guerrero.

Suffrutescent (?), 3 meters high; leaves triangular-ovate, about 10 cm. long, 6 cm. wide, short-petioled, coarsely about 2-toothed on each side and serrulate; phyllaries 1.1 to 1.9 cm. long.

51. RHYSOLEPIS Blake, Contr. Gray Herb. n. ser. 52: 36. 1917.

REFERENCE: Blake, Contr. Gray Herb. n. ser. 52: 36-37. 1917.

Suffrutescent; leaves opposite or alternate, serrate; heads radiate, yellow, few in terminal cymose panicles; involucre 3 or 4-seriate, graduate, of herbaceous-tipped phyllaries; rays neutral; pales indurate, gibbous, cross-wrinkled, closely embracing the disk achenes; disk achenes strongly compressed; pappus of 2 awns and 6 to 8 minute squamellae.

Only the two species following are known.

Leaves chiefly alternate, oblong or ovate-oblong, sessile... **1. R. morelensis.**

Leaves opposite, ovate-lanceolate, on petioles 3 to 13 mm. long... **2. R. palmeri.**

1. Rhysolepis morelensis (Greenm.) Blake, Contr. Gray Herb. n. ser. 52: 36. 1917.

Viguiera morelensis Greenm. Proc. Amer. Acad. 40: 40. 1904.

Morelos; type from Cuernavaca.

Leaf blades 4 to 6.8 cm. long, 0.8 to 2 cm. wide; involucre 7 mm. high, the two outer rows of phyllaries strongly reflexed, the two inner with only the tips reflexed.

2. *Rhysolepis palmeri* (A. Gray) Blake, Contr. Gray Herb. n. ser. 52: 37. 1917.

Viguiera palmeri A. Gray in S. Wats. Proc. Amer. Acad. 22: 427. 1887.

Jalisco; type from Río Blanco.

Leaf blades 4 to 10.5 cm. long, 1.3 to 3 cm. wide; phyllaries all squarrose-tipped, the outer with lance-linear foliaceous tips up to 2.5 cm. long.

52. **MONTANO** Cervant. in Llave & Lex. Nov. Veg. Descr. 2: 11. 1825.

REFERENCE: Robinson & Greenman, Proc. Amer. Acad. 34: 508-521. 1899.

Shrubs or trees; leaves chiefly opposite, usually ovate, sometimes lobed or coarsely pinnatifid; heads white, radiate, rarely discoid, usually numerous; outer phyllaries about 5 to 7, usually linear to oblong; rays neutral; pales in fruit accrescent, usually scarious, often spinescent-tipped, including and greatly surpassing the obovoid, thickened, epappose achenes.

The genus was named by Cervantes in honor of Don Luis Montaña, native of Puebla, a distinguished physician and naturalist.

The name "cerbatana" is reported for some unidentified species of the genus. In Central America this same name is sometimes applied to species of *Verbesina* because of the fact that the hollow stems are employed by boys for making popguns (cerbatanas).

Rays none; heads 3 or 4-flowered.

Leaves suborbicular, rusty-tomentose beneath.....1. *M. hemsleyana*.

Leaves elliptic-lanceolate to oval-ovate, quickly glabrate beneath...2. *M. rekoi*.

Rays present; heads with more numerous flowers.

Heads very large, 4.5 to 8 cm. wide; leaves deeply pinnatifid.

Petioles broadly winged to the very base.....29. *M. grandiflora*.

Petioles incompletely or not at all winged.

Leaves permanently canescent-tomentose beneath.....30. *M. speciosa*.

Leaves soon green and merely puberulent beneath...31. *M. pyramidata*.

Heads smaller, 4.5 (rarely 5) cm. wide or less; leaves often merely serrate.

Heads very small, 16 mm. wide or less, the rays 2 to 5; pales densely silky-villous.

Leaves truncate or subcordate at base.

Leaves deltoid-ovate, about as wide as long.....3. *M. floribunda*.

Leaves triangular-ovate, much longer than wide....4. *M. tomentosa*.

Leaves cuneate to acute at base.

Leaves distinctly 3 or 5-lobed.

Phyllaries in anthesis 5 to 6 mm. long.....9. *M. palmeri*.

Phyllaries in anthesis 3 to 4 mm. long.

Leaves about one-half as wide as long.....7. *M. myriocephala*.

Leaves about three-fourths as wide as long...8. *M. xanthiifolia*.

Leaves unlobed.

Phyllaries at anthesis 2.5 to 4 mm. long.

Leaves 2 to 7 cm. wide, on petioles 1 cm. long...5. *M. seleriana*.

Leaves 1.8 to 2 cm. wide, on winged petioles...6. *M. microcephala*.

Phyllaries at anthesis 4.5 to 6 mm. long.

Larger leaves rhombic-ovate, 7 to 8 cm. wide.....9. *M. palmeri*.

Larger leaves ovate, 2 to 5 cm. wide.....10. *M. rosei*.

Heads medium-sized, the rays 7 to 10; pales from rather densely villous to nearly glabrous, not silky.

Phyllaries about 10 mm. long.

Phyllaries spatulate-obovate.....11. *M. pringlei*.

- Phyllaries broadly oblong-----12. *M. liebmannii*.
 Phyllaries smaller, 3 to 7 mm. long.
 Leaves very large, 10 to 30 cm. wide, deeply palmate-lobed, on wingless
 petioles-----15. *M. hibiscifolia*.
 Leaves much smaller, or else merely angulate-lobed.
 Leaves oblong or elliptic-oblong, the petioles short, naked or winged.
 13. *M. samalensis*.
 Leaves mostly ovate or lance-ovate.
 Petioles short, winged throughout-----14. *M. tehuacana*.
 Petioles usually rather long, winged only at apex if at all.
 Pales in fruit stiff and firm, gradually long-acuminate into a
 stout spinescent tip.
 Leaves essentially glabrous beneath except along the veins.
 17. *M. frutescens*.
 Leaves hirtellous beneath-----18. *M. arborescens*.
 Pales in fruit thin, subscarious, varying from abruptly mucronate
 to short-acuminate.
 Pales in fruit rather densely long-pilose, especially on margin.
 23. *M. pilosipalea*.
 Pales in fruit subglabrous or sparsely pubescent.
 Plants scandent.
 Leaves broadly ovate or deltoid-ovate, rounded or
 truncate to subcordate at base.
 Leaves puberulous beneath-----26. *M. pauciflora*.
 Leaves sordid-tomentulose beneath---27. *M. schottii*.
 Leaves lance-ovate, cuneate at base----28. *M. gracilis*.
 Plants not scandent.
 Leaves hexagonal-ovate, about 14 cm. long and nearly as
 wide, long-petioled, arachnoid-tomentose beneath;
 branchlets strongly quadrangular.
 16. *M. hexagona*.
 Leaves usually much longer than wide, not arachnoid-
 tomentose beneath; branchlets not strongly quad-
 rangular.
 Pales in fruit retuse and short-mucronate.
 Leaves pubescent beneath on all the veins and
 veinlets-----24. *M. subtruncata*.
 Leaves sparsely puberulous beneath on the chief
 veins-----25. *M. affinis*.
 Pales in fruit rather gradually or abruptly cuspidate or
 mucronate, not retuse.
 Pales in fruit with straightish tips.
 Leaves rhombic-ovate or triangular-ovate, shortly
 cuneate at base-----19. *M. purpurascens*.
 Leaves lanceolate to lance-obovate, truncate at
 base-----20. *M. arsenei*.
 Pales in fruit with uncinete-recurved tips.
 Leaves lanceolate to ovate, obscurely or not at all
 angulate-lobed-----21. *M. uncinata*.
 Leaves usually rhombic-ovate, distinctly angulate-
 lobed-----22. *M. patens*.
1. *Montanoa hemsleyana* (Kuntze) Blake.
Montanoa sp. (no. 24) Hemsl. Biol. Centr. Amer. Bot. 2: 166. 1881.
Eriocoma hemsleyana Kuntze, Rev. Gen. Pl. 1: 336. 1891.

Montanoa anomala Robins. & Greenm. Proc. Amer. Acad. **34**: 509. 1899.

Known only from the type locality, Valley of Córdoba, Veracruz.

Leaves petioled, the blades of the uppermost 4 cm. long, 5 cm. wide, unlobed; panicle 18 cm. wide; phyllaries linear or linear-lanceolate. (Description compiled.)

2. *Montanoa rekoi* Blake, Contr. U. S. Nat. Herb. **22: 610. 1924.**

Known only from the type locality, Apango, Oaxaca.

Large tree, the trunk up to 50 cm. thick, the bark cork-like; leaf blades 8.5 to 19 cm. long, 2.3 to 9.5 cm. wide, unlobed or sometimes 3-lobed; disk 5 mm. high, 2.5 mm. thick; phyllaries ovate. "Yagazeche," "ocotillo."

The branches contain a rosin or camphor-like substance which burns like pitch.

3. *Montanoa floribunda* (H. B. K.) Schultz Bip.; C. Koch, Wochenschr. Gärtn. **7: 406. 1864.**

Eriocoma floribunda H. B. K. Nov. Gen. & Sp. **4**: 268. pl. 396. 1820.

Montagnaea floribunda DC. Prodr. **5**: 564. 1836.

State of Mexico to Oaxaca; type collected between Guadalupe and City of Mexico.

Shrub, up to 2.5 meters high; branches sordidly pilose-tomentose, glabrescent; leaves slender-petioled, the blades 2.5 to 6.5 cm. long and wide, crenate-dentate, scabrous above, sordid-tomentose beneath; heads very numerous, cymose-panicled. "Cihuapatli," "zuapatli," "zoapatle," "zoapatli."

4. *Montanoa tomentosa* Cervant. in Llave & Lex. Nov. Veg. Descr. **2: 11. 1825.**

Eriocoma fragrans D. Don in Sweet, Brit. Fl. Gard. II. **1**: pl. 44. 1830.

Eriocoma heterophylla Schrad. "Ind. Sem. Hort. Gott. **1833**: 3. 1833;"

Linnaea **10**: Litt.-Ber. 70. 1835.

Montagnaea tomentosa DC. Prodr. **5**: 564. 1836.

Montagnaea tomentosa cordifolia DC. Prodr. **5**: 565. 1836.

Montagnaea tomentosa ternifolia DC. Prodr. **5**: 565. 1836.

Montanoa ternifolia Schultz Bip.; C. Koch, Wochenschr. Gärtn. **7**: 406. 1864.

Eriocoma tomentosa Kuntze, Rev. Gen. Pl. **1**: 336. 1891.

Eriocoma ternifolia Kuntze, Rev. Gen. Pl. **1**: 336. 1891.

Montanoa tomentosa ternifolia Hemsl. (Biol. Centr. Amer. Bot. **2**: 166. 1881, as synonym); Robins. & Greenm. Proc. Amer. Acad. **34**: 510. 1899.

San Luis Potosí to Oaxaca; type from State of Mexico.

Similar to *M. floribunda*; leaf blades 3.5 to 11 cm. long, 2 to 8.5 cm. wide, often coarsely lobed especially toward base. "Cihuapatli," "ciguapacle" (from the Nahuatl *cihua*-patli, woman + medicine); "singuapacle," "zuapatli," "zoapatle," "zihoapactli," "sinhuapastle," "zihuapatli," "zoapatle," "cihoapactli," "hierba de la parida" (Distrito Federal).

The plant is reputed to have stomachic, diuretic, and pectoral properties. Its most common use, however, is as an aid to women in childbirth, the decoction being administered to provoke uterine contractions, although such use is said to be dangerous. It is said to be much used for this purpose in Mexico at the present time. See E. Armendáriz, Estudio químico del zoapatli, Anal. Inst. Méd. Nac. Méx. **1**: 11.

It is doubtless this or a related species of which Sahagún writes as follows: "There is a medicinal plant called *ciuapatli*. It is a shrub from which spring many long branches with ashen, pointed leaves. The flowers are yellow and white. The seed resembles that of blite. The decoction of the leaves is the part used. Pregnant women drink it at the time of delivery to facilitate labor and to prevent consequent exhaustion. The numerous roots of this shrub are fine and long, black outside and yellow within. Ground and mixed with lukewarm water,

they are good for those who suffer from dysentery. The infusion may be taken on an empty stomach or after meals. Those who make use of it should be careful of their diet. This plant grows in the fields, on the mountains, or even in the patios of the houses."

5. *Montanoa seleriana* Robins. & Greenm. Proc. Amer. Acad. 34: 510. 1899.
Known only from the type locality, Tuxtla, Chiapas.

Leaves rhombic-ovate or lanceolate, 5 to 10 cm. long, cuneate at base, serrulate or subentire, scabrous above, tomentose beneath, at length subglabrate; panicles 10 cm. wide. (Description compiled.)

6. *Montanoa microcephala* Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 406. 1864.

Eriocoma microcephala Kuntze, Rev. Gen. Pl. 1: 336. 1891.

Known only from the type locality, Ejutla, Oaxaca.

Rusty-tomentose; leaves elliptic-lanceolate, 6 cm. long, acute at each end, serrate, scabrous above, densely tomentose beneath; heads very small and numerous. (Description compiled.)

7. *Montanoa myriocephala* Robins. & Greenm. Proc. Amer. Acad. 34: 511. 1899.

Jalisco and Puebla to Chiapas; type from Chapala, Jalisco.

Branches sordidly pilose-tomentose, glabrate; leaf blades rhombic-ovate in outline, 7 to 13 cm. long, 3 to 8 cm. wide, 3 or 5-lobed with short blunt lateral lobes, cuneately decurrent on the upper part of the petiole, scabrous above, more or less tomentose beneath; heads numerous.

8. *Montanoa xanthiifolia* Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 406. 1864.

Eriocoma xanthiifolia Kuntze, Rev. Gen. Pl. 1: 336. 1891.

"Chacalepa Estate, Mexico" (type locality). Costa Rica.

Similar to *M. myriocephala*; leaf blades 3-lobed, 12 cm. long, 9 cm. wide, cuneately narrowed into the rusty-tomentose petiole, very scabrous above, the lobes ovate or triangular, acute to caudate-acuminate. (Description compiled.)

9. *Montanoa palmeri* Fernald, Proc. Amer. Acad. 33: 93. 1897.

Known only from the type locality, Acapulco, Guerrero.

Shrub 2.5 meters high, soon glabrate; leaf blades rhombic-ovate, 10 to 14 cm. long, 7 to 8 cm. wide, the larger angulate-lobed near middle, caudate-acuminate, crenulate, rough above, pubescent beneath; flowers with fragrance suggesting that of apple blossoms.

10. *Montanoa rosei* Robins. & Greenm. Proc. Amer. Acad. 32: 45. 1896.

Known only from the vicinity of the type locality, Alamos, Sonora.

Similar to *M. palmeri*; leaf blades ovate or lance-ovate, 7 to 10 cm. long, 2 to 5 cm. wide, unlobed, serrate, rough and bullate above, pubescent and gland-dotted beneath; heads very silky.

11. *Montanoa pringlei* Robins. & Greenm. Proc. Amer. Acad. 34: 512. 1899.

Known only from the type locality, Tehuacán, Puebla.

Branchlets pulverulent-tomentose; leaves lanceolate or oblong-lanceolate, 4 to 8 cm. long, 1.5 to 3 cm. wide, acute, serrate, gradually narrowed into wings decurrent nearly to base of petiole, green and scabrous above, canescent-tomentose beneath; heads 2 or 3 at ends of branches; rays 6 to 8 mm. long; pales (in anthesis) attenuate, villous. (Description compiled.)

12. *Montanoa liebmännii* (Schultz Bip.) Blake, Contr. Gray Herb. n. ser. 52: 37. 1917.

Polymnia liebmännii Schultz Bip.; Klatt, Leopoldina 23: 89. 1887.

Montanoa macrolepis Robins. & Greenm. Proc. Amer. Acad. 32: 44. 1896.

Oaxaca; type from Cumbre de Estepe.

Stem hirsute-pilose, glabrescent; leaf blades rhombic-ovate, 6 to 12.5 cm. long, 3.5 to 7.5 cm. wide, sinuately 3 or 5-lobed, decurrent on the upper part of the petiole, rough above, green and pubescent beneath; heads 1 to 5 at ends of branches; phyllaries acute to rounded, 3.5 to 5 mm. wide; pales elongate, attenuate, straightish, pungent-tipped.

13. *Montanoa samalensis* Coult. Bot. Gaz. 20: 49. 1895.

Zacatecas. Guatemala; type from Río Samalá, Guatemala.

Branches sordid-tomentose, glabrescent; leaves 8 to 24 cm. long, a third as wide, obtuse or acuminate, crenate, green and scabrous above, beneath at first canescent-tomentose, at length glabrate and green; heads solitary or few; pales truncate, spinescent-mucronate.

14. *Montanoa tehuacana* Robinson, Proc. Amer. Acad. 47: 209. 1911.

Puebla; type from Tehuacán.

Shrub, up to 5 meters high; leaf blades lance-ovate to rhombic-ovate, 4.5 to 20 cm. long, 2.5 to 16 cm. wide, cuneately decurrent on the petiole (sometimes broadly so), often sinuately 3 or 5-lobed, green and scabrous above, canescent-tomentulose beneath; heads rather few or numerous; pales rather abruptly contracted into long, spreading, spinescent tips.

15. *Montanoa hibiscifolia* (Benth.) Schultz Bip.; C. Koch, Wochenschr. Gärtn. 7: 407. 1864.

Montagnaea hibiscifolia Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 89. 1852.

Eriocoma hibiscifolia Kuntze, Rev. Gen. Pl. 1: 336. 1891.

Chiapas. Guatemala to Costa Rica; type from Segovia, Nicaragua.

Shrub, up to 6.5 meters high; branches glabrescent; petioles long, often biauriculate at apex; leaves sinuately several-lobed usually to middle or deeper, canescent-tomentulose to merely puberulous beneath; heads numerous, cymose-panicled, 2 to 3.5 cm. wide; rays white "with roseate tinge"; pales in fruit short-mucronate from a subtruncate or emarginate apex. "Telecate blanco" (Nicaragua); "palo de marimba" (El Salvador).

16. *Montanoa hexagona* Robins. & Greenm. Proc. Amer. Acad. 34: 514. 1899.

Known only from the type locality, Chiapas.

Large tree; leaves scabrous above, unappendaged at base; petioles wingless, 7 cm. long; heads numerous, rather large; rays about 2 cm. long. (Description compiled.)

17. *Montanoa frutescens* (Mairet) Hemsl. Biol. Centr. Amer. Bot. 2: 165. 1881.

Montagnaea frutescens Mairet; DC. Prodr. 5: 565. 1836.

Priestleya squarrosa Moc. & Sessé; DC. Prodr. 5: 565. 1836, as synonym.

Eriocoma frutescens Alamán; DC. Prodr. 5: 565. 1836, as synonym.

Aldama montanoa Schultz Bip.; C. Koch, Wochenschr. Gärtn. 7: 406. 1864.

Michoacán to Oaxaca; type from Mexico, without definite locality.

Shrub, up to 4 meters high; stem glabrous or early glabrate; leaf blades ovate to deltoid- or rhombic-ovate, 6 to 15.5 cm. long, 2.5 to 11 cm. wide, rarely sinuately 3-lobed, acuminate, green on both sides, harsh above; heads few or numerous, up to 4.5 cm. wide.

18. *Montanoa arborescens* (DC.) Schultz Bip.; C. Koch, Wochenschr. Gärtn. 7: 406. 1864.

Montagnaea arborescens DC. Prodr. 5: 565. 1836.

Eriocoma arborescens Alamán; DC. Prodr. 5: 566. 1836, as synonym.

Montanoa floribunda Cerv.; DC. Prodr. 5: 566. 1836, as synonym.

Mexico, without definite locality (type); "Cordillera Guchilaqua."

Branches villous; leaves oblong-lanceolate, acuminate, acute at base, serrate near middle, harsh above; heads loosely cymose, long-pediceled; phyllaries oblong, nearly equaling the disk. (Description compiled.)

The name "tacote de flor" has been reported for the species.

19. **Montanoa purpurascens** Robins. & Greenm. Proc. Amer. Acad. **34**: 515. 1899.

Eriocoma hartwegiana Kuntze, Rev. Gen. Pl. **1**: 336. 1891, nomen nudum.

Zacatecas to Guanajuato; type locality not definitely stated.

Stem sordid-tomentose; leaf blades triangular-ovate or rhombic-ovate, 6 to 12.5 cm. long, 2 to 8 cm. wide, attenuate, cuneate at base, crenate-serrate, harsh above, sordid-tomentose or tomentulose beneath; heads numerous; fruiting pales broad, rather abruptly pungent-pointed.

20. **Montanoa arsenei** Blake, Contr. U. S. Nat. Herb. **22**: 611. 1924.

Known only from the type locality, near Morelia, Michoacán.

Stem sordidly subtomentose-pubescent; leaf blades 6 to 12 cm. long, 1.5 to 4 cm. wide, acuminate, at base often very unequal, harsh above, rather densely hispidulous-pilosulous beneath; heads numerous, about 2 cm. wide; pales in fruit rather gradually narrowed to the spreading or reflexed cuspidate tip.

21. **Montanoa uncinata** Schultz Bip.; C. Koch, Wochenschr. Gärtn. **7**: 406. 1864.

Eriocoma uncinata Kuntze, Rev. Gen. Pl. **1**: 336. 1891.

Michoacán to Oaxaca; type from "Cumbre de Estepa."

Shrub, up to 4 meters high; branches soon glabrate or glabrescent; leaf blades lance-ovate to rhombic-ovate, 6 to 12 cm. long, 2 to 6.5 cm. wide, caudate-acuminate, cuneate or rounded at base, griseous-tomentose or tomentulose beneath; heads numerous, about 2 cm. wide; pales broad, with short abrupt spinescent tips.

22. **Montanoa patens** A. Gray, Proc. Amer. Acad. **21**: 388. 1886.

Sonora and Chihuahua to Jalisco and Puebla; type from Batopilas, Chihuahua.

Shrub, up to 4 meters high; branches puberulent; leaf blades 9 to 25 cm. long, 4 to 18 cm. wide, acuminate or attenuate, short-cuneate and often biauriculate at base, green and scabrous above, paler and puberulent-tomentulose beneath; heads numerous, about 2.5 cm. wide; pales broad, abruptly and shortly uncinately-cuspidate.

23. **Montanoa pilosipalea** Blake, Contr. U. S. Nat. Herb. **22**: 612. 1924.

Known only from the type locality, Fort de La Guadalupe, near City of Puebla.

Stem sordidly pilose-tomentose; leaf blades triangular-ovate, 3.5 to 7 cm. long, 1.3 to 4 cm. wide, subentire or usually coarsely 1 or 2-toothed or lobed on each side near base, acuminate, short-cuneate at base, griseous-tomentose beneath; heads numerous; rays 7 mm. long; fruiting pales loosely long-pilose and densely pilose-ciliate above, abruptly contracted into a firm, spreading or slightly recurved cusp 1.5 to 1.8 mm. long.

24. **Montanoa subtruncata** A. Gray in S. Wats. Proc. Amer. Acad. **22**: 424. 1887.

Jalisco; type from Río Blanco.

Shrub, up to 4 meters high; stem somewhat puberulous; leaves slender-petioled, the blades ovate or rhombic-ovate, 4.5 to 12 cm. long, 3 to 8 cm. wide, acuminate, at base truncate-rounded to broadly subcordate, not auriculate, sometimes sinuately 3 or 5-lobed, scabrous above, green beneath; heads numerous, 2.5 to 3.8 cm. wide; fruiting pales broad, abruptly mucronulate at the retuse apex.

25. **Montanoa affinis** Blake, Contr. U. S. Nat. Herb. **22**: 612. 1924.

Known only from the type locality, El Ocote, Michoacán or Guerrero.

Shrub, 3 meters high; stem sparsely strigillose; petioles slender, 1.5 to 4.5 cm.

long; blades broadly ovate or suborbicular-ovate, 7 to 11 cm. long, 4.5 to 8 cm. wide, acute or short-acuminate, cuneate to subtruncate at base, sometimes with a short blunt lobe on each side near middle, remotely crenate, harsh above; heads numerous, 1.7 to 2 cm. wide; immature pales truncate-rounded and abruptly contracted into a short erect cusp. "Flor de San Francisco."

26. *Montanoa pauciflora* Klatt, *Leopoldina* 23: 90. 1887.

Coreopsis trilobata Vahl; Klatt, *Leopoldina* 23: 90. 1887, as synonym.

Oaxaca. Guatemala, Honduras, and El Salvador; type locality erroneously given as South America.

Scandent, suffrutescent; stem puberulent; petioles slender; leaf blades ovate, 5 to 9 cm. long, 3 to 6.8 cm. wide, acute or acuminate, sometimes shallowly and acutely 3-lobed, scabrous above; heads usually rather numerous, 2.5 to 3 cm. wide; fruiting pales retuse and short-mucronate. "Margarita," "palo de marimba," "tatascamite blanco" (El Salvador).

27. *Montanoa schottii* Robins. & Greenm. *Proc. Amer. Acad.* 34: 518. 1899.

Yucatán and Campeche (?); type collected between Mérida and Sisal, Yucatán.

Similar to *M. pauciflora*; leaves not lobed; branches of inflorescence sordid-tomentose; phyllaries acute; heads 4.5 to 5 cm. wide; fruiting pales retuse and mucronulate. "Homahak" (Maya, Yucatán).

28. *Montanoa gracilis* Schultz Bip.; C. Koch, *Wochenschr. Gärt.* 7: 407. 1864.

Eriocoma gracilis Kuntze, *Rev. Gen. Pl.* 1: 336. 1891.

Known only from the type locality, "San Miguel, La Grabra," Mexico.

Similar to *M. pauciflora*; leaves ovate-lanceolate, 5 cm. long, 2.5 cm. wide, cuneate at base, very rough above, essentially glabrous beneath except along the nerves; rays 5; pales with straight mucro. (Description compiled.)

29. *Montanoa grandiflora* (DC.) Schultz Bip.; C. Koch, *Wochenschr. Gärt.* 7: 408. 1864.

Montagnaea grandiflora DC. *Prodr.* 5: 565. 1836.

Eriocoma grandiflora Alamán; DC. *Prodr.* 5: 565. 1836, as synonym.

?*Priestleya longifolia* Moc. & Sessé; DC. *Prodr.* 5: 565. 1836, as synonym.

Durango to Oaxaca; type from Mexico, without definite locality.

Shrubby, up to 4 meters high; stem stout, sordidly subtomentose; leaves up to 30 cm. long (including the broadly margined petiole), pinnatifid with 3 to 9 unequal lobes, usually acuminate, green and rough above, canescent-tomentulose or subglabrescent beneath; heads numerous, 4.5 to 6.5 cm. wide; fruiting pales gradually spinescent-acuminate. "Paracua" (Michoacán, *Seler*).

30. *Montanoa speciosa* (DC.) Schultz Bip.; C. Koch, *Wochenschr. Gärt.* 7: 408. 1864.

Montagnaea speciosa DC. *Prodr.* 5: 565. 1836.

Eriocoma speciosa Kuntze, *Rev. Gen. Pl.* 1: 336. 1891.

Known only from the type locality, Cuernavaca, Morelos.

Leaves about 22 cm. long, 7.5 cm. wide, irregularly pinnatifid, decurrent on the petiole, villous above, softly villous-tomentose beneath; pales subulate-spinescent at apex. (Description compiled.)

31. *Montanoa pyramidata* Schultz Bip.; C. Koch, *Wochenschr. Gärt.* 7: 408. 1864.

Eriocoma pyramidata Kuntze, *Rev. Gen. Pl.* 1: 336. 1891.

Jalisco, Colima, and Morelos; type from Guadalajara, Jalisco.

Similar to *M. speciosa*; leaves soon green and merely puberulent beneath; fruiting pales gradually or rather abruptly narrowed into the straight cusp. "Tacote" (Sinaloa).

DOUBTFUL SPECIES.

MONTANOA ASCHENBORNII Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 407. 1864. *Eriocoma aschenbornii* Kuntze, Rev. Gen. Pl. 1: 336. 1891.

MONTANOA BIPINNATIFIDA (Kunth) C. Koch, Wochenschr. Gärt. 7: 407. 1864. *Uhdea bipinnatifida* Kunth, "Ind. Sem. Hort. Berol. 1847: 13. 1847." Closely allied to *M. pyramidata* Schultz Bip., and perhaps identical.

MONTANOA CRENATA Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 407. 1864. *Eriocoma crenata* Kuntze, Rev. Gen. Pl. 1: 336. 1891.

MONTANOA ELEGANS C. Koch, Wochenschr. Gärt. 7: 408. 1864. *Eriocoma elegans* Kuntze, Rev. Gen. Pl. 1: 336. 1891. Apparently closely related to *M. pyramidata* Schultz Bip., if not identical with that species.

MONTANOA KARVINSKII (DC.) Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 407. 1864, as *M. karwinskyi*. *Montagnaea karvinskii* DC. Prodr. 5: 565. 1836; *Montagnaea clematidea* Walp. Linnaea 14: 308. 1840; *Montanoa clematidea* Hemsl. Biol. Centr. Amer. Bot. 2: 165. 1881; *Eriocoma clematidea* Kuntze, Rev. Gen. Pl. 1: 336. 1891; *Eriocoma karwinskyi* Kuntze, Rev. Gen. Pl. 1: 336. 1891.

MONTANOA OLIVAE Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 406. 1864. *Eriocoma olivae* Kuntze, Rev. Gen. Pl. 1: 336. 1891.

MONTANOA TRILOBA Schultz Bip.; C. Koch, Wochenschr. Gärt. 7: 406. 1864. *Eriocoma triloba* Kuntze, Rev. Gen. Pl. 1: 336. 1891.

53. **VARILLA** A. Gray, Mem. Amer. Acad. n. ser. 4: 106. 1849.

REFERENCE: A. Gray, Syn. Fl. 1²: 257. 1884.

Shrubby, low, glabrous; leaves linear, entire, opposite or alternate; heads discoid, yellow, solitary or cymose-panicled; involucre about 2-seriate, of lanceolate, indurate, vittate, appressed phyllaries; achenes subcylindric, 10 to 15-ribbed; pappus none or of about 10 weak bristle-like awns.

Only two species of this genus are known.

Heads cymose-panicled; leaves opposite, acuminate, not fleshy. 1. **V. mexicana**.

Heads solitary, long-peduncled; leaves chiefly alternate, obtuse, fleshy.

2. **V. texana**.

1. **Varilla mexicana** A. Gray, Mem. Amer. Acad. n. ser. 4: 106. 1849.

Coahuila and Chihuahua; type collected between Pelayo and Cadena, Chihuahua.

Low shrub, about 1.5 meters high, somewhat glutinous, oppositely branched; leaves linear-attenuate, 3 to 8.5 cm. long, 1.5 to 3 mm. wide; achenes about 10-ribbed, 2.5 mm. long; pappus of about 10 short, weak, often sparsely branched, bristle-like, persistent awns. "Varilla" (Coahuila); "jarilla."

2. **Varilla texana** A. Gray, Pl. Wright. 1: 123. 1852.

Northern Mexico (according to Gray). Texas; type collected between the Nueces River and the Rio Grande.

Frutescent, tufted, about 30 cm. high; leaves 1.5 to 3.3 cm. long, 1 to 2 mm. wide; peduncles 6 to 15 cm. long; achenes about 15-ribbed, epappose.

54. **AGIABAMPOA** Rose; O. Hoffm. in Engl. & Prantl, Pflanzenfam. 4⁵: 390. 1894.

REFERENCE: Rose, Contr. U. S. Nat. Herb. 1: 335. pl. 32. 1895.

1. **Agiabampoa congesta** Rose; O. Hoffm. in Engl. & Prantl, Pflanzenfam. 4⁵: 390. 1894.

Sinaloa; type from Agiabampo.

Woody below, 1.5 to 2 meters high, strigillose, exuding a gum with odor of turpentine; leaves opposite, often alternate above, their blades lance-ovate to linear-lanceolate, 3 to 8.5 cm. long, 0.4 to 2.5 cm. wide, acuminate, subentire,

triplinerved, short-petioled; heads in small close cymose panicles at tips of branches, cylindric, about 8 mm. high, yellow; ray flowers 5 or wanting, neutral; disk flowers 10 to 18; involucre strongly graduate, of indurate, obtuse or rounded, vittate phyllaries; achenes obovoid-oblong, about 2 mm. long, trigonous or subquadrangular, glabrous, epappose. "Balayaqui."

55. ZALUZANIA Pers. Syn. Pl. 2: 473. 1807.

REFERENCE: Robinson & Greenman, Proc. Amer. Acad. 34: 530-534. 1899.

Herbs or shrubs; leaves alternate; heads radiate or discoid, yellow, solitary to paniced; involucre about 2-seriate, appressed; receptacle conical; rays fertile; achenes of the ray trigonous, sometimes with a few deciduous aristiform squamelae; disk achenes somewhat compressed, epappose.

Heads discoid.....7. **Z. pringlei**.

Heads radiate.

Leaves 3-lobed.....1. **Z. grayana**.

Leaves entire to dentate, not lobed.

Leaves densely canescent-tomentulose beneath.

Involucre green, merely puberulent.....2. **Z. augusta**.

Involucre canescent-tomentulose.

Leaf blades ovate or triangular, obtuse, abruptly contracted into often winged petioles.....3. **Z. mollissima**.

Leaf blades rhombic-ovate or elliptic-ovate, cuneately narrowed into short naked petioles.....4. **Z. megacephala**.

Leaves green or griseous-pubescent beneath.

Leaf blades triangular-ovate, 1 to 4 cm. wide, abruptly contracted into winged petioles 0.5 to 2 cm. long.....5. **Z. montagnaeifolia**.

Leaf blades broadly ovate or oval-ovate, 3.5 to 8.5 cm. wide, on short, essentially naked petioles.....6. **Z. coulteri**.

1. Zaluzania grayana Robins. & Greenm. Proc. Amer. Acad. 34: 531. 1899.

Gymnolomia triloba A. Gray, Proc. Amer. Acad. 17: 217. 1882. Not *Zaluzania triloba* Pers. 1807.

Chihuahua. Arizona and New Mexico; type collected south of Rucker's Valley, Chiricahua Mountains, Arizona.

Suffrutescent, 80 cm. high; stem puberulous; leaf blades ovate, 3 to 7 cm. long, green on both sides, the primary lobes toothed or slightly lobed; heads about 2 cm. wide.

2. Zaluzania augusta (Lag.) Schultz Bip. Flora 44: 562. 1861.

Ferdinanda augusta Lag. Gen. & Sp. Nov. 31. pl. 2. 1816.

Anthemis lutescens Cervant. in Llave & Lex. Nov. Veg. Deser. 1: 30. 1824.

Chrysophania fastigiata Kunth; Less. Syn. Gen. Comp. 224. 1832.

Ferdinanda lutescens DC. Prodr. 5: 553. 1836.

Zaluzania angusta Benth. & Hook. Gen. Pl. 2: 362. 1873.

Guanajuato to Mexico; type from Mexico, without definite locality.

Shrub up to 2.5 meters high, much branched; leaf blades lance-ovate to triangular-ovate, 1.5 to 7 cm. long, entire to coarsely toothed; heads 7 to 12 mm. wide, numerous in cymose panicles; phyllaries lance-ovate to ovate, mostly acutish. "Caxtidani" (Querétaro); "cenicilla;" "limpia-tunas" (Mexico, Oaxaca).

The name "limpia-tunas" is said to be given because of the fact that the plant usually grows with prickly-pears, and the branches are used as brushes for removing the fine spines from the tunas. The plant is said to have the odor of southernwood (*Artemisia abrotanum*).

3. *Zaluzania mollissima* A. Gray, Proc. Amer. Acad. **15**: 35. 1879.

Zacatecas, San Luis Potosí, and Puebla; type from City of San Luis Potosí.

Shrubby, about 1.5 meters high; leaf blades 2 to 5.2 cm. long, entire to crenate, cuneate to subcordate at base; heads 1 to 2.5 cm. wide, several or numerous; phyllaries ovate to oval, obtuse.

4. *Zaluzania megacephala* Schultz Bip. Flora **44**: 563. 1861.

Ferdinanda augusta megacephala Schultz Bip. Flora **44**: 563. 1861, as synonym.

Hidalgo and Coahuila; type from Real del Monte, Hidalgo.

Suffrutescent (?), about 60 cm. high, simple below the inflorescence; stem cinereous-puberulous; leaf blades 5 to 11 cm. long, 2 to 8 cm. wide, serrulate except at the cuneate base; petioles 2 to 3 mm. long; heads about 2 cm. wide, several or many.

5. *Zaluzania montagnaeifolia* Schultz Bip. Flora **44**: 563. 1861.

Ferdinanda montagnaeifolia Schultz Bip. Allg. Gartenz. **1858**: 179. 1858, nomen nudum.

Zaluzania asperrima Schultz Bip. Flora **47**: 218. 1864.

Zaluzania asperrima montagnaeifolia Robins. & Greenm. Proc. Amer. Acad. **34**: 532. 1899.

Veracruz, Puebla, and Oaxaca; type from between Veracruz and Orizaba.

Shrub; stem puberulous; leaf blades 2 to 6 cm. long, acuminate to obtuse, coarsely crenate-dentate or the upper entire, rough above, griseous-pilosulous or puberulous beneath; heads numerous, 1 to 1.5 cm. wide.

6. *Zaluzania coulteri* Hemsl. Biol. Centr. Amer. Bot. **2**: 159. *pl.* 46. 1881.

Hidalgo; type from Real del Monte.

Suffrutescent at base (?), simple below the inflorescence; leaf blades 6 to 12.5 cm. long, thin, serrulate, green above, pale and pilosulous beneath; heads about 1.8 cm. wide.

7. *Zaluzania pringlei* Greenm. Proc. Amer. Acad. **39**: 101. 1903.

Known only from the type locality, near Jojutla, Morelos.

Shrub; branches puberulous; leaf blades ovate, 3.5 to 5 cm. long, 2 to 3.5 cm. wide, subentire to crenate-dentate, puberulent beneath, on petioles 1 to 1.5 cm. long; heads 6 to 7 mm. high.

DOUBTFUL SPECIES.

ZALUZANIA CINERASCENS Schultz Bip. Flora **47**: 219. 1864. This species, based on *Ehrenberg* 346, from Mineral del Monte, Hidalgo, is insufficiently known. It is probably not a member of the genus.

56. BORRICHIA Adans. Fam. Pl. **2**: 130. 1763.**1. *Borrichia frutescens*** (L.) DC. Prodr. **5**: 489. 1836.

Buphthalmium frutescens L. Sp. Pl. 903. 1753.

Diomedea bidentata Cass. Dict. Sci. Nat. **13**: 283. 1819.

Borrichia frutescens angustifolia DC. Prodr. **5**: 489. 1836.

Trimetra ficoidea Moc.; DC. Prodr. **7**: 262. 1838.

Tamaulipas to San Luis Potosí and "Veracruz." Virginia to Texas; Bermuda; type from "Jamaica, Virginia."

Shrubby, about 1 meter high, the stems canescent-strigillose or glabrate; leaves opposite, oblanceolate or obovate, 2 to 5.5 cm. long, entire or toothed, densely canescent-strigillose, mucronate; heads solitary at tips of branches, yellow, radiate, about 2.5 cm. wide; phyllaries spinescent-pointed; pales with stiff spiny tips; rays and disk fertile; achenes quadrangular; pappus a 4-toothed crown.

57. WEDELIA Jacq. Enum. Pl. Carib. 8. 1760.**1. Wedelia acapulcensis** H. B. K. Nov. Gen. & Sp. 4: 215. 1820.

Sinaloa to Guerrero and Oaxaca, and perhaps farther southward; type from Acapulco, Guerrero.

Suffrutescent, hispidulous and spreading-hirsute; leaves opposite, short-petioled, ovate, 3.5 to 8 cm. long, 1.5 to 4.8 cm. wide, serrate, harsh-pubescent; heads solitary or few at tips of stem and branches, long-peduncled, radiate, yellow, 1.5 to 2.2 cm. wide; involucre 2 or 3-seriate, the phyllaries herbaceous above, or the outermost so throughout; rays fertile; achenes obovoid, thickened, sometimes thin-margined but not truly winged; pappus a crown of connate fimbriate squamellae and usually 2 awns.

58. WYETHIA Nutt. Journ. Acad. Phila. 7: 39. *pl.* 5. 1834.**1. Wyethia mexicana** S. Wats. Proc. Amer. Acad. 25: 154. 1890.

Known only from the type locality, near Monterrey, Nuevo León.

Suffrutescent, 1 to 1.6 meters high, spreading-hirsute; leaves alternate, the blades lance-ovate, 6 to 10 cm. long, crenate-dentate, green above, cinereous-subtomentose beneath; heads few, yellow, 3 to 5.5 cm. wide; involucre several-seriate, graduate, the phyllaries lanceolate, pubescent and densely ciliate, squarrose; rays fertile; achenes subquadrangular, several-ribbed; pappus of 2 short unequal paleaceous awns, connected by a crown of very short connate squamellae.

59. ASPILIA Thouars, Gen. Nov. Madagasc. 12. 1806.

Shrubs or herbs; leaves opposite; heads radiate, rarely discoid, yellow, rarely white or purple, the rays neutral; involucre few-seriate, the phyllaries herbaceous at least at apex; achenes obovoid, plump, wingless; pappus a cup composed of united squamellae, sometimes with awns added.

Leaves linear or narrowly linear-lanceolate.

Plants tall; heads several or numerous.

Leaves densely hispid-pilose beneath.....1. *A. angusta*.

Leaves rather sparsely strigillose or strigose beneath...2. *A. stenophylla*.

Plants low; heads solitary.....3. *A. rosei*.

Leaves elliptic or oblong to ovate.

Rays yellow.

Leaves elliptic-lanceolate; plant 30 cm. high or less.....3. *A. rosei*.

Leaves ovate or lance-ovate; plant much taller.....4. *A. strigosa*.

Rays purple or none.

Rays purple.....5. *A. purpurea*.

Rays none.....6. *A. aggregata*.

1. Aspilia angusta Blake, Contr. U. S. Nat. Herb. 22: 619. 1924.

Aspilia angustifolia A. Gray in S. Wats. Proc. Amer. Acad. 22: 425. 1887.

Not *A. angustifolia* Oliver & Hiern, 1877.

Known only from the type locality, Tequila, Jalisco.

Suffrutescent (?), about 1.5 meters high, densely tuberculate-strigillose or ascending-hispidulous; leaves short-petioled, linear-lanceolate, 4 to 6.5 cm. long, 4 to 7 mm. wide, very harsh above, obscurely serrulate; heads numerous, loosely paniced, about 2 cm. wide; phyllaries indurate to middle or above.

2. Aspilia stenophylla Greenm. Proc. Amer. Acad. 39: 102. 1903.

Sierra Madre of Chihuahua; type from Seven Star Mine.

Suffrutescent (?), about 70 cm. high, finely strigillose; leaves short-petioled, linear-lanceolate or linear, 3.5 to 12 cm. long, 2.5 to 10 mm. wide; heads 1.5 to 1.8 cm. wide; outer phyllaries caudate-acuminate.

3. *Aspilia rosei* Greenm. Proc. Amer. Acad. 40: 39. 1904.

Tepic and Durango; type collected between Santa Gertrudis and Santa Teresa, Sierra Madre of Tepic.

Suffrutescent, about 30 cm. high, hispidulous and hispid-hirsute; leaves short-petioled, linear to elliptic-lanceolate, 2 to 5 cm. long, 4 to 10 mm. wide, revolute-margined, subentire; heads solitary at tips of stems and branches, about 2 cm. wide; involucre subequal.

4. *Aspilia strigosa* (Hook. & Arn.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 171. 1881.

Wedelia strigosa Hook. & Arn. Bot. Beechey Voy. 435. 1840-41.

Guerrero and "Veracruz;" type from Acapulco, Guerrero.

Suffrutescent (?), probably about 1 meter high, hispidulous and sparsely hispid; leaf blades 4 to 6.5 cm. long, 1.7 to 2.3 cm. wide, acuminate, harsh above, rather softly pubescent beneath; heads 1 to 3 at tips of stem and branches, about 1.8 cm. wide.

5. *Aspilia purpurea* Greenm. Proc. Amer. Acad. 40: 39. 1904.

Aspilia scabrida T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 420. 1924.

Chiapas; type from Valley of Jiquipilas.

Suffrutescent, about 40 cm. high, strigose, spreading-hispid toward base; leaves oval to elliptic, 2.2 to 5 cm. long, 0.8 to 2 cm. wide, acute, short-petioled or subsessile, serrate or serrulate; heads solitary, long-peduncled, about 3 cm. wide; flowers all purple.

6. *Aspilia aggregata* Greenm. Proc. Amer. Acad. 39: 102. 1903.

Known only from the type locality, between Bolaños and Guadalajara, Jalisco.

Suffrutescent (?), about 0.5 meter high; stem and branches slender, tuberculate-strigose; leaves short-petioled, elliptic, 2.5 to 4 cm. long, 5 to 10 mm. wide, acute, serrulate, sparsely tuberculate-hispid on both sides; heads small, discoid, about 9 mm. high, in close clusters of about 2 to 5 apex of long naked peduncles; phyllaries acuminate, purplish, densely brownish-ciliolate or -ciliate, on back somewhat strigose and strigillose.

60. *TITHONIA* Desf.; Gmel. Syst. Nat. 1259. 1791.

REFERENCE: Blake, Revision of the genus *Tithonia*, Contr. U. S. Nat. Herb. 20: 423-436. 1921.

Herbs or shrubs; leaves alternate, or opposite below; heads radiate, yellow, large, borne on fistulose peduncles; involucre (in the following species) 4-seriate, strongly graduate, the phyllaries broad; rays neutral; achenes plump; pappus of free or connate squamellae, with or without awns, or entirely wanting.

Pappus present.

Leaves unlobed; stem densely and canescently pilose-tomentose.

1. *T. fruticosa*.

Leaves usually 3 or 5-lobed; stem not canescently pilose-tomentose.

2. *T. diversifolia*.

Pappus wanting-----**3. *T. scaberrima*.**

1. *Tithonia fruticosa* Canby & Rose, Contr. U. S. Nat. Herb. 1: 104. pl. 5. 1891.

Sonora and Sinaloa to Chihuahua and Durango; type from Alamos, Sonora.

Stout shrub, 3 or 4 meters high; leaf blades ovate or lanceolate, 6.5 to 30 cm. long, 2.2 to 14 cm. wide, rather softly and densely canescent-pilose; heads 7 to 9.5 cm. wide; pappus a paleaceous crown, the awns obsolete or represented by short teeth.

2. *Tithonia diversifolia* (Hemsl.) A. Gray, Proc. Amer. Acad. 19: 5. 1883.

Mirasolia diversifolia Hemsl. Biol. Centr. Amer. Bot. 2: 168. pl. 47. 1881.

Veracruz to Oaxaca and Yucatán; type from Valley of Orizaba, Veracruz. Guatemala to Costa Rica; established in Ceylon and India.

Stout perennial herb, or perhaps shrubby, 3 to 9 meters high; stem hispid-pilose to sordidly pilose-tomentose, glabrate; leaf blades ovate or deltoid-ovate, 7 to 20 cm. long, green above, paler or subcanescent beneath; heads 6 to 14 cm. wide; pappus of 2 awns and several squamellae. "Jalacate," "guasmara," "mirasol" (El Salvador).

2a. *Tithonia diversifolia glabriuscula* Blake, Contr. U. S. Nat. Herb. **20**: 435. 1921.

Veracruz and Oaxaca; type from Tuxtepec, Oaxaca.

Stem essentially glabrous; leaves very sparsely pubescent beneath.

3. *Tithonia scaberrima* Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. **1852**: 91. 1852.

Tithonia platylepis Schultz Bip.; Benth. & Hook. Gen. Pl. **2**: 368. 1873, as synonym.

Mirasolia scaberrima Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 168. 1881.

Gymnolomia platylepis A. Gray, Proc. Amer. Acad. **19**: 5. 1883.

Gymnolomia decurrens Klatt, Leopoldina **23**: 90. 1889.

Perimeniopsis perfoliata Schultz Bip.; Klatt, Leopoldina **23**: 90. 1889, as synonym.

Tithonia glaberrima Kuntze, Rev. Gen. Pl. **1**: 371. 1891.

Gymnolomia scaberrima Greenm. Field Mus. Bot. **2**: 268. 1907.

Veracruz to Chiapas. Guatemala to Costa Rica; type from vicinity of Chinotega, Segovia, Nicaragua.

Herbaceous or suffrutescent, 1.3 to 5 meters high; stem densely spreading-pilose or hispid-pilose, or sometimes incurved-hispid; leaf blades ovate or lance-ovate, 8.5 to 17 cm. long, 2.5 to 9.8 cm. wide, acuminate, scabrous above, pale or canescent beneath with dense spreading hairs; heads 5 to 7 cm. wide; phyllaries broadly rounded; pappus none. "Pulagaste," "mirasol" (El Salvador).

In El Salvador the leaves are used in baths for fevers and colds.

61. VIGUIERA H. B. K. Nov. Gen. & Sp. **4**: 224. *pl.* 379. 1820.

REFERENCE: Blake, A revision of the genus *Viguiera*, Contr. Gray Herb. n. ser. **54**: 1-205. *pl.* 1-3. 1918.

Herbs or shrubs; leaves opposite, at least below; heads small to large, yellow (in our species), radiate; involucre 2 to 7-seriate, graduate or subequal, the phyllaries usually with indurate base and herbaceous tip; rays neutral; achenes thickened; pappus persistent, of 2 awns and several free or united squamellae, or wanting.

Leaves pinnatilobate.

Leaf lobes attenuate..... **19. V. stenoloba.**

Leaf lobes blunt (the terminal one sometimes acute).

Leaves densely and softly tomentose beneath..... **17. V. zaluzanioides.**

Leaves not densely tomentose beneath.

Leaves several-lobed, subcanescent beneath..... **16. V. pinnatilobata.**

Leaves hastately 3-lobed, scarcely subcanescent beneath.

18. V. tripartita.

Leaves entire to laciniate.

Leaves small (the blades 0.7 to 2.5 cm. long), canescent at least beneath; heads solitary.

Pappus none; achene glabrous..... **22. V. greggii.**

Pappus present; achene pubescent.

Leaf blades ovate or triangular-ovate, acute or sometimes obtuse.

20. *V. brevifolia*.

Leaf blades rotund or roundish-ovate, obtuse to rounded or retuse.

21. *V. bicolor*.

Leaves larger, usually not canescent, or if small, then heads 2 to 4.

Leaves laciniate or deeply jagged-serrate.

Plant resinous; stem pubescent throughout-----10. *V. laciniata*.

Plant not resinous; stem glabrous below-----11. *V. subincisa*.

Leaves entire or merely serrate.

Plant densely pannose-tomentose-----15. *V. lanata*.

Plant not pannose-tomentose.

Leaf blades narrowly oblong to broadly linear, densely canescent-hispidulous beneath-----1. *V. angustifolia*.

Leaves ovate or lance-ovate, usually not canescent-hispidulous beneath.

Leaf blades 8 to 12 mm. long-----14. *V. microphylla*.

Leaf blades larger.

Leaves densely silky or pilose-tomentose beneath.

Pappus none; achenes glabrous-----7. *V. bombycina*.

Pappus present; achenes pubescent.

Leaves densely silky-canescens beneath.

6. *V. grammatoglossa*.

Leaves densely pilose-tomentose beneath.

12. *V. tomentosa*.

Leaves not densely silky or pilose-tomentose beneath.

Pales tipped with stiff abrupt spreading mucros.

2. *V. sphaerocephala*.

Pales without stiff spreading mucros.

Heads at first subcylindric, very numerous; involucre 2-seriate, 5 to 6 mm. high-----5. *V. quinquerradiata*.

Heads not subcylindric, usually few.

Involucre 4 to 5-seriate, of linear-lanceolate to lanceolate phyllaries with thickened midrib.

Leaves ovate to oval-----8. *V. pringlei*.

Leaves lanceolate to ovate-oblong-----9. *V. seemannii*.

Involucre 2 to 4-seriate, of oblong or lance-ovate phyllaries without strongly thickened midrib.

Phyllaries with ovate indurate base and lance-oblong herbaceous apex, canescently strigillose and often strigose or hispid-----13. *V. deltoidea*.

Phyllaries oblong, with conspicuous pale margins, on back glabrous, pilosulous, or pilose.

Phyllaries and petioles sparsely ciliate.

3. *V. maculata*.

Phyllaries and petioles strongly ciliate.

4. *V. eriophora*.

1. *Viguiera angustifolia* (Hook. & Arn.) Blake, Proc. Amer. Acad. 51: 518. 1916.

Tithonia angustifolia Hook. & Arn. Bot. Beechey Voy. 435. 1841.

Viguiera blepharolepis A. Gray, Proc. Amer. Acad. 19: 5. 1883.

Sinaloa, Tepic, and Jalisco; type from Tepic.

Suffrutescent (?); stem slender, densely strigose or strigillose, subglabrate; leaves opposite, short-petioled, the blades 3 to 9.5 cm. long, 4 to 13 mm. wide; heads solitary, 3 to 5 cm. wide; involucre 11 to 19 mm. high, 4 to 5-seriate, the phyllaries oval to oblong, canescently strigillose and ciliate.

2. **Viguiera sphaerocephala** (DC.) Hemsl. Biol. Centr. Amer. Bot. **2**: 179. 1881.

Leighia sphaerocephala DC. Prodr. **5**: 582. 1836.

Encelia squarrosa Greenm. Proc. Amer. Acad. **39**: 112. 1903.

Viguiera squarrosa Blake, Proc. Amer. Acad. **49**: 376. 1913.

Guerrero; type from Mexico, without definite locality.

Shrub 5 to 7 meters high; branches sordid-tomentose; leaf blades ovate, 9 to 10 cm. long, crenate-dentate, pilosulous beneath; heads cymose-panicled, 5 cm. wide; phyllaries oblong, ciliolate and puberulous, the spreading herbaceous tips as long as the indurate body.

3. **Viguiera maculata** (T. S. Brandeg.) Blake, Proc. Amer. Acad. **49**: 374. 1913.

Encelia maculata T. S. Brandeg. Zoe **5**: 259. 1908.

Oaxaca and Puebla; type from San Luis Tultitlanapa, Puebla.

Shrub; branches appressed-pubescent; leaf blades ovate or lance-ovate, 5 to 12 cm. long, harshly lepidote-strigillose above, hispidulous beneath; heads 2.7 to 3.5 cm. wide, in cymose panicles of 3 to 8; involucre 6 to 7 mm. high, the phyllaries with abrupt triangular herbaceous tips.

4. **Viguiera eriophora** Greenm. Proc. Amer. Acad. **39**: 104. 1903.

Oaxaca.

Shrub; branches canescent-tomentose; leaf blades ovate, 7 to 13.5 cm. long, serrate, tuberculate-hispidulous above, hispidulous-pilosulous beneath; heads 2.5 to 5 cm. wide, numerous in trichotomous panicles; involucre 8 to 10 mm. high.

5. **Viguiera quinquerradiata** (Cav.) A. Gray in S. Wats. Proc. Amer. Acad. **22**: 426. 1887.

Helianthus quinque-radiatus Cav. Icon. Pl. **3**: 36. pl. 272. 1795.

Leighia ? leptcephala DC. Prodr. **5**: 582. 1836.

Jalisco; type from Mexico, without definite locality.

Shrub, 3 to 7 meters high; branchlets puberulous; leaf blades ovate, 3 to 15 cm. long, serrulate or serrate, scabrous above, loosely hispidulous-pilosulous beneath; heads about 2 cm. wide, the disk at first 1 cm. high, 3.5 to 5 mm. thick. "Vara blanca" (Dugès).

6. **Viguiera grammatoglossa** DC. Prodr. **5**: 580. 1836.

Encelia hypargyrea Robins. & Greenm. Amer. Journ. Sci. III. **50**: 155. 1895.

Not *V. hypargyrea* Greenm. 1903.

Viguiera argyrophylla Blake, Proc. Amer. Acad. **49**: 374. 1913.

Michoacán, Puebla, and Oaxaca; type from Tlapujahua, Michoacán.

Shrubby (?), 1.6 to 5 meters high; stem densely hispid-pilose; leaf blades 4.4 to 8 cm. long, greenish above, densely appressed-silky beneath; heads in cymose panicles of 2 to 8, 2.8 to 5 cm. wide; involucre 8 to 10.5 mm. high, hispid-pilose or subsericeous.

7. **Viguiera bombycina** Blake, Contr. Gray Herb. n. ser. **54**: 71. 1918.

Gymnolomia sericea Klatt, Leopoldina **23**: 90. 1887. Not *Viguiera sericea*

A. Gray, 1883.

Puebla; type from Mexico, without definite locality.

Shrubby; stem subsericeous-pilose, subglabrate; leaf blades 2.5 to 5.3 cm. long, entire, dull green or canescent above, densely silky-pilose with appressed hairs beneath; heads 1 to 3, 4.5 cm. wide; involucre 7 to 8 mm. high, silky-pilose.

8. **Viguiera pringlei** Robins. & Greenm. Proc. Amer. Acad. **29**: 387. 1894.

Tepic and Jalisco; type from Zapotlán, Jalisco.

Shrub up to 3.3 meters high; stem tuberculate-hispid; leaf blades 4 to 7.3 cm. long, subsessile, green and harshly lepidote-tuberculate on both sides, strongly

reticulate beneath; heads 2.5 cm. wide, in contracted cymes or cymose panicles of 3 to 15; phyllaries densely granular-tuberculate, hispidulous-ciliolate.

9. **Viguiera seemannii** Schultz Bip. in Seem. Bot. Voy. Herald 305. 1856.
Oyedaea seemanni A. Gray, Proc. Amer. Acad. 19: 10. 1883.

Known only from the type locality, Sierra Madre of northwestern Mexico.

Frutescent; stem densely tuberculate-setulose and hispidulous; leaf blades 4 to 10 cm. long, harshly tuberculate-setulose above, hispid-pilosulous beneath and reticulate; heads 1.7 cm. wide, subsessile in cymes of 3 to 5; phyllaries tuberculate and hispidulous.

10. **Viguiera laciniata** A. Gray in Torr. U. S. & Mex. Bound. Bot. 89. 1859.

Northern Baja California. California; type from Rancho Gamacha, east of San Diego.

Frutescent, up to 1.3 meters high; leaves alternate, the blades lanceolate to lance-ovate, 1.5 to 3 cm. long, lacinate repand-lobate, green and tuberculate-hispid on both sides; heads 1.7 to 2.7 cm. wide, in cymose panicles of 3 to 13; involucre 6 mm. high, hispidulous.

11. **Viguiera subincisa** Benth. Bot. Voy. Sulph. 27. 1844.

Known only from the vicinity of the type locality, Magdalena Bay, Baja California.

Suffrutescent (?) or herbaceous, about 60 cm. high; leaves opposite below, alternate above, the blades ovate, 4.8 to 6.3 cm. long, incisely jagged-serrate with 5 to 10 pairs of triangular teeth; heads 1.4 to 3.5 cm. wide, 12 to 26 in a narrow long-peduncled panicle; involucre 3.5 mm. high, strigillose.

12. **Viguiera tomentosa** A. Gray, Proc. Amer. Acad. 5: 161. 1861.

Cape region of Baja California; type from Cape San Lucas.

Shrubby, 3 to 4 meters high; stem pilosulous; leaf blades ovate or triangular-ovate, 4 to 10 cm. long, canescent or greenish-canescient above; heads 3.3 to 4 cm. wide, 3 to 16 in terminal panicles; involucre 6 to 10 mm. high, densely pilose-tomentose.

13. **Viguiera deltoidea** A. Gray, Proc. Amer. Acad. 5: 161. 1861.

Baja California; type from Cape San Lucas.

Shrub, 3 meters high; stem strigillose or hispid; leaf blades deltoid-ovate, 2.5 to 6.5 cm. long, usually dentate, harshly or rather softly pubescent beneath; heads several, usually about 3.5 cm. wide.

- 13a. **Viguiera deltoidea townsendii** Vasey & Rose, Proc. U. S. Nat. Mus. 13: 148. 1890.

Known only from the type locality, Socorro Island.

Leaf blades ovate to oblong-ovate, 2.5 to 5.7 cm. long, obtuse or rounded, entire, scabrously tuberculate-strigillose above, beneath rather softly pilose or sometimes hispidulous-strigillose; heads 1.7 to 3.8 cm. wide.

- 13b. **Viguiera deltoidea tastensis** T. S. Brandeg. Zoe 5: 161. 1903.

Known only from the type locality, Sierra El Taste, Baja California.

Leaf blades 6 to 10 cm. long, very harsh above, beneath rather softly and densely hispidulous-pilosulous, crenate-dentate; heads 4.5 to 5 cm. wide.

- 13c. **Viguiera deltoidea parishii** (Greene) Vasey & Rose, Contr. U. S. Nat. Herb. 1: 72. 1890.

Viguiera parishii Greene, Bull. Torrey Club 9: 15. 1882.

Sonora and northern Baja California. Nevada to California and Arizona; type from San Luis Rey, California.

Stem harshly tuberculate-hispidulous; leaf blades rather small, deltoid, strongly toothed and reticulate, harshly pubescent; heads mostly solitary and long-peduncled.

- 13d. *Viguiera deltoidea chenopodina*** (Greene) Blake, Contr. Gray Herb. n. ser. **54**: 91. 1918.

Viguiera chenopodina Greene, Leaflets **2**: 154. 1911.

Baja California; type collected between Santo Domingo and Matancita.

Leaf blades small, deltoid- or rhombic-ovate, 1.5 to 2.5 cm. long, entire, obtuse or rounded, canescent-strigillose beneath or on both sides.

- 14. *Viguiera microphylla*** Vasey & Rose, Proc. U. S. Nat. Mus. **11**: 535. 1890.

Northern Baja California; type collected 64 km. inland from Lagoon Head.

Shrubby, about 60 cm. high; branches canescent-strigillose; leaf blades ovate, 8 to 12 mm. long, 5 to 8 mm. wide, entire, canescent-strigillose; heads 2 to 4, long-peduncled, 1.5 cm. wide; involucre 3 to 4 mm. high, canescent-strigillose.

- 15. *Viguiera lanata*** (Kellogg) A. Gray, Proc. Amer. Acad. **17**: 218. 1882.

Bahiopsis lanata Kellogg, Proc. Calif. Acad. **2**: 35. 1863.

Cedros Island, Baja California.

Frutescent at base, 35 to 55 cm. high, densely pannose-tomentose; leaves chiefly basal, the blades oval or roundish-ovate, 2.5 to 5.5 cm. long; heads few, 4.5 to 6 cm. wide.

- 16. *Viguiera pinnatilobata*** (Schultz Bip.) Blake, Contr. Gray Herb. n. ser. **54**: 95. 1918.

Zaluzania pinnatilobata Schultz Bip. Flora **47**: 219. 1864.

Gymnolomia pinnatilobata Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 163. 1881.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Shrubby, 1 meter high; stem puberulous; leaves chiefly alternate, the blades ovate or deltoid-ovate in outline, 2 to 4 cm. long, deeply pinnatilobate, the lobes 1 to 3 pairs, short, entire or slightly toothed or lobed; heads in cymose panicles of 3 or more, 3.5 cm. wide; involucre sparsely strigose and strigillose; achenes glabrous, epappose.

- 17. *Viguiera zaluzanioides*** Blake, Contr. Gray Herb. n. ser. **54**: 96. 1918.

Known only from the type locality, San Antonio, Oaxaca.

Shrubby; stem and branches canescently pilosulous-tomentose, subglabrate; leaf blades ovate or triangular-ovate in outline, 2 to 4.5 cm. long, pinnately 5 to 7-lobed, canescent-tomentose beneath; heads about 1.4 cm. wide; involucre rather densely pilose; achenes glabrous, epappose.

- 18. *Viguiera tripartita*** (Robins. & Greenm.) Blake, Proc. Amer. Acad. **49**: 97. 1918.

Gymnolomia tripartita Robins. & Greenm. Amer. Journ. Sci. III. **50**: 154. 1895.

Oaxaca; type from Cuicatlán.

Herbaceous (?); stem nearly glabrous; leaf blades lanceolate or lance-ovate in outline, 4 to 6 cm. long, deeply 3-lobed, with short, blunt, entire or slightly lobed divisions, barely subcanescent beneath; heads 2 cm. wide; involucre sparsely strigose; achenes glabrous, epappose.

- 19. *Viguiera stenoloba*** Blake, Contr. Gray Herb. n. ser. **54**: 97. 1918.

Helioomeris tenuifolia A. Gray, Mem. Amer. Acad. n. ser. **4**: 84. 1849. Not

V. tenuifolia Gardn. 1848.

Gymnolomia tenuifolia Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 163. 1881.

Chihuahua to Tamaulipas; type from Coahuila. Texas.

Much-branched shrub 1 meter high; stem glabrous or strigillose; leaf blades ovate in outline, 2.5 to 6 cm. long, divided nearly to midrib into 3 to 7 linear or linear-lanceolate lobes 1 to 5 mm. wide, canescent-strigillose beneath; heads solitary, 1.8 to 3 cm. wide; achenes glabrous, epappose.

20. *Viguiera brevifolia* Greenm. Proc. Amer. Acad. 39: 103. 1903.

Coahuila and Durango; type from Mapimí, Durango.

Much-branched shrub 1 meter high; stem strigillose; leaf blades 1 to 2.1 cm. long, above greenish or canescent, beneath canescent-strigillose; heads 1.4 cm. wide; achenes sparsely pubescent near apex; pappus squamellae equaling the awns.

21. *Viguiera bicolor* Blake, Proc. Amer. Acad. 51: 519. 1916.

Known only from the type locality, between Río Grande and Jamaltepec, Hidalgo (?).

Shrub; branches canescent-strigillose; leaf blades 1.2 to 1.8 cm. long, greenish above, canescent-strigillose beneath; heads 1.8 cm. wide; achenes subsericeous; pappus squamellae shorter than the awns.

22. *Viguiera greggii* (A. Gray) Blake, Contr. Gray Herb. n. ser. 54: 100. 1918.

Gymnolomia greggii A. Gray, Proc. Amer. Acad. 15: 36. 1879.

Coahuila.

Much-branched undershrub 30 to 40 cm. high, finely canescent; leaf blades broadly ovate or oval, 7 to 25 mm. long, rounded to obtuse, greenish above, canescent-strigillose beneath; heads 1.8 to 4 cm. wide; achenes glabrous, epappose.

62. *ALVORDIA* T. S. Brandeg. Proc. Calif. Acad. II. 2: 174. 1889.

Frutescent; leaves opposite, or alternate above, subentire; heads 1 to 5-flowered, radiate or discoid, in small terminal glomerules; involucre compressed, strongly graduate, the phyllaries indurate; rays neutral; achenes thickened; pappus of about 10 to 20 unequal paleaceous awns.

The following treatment contains all the known species of this genus.

Phyllaries densely strigillose dorsally; rays 1 or 2.....1. *A. glomerata*.

Phyllaries ciliolate, essentially glabrous dorsally; rays none.

Leaves ovate, 1.3 to 3 cm. wide.....2. *A. fruticosa*.

Leaves narrowly lanceolate, 5 to 10 mm. wide.....3. *A. angusta*.

1. *Alvordia glomerata* T. S. Brandeg. Proc. Calif. Acad. II. 2: 174. 1889.

Baja California; type from mesas about Purísima and Comondú.

Shrubby, strigillose, about 1.3 meters high; leaf blades ovate or oval, 2 to 5 cm. long, triplinerved, petiolate; involucre 6 to 8 mm. high; rays 1 or 2; disk flowers 2 or 3.

2. *Alvordia fruticosa* T. S. Brandeg. Erythea 7: 5. 1899.

Baja California; type from San José del Cabo.

Similar; involucre 5 to 6 mm. high; heads 2 or 3-flowered.

3. *Alvordia angusta* Blake, Contr. Gray Herb. n. ser. 52: 42. 1917.

Baja California; type from Todos Santos.

Similar to *A. fruticosa*; leaves much narrower; heads 1 or 2-flowered.

63. *HELIANTHUS* L. Sp. Pl. 904. 1753.

Herbs or shrubs; leaves opposite or alternate; heads small to large, the rays yellow, the disk yellow, brown, or purple; involucre 2 to several-seriate, the phyllaries usually herbaceous at least at tip; rays neutral; achenes thickened; pappus deciduous, of 2 paleaceous awns and sometimes several intermediate squamellae.

The English name "sunflower" is applied commonly to the herbaceous species of the genus, while the usual Spanish names are "mirasol" and "girasol."

Leaves alternate, the blades 4.5 cm. long or less.....1. *H. niveus*.

Leaves opposite, the blades up to 12 cm. long.....2. *H. similis*.

1. **Helianthus niveus** (Benth.) T. S. Brandeg. Proc. Calif. Acad. II. 2: 173. 1889.

Encelia nivea Benth. Bot. Voy. Sulph. 27. 1844.

Helianthus tephrodes A. Gray in Torr. U. S. & Mex. Bound. Bot. 90. 1859.

Viguiera nivea A. Gray, Proc. Amer. Acad. 8: 658. 1873.

Viguiera tephrodes A. Gray, Proc. Amer. Acad. 17: 218. 1882.

Gymnolomia encelioides A. Gray, Proc. Amer. Acad. 19: 4. 1883.

Helianthus dealbatus A. Gray, Syn. Fl. 1²: 280. 1884.

Viguiera sonora Rose & Standl. Contr. U. S. Nat. Herb. 16: 20. pl. 16. 1912.

Sonora and Baja California; type from San Quintín, Baja California. California.

Suffrutescent (sometimes annual?), decumbent at base, 30 to 60 cm. high, canescent-strigillose; leaf blades ovate or lance-ovate to oblong, obtuse to acuminate, cuneate to subcordate at base, slender-petioled, entire to serrulate, sometimes greenish above; heads several, long-peduncled, about 2.5 cm. wide; disk purple; pappus of several unequal deciduous awns and squamellae.

2. **Helianthus similis** (T. S. Brandeg.) Blake, Contr. Gray Herb. n. ser. 54: 189. 1918.

Viguiera similis T. S. Brandeg. Zoe 5: 260. 1908.

Cape Region of Baja California.

Suffruticose, thinly tomentose, 1 meter high; leaf blades cordate, long-acuminate, sharply serrate; pappus of 2 awns and usually a few squamellae. (Description compiled.)

64. **PERYMENIUM** Schrad. "Ind. Sem. Hort. Gotting. 1830;" Linnaea 6: Litt.-Ber. 73. 1831.

REFERENCE: Robinson & Greenman, Proc. Amer. Acad. 34: 521-529. 1899.

Shrubs or herbs, usually strigillose or strigose; leaves opposite, usually ovate, serrate, and petioled; heads radiate, yellow or the rays rarely white, solitary, cymose, or paniced; involucre 2 to 4-seriate, the phyllaries usually indurate below and with short herbaceous tips; receptacle paleaceous; rays pistillate; achenes somewhat compressed, wingless or rarely winged; pappus of several to many unequal or subequal setiform deciduous awns.

Leaves green above, densely and canescently or subcanescently tomentose, hispidulous, or strigillose beneath.

Leaves narrowly linear, 1 to 4 mm. wide.....28. **P. stenophyllum.**

Leaves lanceolate to ovate.

Heads larger, the disk in anthesis usually 1 cm. wide or more.

38. **P. nelsonii.**

Heads smaller, the disk in anthesis much less than 1 cm. wide.

Leaves lanceolate or lance-ovate, more than 3 times as long as wide.

Phyllaries acute or acuminate; leaves densely hispidulous with spreading hairs beneath, narrowed to an obtuse or obtusish tip.

29. **P. angustifolium.**

Phyllaries obtuse or rounded; leaves densely strigillose or hispidulous with subappressed hairs beneath, acuminate to a very acute tip.

Leaves turning blackish in drying; pedicels usually elongate.

27. **P. pellitum.**

Leaves not blackening in drying; pedicels usually short.

Leaves serrate or serrulate, not rugose above...25. **P. croceum.**

Leaves subentire, strongly impressed-veined and rugose above.

26. **P. discolor.**

Leaves ovate, less than 3 times as long as wide.

Phyllaries distinctly acute or acuminate.

Phyllaries and under surface of leaves pilose-tomentose or villous.

Leaves cordate at base, scabrous above.....12. *P. asperifolium*.

Leaves cuneate or rounded-cuneate at base, scarcely scabrous above.

30. *P. lasiolepis*.

Phyllaries strigillose; leaves subcanescently strigose and strigillose or hispidulous beneath.

Leaves slightly reticulate, strigose and strigillose or antrorse-hispidulous beneath.....31. *P. blepharolepis*.

Leaves densely reticulate and hispidulous with more or less spreading hairs beneath.....32. *P. hypoleucum*.

Phyllaries obtuse or rounded, or sometimes acuminate to an obtuse apex.

Involucre 4 to 6.5 mm. high.

Involucre 4 to 4.5 mm. high, 4.5 to 5 mm. thick.

32. *P. hypoleucum*.

Involucre 5.5 to 6.5 mm. high, 5 to 7 mm. thick.

33. *P. consobrinum*.

Involucre 7 to 8 mm. high.

Pubescence of the lower leaf surface ochroleucous...34. *P. collinum*.

Pubescence of the lower leaf surface bluish white...35. *P. ovatum*.

Leaves green beneath as well as above.

Heads large, the disk in anthesis 8 to 12 mm. thick.

Petioles 3 mm. long or less.

Phyllaries with herbaceous tips.....5. *P. subsquarrosum*.

Phyllaries without herbaceous tips.....36. *P. acuminatum*.

Petioles of the larger leaves 1 cm. long or more.

Middle and inner phyllaries 5 mm. wide or more, broadly rounded.

39. *P. latisquamum*.

Middle and inner phyllaries less than 5 mm. wide.

Leaves hispidulous chiefly along the veins beneath; some of the phyllaries usually acute or acuminate.....37. *P. macrocephalum*.

Leaves rather densely pilosulous to subtomentose beneath; phyllaries all obtuse or rounded at apex.....38. *P. nelsonii*.

Heads smaller, the disk in anthesis 7 mm. thick or less.

Leaves, branchlets, and involucre densely glandular...13. *P. glandulosum*.

Leaves, branchlets, and involucre not densely glandular, the involucre sometimes with a few glands.

Heads solitary and long-peduncled, or several and cymose at the tip of an elongate, essentially naked peduncle.

Heads solitary, rarely 2 or 3, long-peduncled...1. *P. buphthalmoides*.

Heads several, cymose at the tips of elongate, essentially naked peduncles.

Leaves (at least the middle and upper) entire, strongly conduplicate.

2. *P. jaliscense*.

Leaves distinctly serrate or serrulate.

Leaves conduplicate; phyllaries essentially without herbaceous tips.....4. *P. chihuahuense*.

Leaves plane, rarely somewhat conduplicate; phyllaries with distinctly herbaceous tips.

Stem leaves smaller, elliptic to lanceolate, 1.8 cm. wide or less.

3. *P. parvifolium*.

Stem leaves larger, ovate, 2 to 3.5 cm. wide.

5. *P. subsquarrosum*.

Heads cymose or cymose-panicled at tips of stem and branches, rarely solitary and very short-peduncled.

Leaves linear or linear-elliptic, 1.2 to 2.4 cm. long, 2 to 4 mm. wide

16. *P. microphyllum*.

Leaves lanceolate or ovate, much larger.

Phyllaries (at least the inner) acute or acuminate.

Leaves lanceolate or lance-oblong, cuneate at base.

Leaves very scabrous on both sides-----23. *P. chalarolepis*.

Leaves smooth or nearly so above, slightly scabrous beneath.

24. *P. ghiesbreghtii*.

Leaves ovate or lance-ovate.

Heads few, 3 to 5 at apex of branches, long-pedicelled.

7. *P. cornutum*.

Heads usually numerous, cymose or cymose-panicled.

Involute 2.5 to 3 mm. high-----10. *P. globosum*.

Involute 4 mm. high or more.

Phyllaries coarsely villous; leaves villous beneath.

12. *P. asperifolium*.

Phyllaries not villous; leaves harshly pubescent beneath.

Leaves acutely cuneate at base, usually oblong-ovate or lance-ovate-----15. *P. purpusii*.

Leaves cuneate-rounded to truncate at base, mostly ovate.

Phyllaries mostly acuminate---11. *P. verbesinoides*.

Phyllaries acutish.

Involute bearing a few shining glands.

17. *P. goldmanii*.

Involute without shining glands.

Leaves less than 5 cm. long.

Rays much longer than the disk-----8. *P. rude*.

Rays equaling the disk-----18. *P. pinetorum*.

Leaves 6 to 11 cm. long-----9. *P. pringlei*.

Phyllaries obtuse or rounded.

Leaves distinctly lanceolate.

Stem simple; leaves strigillose beneath.

19. *P. rotundisquamum*.

Stem branched; leaves antrorse-hispidulous or spreading-hispidulous beneath-----20. *P. lancifolium*.

Leaves ovate or lance-ovate.

Heads very small, the involucre in anthesis 3 mm. thick.

Leaves 3 cm. long or less; pedicels 7 to 16 mm. long.

21. *P. microcephalum*.

Leaves up to 10 cm. long; pedicels 1.2 to 2.5 cm. long.

22. *P. gracile*.

Heads larger, the disk in anthesis 4 mm. thick or more.

Phyllaries bearing a few shining glands---17. *P. goldmanii*.

Phyllaries without glands.

Petioles 1 cm. long or more.

Leaves usually rounded at base, ovate---9. *P. pringlei*.

Leaves acutely cuneate at base, usually oblong-ovate or lance-ovate-----15. *P. purpusii*.

Petioles much less than 1 cm. long.

Leaves reflexed, conduplicate, with crisped margins.

4. *P. chihuahuense*.

Leaves not reflexed, plane.

Leaves cordate-ovate, small, 1.5 to 3 cm. long.

6. *P. subcordatum*.

Leaves rarely cordate, mostly larger.

Heads few, borne on long pedicels in the upper axils or in a long-peduncled umbellate cyme; phyllaries with subsquarrose thick-herbaceous tips.

5. *P. subsquarrosum*.

Heads usually numerous and paniced; phyllaries with usually appressed tips.

Heads usually loosely paniced or cymose, much exceeding the leaves; involucre 4 to 7 mm. high, not strongly graduate-----

8. *P. rude*.

Heads usually closely cymose-paniced at apex of branches, scarcely or not surpassing the leaves; involucre about 4-seriate, strongly graduate, 5 to 8 mm. high-----

14. *P. berlandierii*.

1. *Perymenium buphthalmoides* DC. Prodr. 5: 609. 1836.

San Luis Potosí to Jalisco, Michoacán, and Puebla; type from Mexico, without definite locality.

Suffrutescent, usually 30 cm. high or less, many-stemmed, usually ascending, strigose or strigillose; leaves short-petioled, elliptic to oblong, sharply serrate, 1 to 7.5 cm. long; heads about 3 cm. wide, long-peduncled, usually solitary; phyllaries 2-seriate, subequal, acute or acuminate.

2. *Perymenium jaliscense* Robins. & Greenm. Amer. Journ. Sci. III. 50: 154. 1895.

Jalisco; type from Río Blanco.

Suffrutescent or "herbaceous," about 45 cm. high, strigose and strigillose; leaves short-petioled, the blades elliptic to oblong, 3 to 5.5 cm. long, mostly reflexed, conduplicate, entire; heads few, cymose at apex of usually elongate peduncles; involucre about 5 mm. high.

3. *Perymenium parvifolium* A. Gray, Proc. Amer. Acad. 15: 36. 1879.

Chihuahua to Querétaro; type from city of San Luis Potosí.

Suffrutescent or truly shrubby, much-branched, strigose and strigillose; stem leaves lanceolate, rarely ovate, 2 to 5 cm. long, 1.8 cm. wide or less, serrate; those of the branches usually very small, linear or elliptic and obtuse; heads 2.5 cm. wide or usually less; involucre 4 to 5 mm. high, the phyllaries obtuse or sometimes acutish.

4. *Perymenium chihuahuense* Blake, Contr. U. S. Nat. Herb. 22: 625. 1924.

Known only from the type locality, near city of Chihuahua.

Shrub, strigose and strigillose, with long erect simple branches; leaves short-petioled, lance-ovate, 2 to 3 cm. long, 7 to 10 mm. wide, reflexed, conduplicate, plicate-cripsed on margin; heads small, in terminal clusters of 3 to 5; involucre 4 to 5 mm. high, the phyllaries obtuse or the outer acutish, densely cinereous-strigillose and ciliate, practically without herbaceous tips.

5. *Perymenium subsquarrosum* Robins. & Greenm. Proc. Amer. Acad. 34: 524. 1899.

Zacatecas and Puebla; type from Plateado, Zacatecas.

Shrubby, up to 2.6 meters high, strigillose and strigose; leaves short-petioled, the blades ovate, acute or acuminate, subcordate to rounded at base, the larger 3 to 7 cm. long, 2 to 3.5 cm. wide, very rough on both sides; heads long-peduncled from the upper axils, or in a pedunculate cyme; involucre 5 to 7 cm. high, the phyllaries ovate, with obtuse, subsquarrose, herbaceous tips.

6. *Perymenium subcordatum* Blake, Contr. U. S. Nat. Herb. 22: 622. 1924.

Known only from the type locality, Tlapancingo, Oaxaca.

Shrub with flexuous branches, strigose and strigillose; leaves short-petioled, ovate, 1.5 to 3 cm. long, 9 to 17 mm. wide, acute, slightly cordate to broadly

rounded at base, serrulate, roughish on both sides; heads 3 or 4 toward tips of branches, axillary and terminal, long-peduncled; involucre about 5 mm. high, the phyllaries obtuse or rounded, with obscurely herbaceous tips.

7. *Perymenium cornutum* T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 192. 1911.

San Luis Potosí; type from Agua Media.

Suffrutescent or "herbaceous," 35 cm. high and more, hispidulous-strigillose and somewhat glandular; petioles 4 to 10 mm. long; blades ovate or lance-ovate, 4 to 5.5 cm. long, 2 to 3 cm. wide, serrate or serrulate; peduncles 2.5 to 9 cm. long; involucre 5 to 7 mm. high, the phyllaries ovate, the inner or all acute or acutish.

8. *Perymenium rude* Robins. & Greenm. Proc. Amer. Acad. 34: 526. 1899.

Puebla, Morelos, and Oaxaca; type from Las Sedas, Oaxaca.

Shrub 1 to 2 meters high, strigose and strigillose; leaves short-petioled, the blades ovate, 2 to 4.5 cm. long, 1 to 2.3 cm. wide, acute, rounded-cuneate to subtruncate at base, serrate, green and rough above, beneath paler green and rather densely hispidulous with chiefly antrorse hairs; heads about 1.8 cm. wide, few, cymose, and rather long-peduncled, or more numerous and cymose-panicled; involucre 4 to 7 mm. high, the phyllaries chiefly obtuse.

9. *Perymenium pringlei* Robins. & Greenm. Proc. Amer. Acad. 34: 526. 1899.

Sinaloa and Jalisco; type from Guadalajara, Jalisco.

Shrubby; stem strigose or strigillose; petioles 5 to 20 mm. long; blades ovate, 6 to 11 cm. long, 2 to 4 cm. wide, acuminate, coarsely serrate to subentire, harsh on both sides, beneath venose, hispid, and hispidulous; heads cymose-panicled; involucre 6 to 7 mm. high, the phyllaries obtuse or subacute. "Guisandira" (Sinaloa).

10. *Perymenium globosum* Robinson, Proc. Amer. Acad. 43: 40. 1907.

Known only from the type locality, Uruapan, Michoacán.

Shrubby, 2 meters high; stem strigillose; petioles 8 to 15 mm. long; blades ovate, 8 to 12 cm. long, 4 to 5 cm. wide, acuminate, rounded or shortly cuneate at base, closely serrate, roughish on both sides, prominulous-reticulate beneath and there hispidulous and gland-dotted; heads numerous; involucre short, 3 mm. high, the phyllaries ovate, acute or acuminate.

11. *Perymenium verbesinoides* DC. Prodr. 5: 608. 1836.

Hidalgo to Guerrero; type from Mexico, without definite locality.

Shrubby, up to 2.6 meters high; stem strigose and strigillose; petioles 2 to 13 mm. long; blades ovate, 2.5 to 8.5 cm. long, acute or acuminate, truncate to subcuneate at base, serrate, rough above, antrorse- or divergent-hispidulous beneath; heads usually in small close cymose panicles; involucre 5 to 7 mm. high, the phyllaries ovate, acute or usually acuminate.

12. *Perymenium asperifolium* Schultz Bip.; Klatt, Leopoldina 23: 143. 1887.

Known only from the type locality, Ejutla, Oaxaca.

Leaves short-petioled, 3.7 cm. long, 1.8 cm. wide, cordate, scabrous above, villous beneath; heads cymose; phyllaries 2-seriate, oblong-lanceolate, acute, densely villous. (Description compiled.)

13. *Perymenium glandulosum* T. S. Brandeg. Zoe 5: 261. 1908.

Known only from the type locality, Barranca de Tlacuilosto, Puebla.

Small shrub; younger branches, leaves, and involucre very glandular and more or less hispid or strigose; leaves short-petioled, lanceolate or lance-elliptic, cuneate at base, 2 to 3.5 cm. long, 6 to 11 mm. wide, scabrous-pubescent; heads several, closely cymose, short-pedicelled; involucre 5 to 6 mm. high, the inner phyllaries long-acuminate, spreading at apex.

14. *Perymenium berlandierii* DC. Prodr. 5: 608. 1836.

Perymenium mendezii cylindrocephalum Robins. & Greenm. Proc. Amer. Acad. 34: 528. 1899.

Hidalgo to Morelos and Puebla; Chiapas; type from Villalpando.

Shrub, up to 4 meters high, strigose and strigillose; leaves short-petioled, lance-ovate or ovate, 3.5 to 8 cm. long, 1 to 4 cm. wide, acute or acuminate, cuneate to rounded at base, rather thick, serrate or serrulate; heads usually in close terminal cymes, often surpassed by the leaves; involucre 3 or 4-seriate, 5 to 8 mm. high, the phyllaries mostly oval or oblong, obtuse or rounded.

15. *Perymenium purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 74. 1914.

Perymenium leptopodium Blake, Proc. Amer. Acad. 51: 523. 1916.

Chiapas; type from Cerro del Boquerón. Guatemala.

Shrubby, 2 meters high, rather sparsely strigose and strigillose; petioles usually 1 to 1.6 cm. long; blades mostly oblong-ovate or lance-ovate, 4.6 to 8.5 cm. long, 1.5 to 4 cm. wide, acute or acuminate, cuneate or rarely rounded at base, serrate; heads usually rather numerous, cymose, on pedicels 0.5 to 3.2 cm. long; involucre 4 to 5 mm. high, the phyllaries ovate, obtuse to acute.

16. *Perymenium microphyllum* Robins. & Greenm. Proc. Amer. Acad. 34: 527. 1899.

Durango, without definite locality.

Shrub; branches strigillose; leaves short-petioled, linear or linear-elliptic, 1.2 to 2.4 cm. long, 2 to 4 mm. wide, acute, entire, revolute-margined, scabrous; heads scattered, axillary and terminal, small, the pedicels 7 mm. long; involucre 7 mm. high, the phyllaries ovate or lanceolate, the tips herbaceous, loose, obtuse to acute.

17. *Perymenium goldmanii* Greenm. Field Mus. Bot. 2: 269. 1907.

Known only from the type locality, Apazote, near Yohaltún, Campeche.

Shrubby; stem strigillose; petioles 3 to 12 mm. long; blades ovate or lance-ovate, 4.5 to 8 cm. long, 2 to 4 cm. wide, acuminate, broadly rounded to subcordate at base, crenate-serrate to subentire, rough above, hirsute and hirsutulous beneath and dotted with shining glands; heads small, few or numerous in close cymose clusters; involucre 4 mm. high, the phyllaries acute to obtusish, somewhat dotted with shining glands.

18. *Perymenium pinetorum* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 420. 1924.

Known only from the type locality, near Hacienda Monserrate, Chiapas.

Branching shrub, the stem strigillose; leaves short-petioled, the blades ovate or oval-ovate, 2.5 to 3.8 cm. long, 1 to 1.6 cm. wide, acute, rounded at base, serrulate, rough-strigillose on both sides, green and scarcely paler beneath; heads few, small, in small terminal cymose clusters, the pedicels 3 mm. long or less; involucre 4 mm. high, the phyllaries acute or subacuminate, strigillose; rays about 3, about 3 mm. long; disk flowers about 7.

19. *Perymenium rotundisquamum* Blake, Contr. U. S. Nat. Herb. 22: 623. 1924.

Known only from the type locality, Vallecito, Michoacán or Guerrero.

Suffrutescent, tufted; stems strigillose, simple, remotely leafy; leaves short-petioled, the blades lance-oblong or oblong, 3 to 4.8 cm. long, 1 to 1.5 cm. wide, acute, cuneate at base, serrulate, scabrous above, beneath strigillose and prominulous-reticulate; heads in small cymes at apex of stem and on subterminal peduncles; involucre about 4 mm. high, the inner phyllaries suborbicular, broadly rounded.

20. *Perymenium lancifolium* Blake, Contr. U. S. Nat. Herb. 22: 623. 1924.

Known only from the type locality, Batel, Concordia, Sinaloa.

Shrubby; stem strigillose; petioles 6 to 10 mm. long; blades lanceolate, 6 to 10 cm. long, 1 to 2 cm. wide, long-acuminate, acutely cuneate at base, serrulate, rough above, antrorse-hispid and hispidulous beneath; heads in cymes or cymose panicles; pedicels usually about 1.8 cm. long; involucre 5 to 6 mm. high, all but the outermost phyllaries oval, with broadly rounded tips.

21. *Perymenium microcephalum* Schultz Bip.; Klatt, *Leopoldina* **23**: 143. 1887.

Oaxaca; type from Santa Talca.

Shrubby, finely strigillose; petioles of the upper leaves 4 to 8 mm. long; blades of the upper leaves ovate-lanceolate or ovate, 3 cm. long or less, half as wide, serrate, acute or acuminate, rounded at base; heads numerous, about 1.2 cm. wide; involucre 5 mm. high, the phyllaries obtuse, the inner with scarious yellowish tips.

22. *Perymenium gracile* Hemsl. *Biol. Centr. Amer. Bot.* **2**: 181. 1881.

Known only from the type locality, San Cristóbal, Orizaba, Veracruz.

Strigillose; petioles up to 12 mm. long; blades lance-ovate, up to 10 cm. long, very acute, serrulate, scabrid-strigillose; heads small, few-flowered, numerous in leafy panicles; involucre 4 mm. high, the phyllaries obtuse. (Description compiled.)

23. *Perymenium chalarolepis* Robins. & Greenm. *Proc. Amer. Acad.* **34**: 525. 1899.

Known only from the type locality, mountains of Chiapas.

Shrub; branches strigillose; petioles 6 to 9 mm. long; blades lanceolate, 4 to 6 cm. long, 1 to 1.5 cm. wide, acuminate, sharply serrate, scabrous on both sides; heads small, borne in numerous 5-headed terminal cymes; phyllaries ovate, acuminate, spreading-tipped. (Description compiled.)

24. *Perymenium ghiesbreghtii* Robins. & Greenm. *Proc. Amer. Acad.* **34**: 525. 1899.

Chiapas.

Shrub 1 to 2 meters high; branches strigillose, glabrate; petioles 5 to 12 mm. long; blades lance-oblong, 6 to 11 cm. long, 1.5 to 3 cm. wide, acuminate, cuneate at base, serrate, smoothish above, appressed-hirsutulous beneath; heads in small close cymes; involucre about 5 mm. high, the phyllaries ovate, acuminate, with spreading tips.

25. *Perymenium croceum* Robins. & Greenm. *Proc. Amer. Acad.* **34**: 527. 1899.

Durango.

Shrub; branches strigillose; petioles about 5 mm. long; blades lanceolate or lance-oblong, 5 to 9 cm. long, 1.3 to 1.8 cm. wide, acuminate, cuneate at base, serrate, green and rough above, densely and subcanescently strigillose beneath; heads in cymes of 3 to 5, short-pedicled; involucre 5 to 6 mm. high, the phyllaries obtuse or the outer acutish, appressed.

26. *Perymenium discolor* Schrad. "Ind. Sem. Hort. Gott. 1830;" *Linnaea* **6**: Litt.-Ber. 73. 1831.

Oaxaca.

Shrub up to 5 meters high; branches strigose or strigillose; leaves short-petioled, lanceolate, 2 to 6.5 cm. long, 5 to 14 mm. wide, attenuate, acutely cuneate at base, green, scabrous, impressed-veined and somewhat rugose above, beneath densely and canescently subtomentose-hispidulous; heads in rounded panicles; involucre 4 mm. high, the phyllaries obtuse or rounded.

27. *Perymenium pellitum* Klatt, *Leopoldina* **23**: 143. 1887.

Veracruz and Oaxaca; type from Yavesia, Oaxaca.

Similar to *P. discolor*; leaves nigrescent in drying; heads usually in 3's, on pedicels 2 to 6 cm. long.

- 28. *Perymenium stenophyllum*** Blake, Proc. Biol. Soc. Washington **32**: 191. 1919.

Known only from the type locality, San Ignacio, Sinaloa.

Shrubby; branches strigose and strigillose; leaves short-petioled, narrowly linear, 3 to 15 cm. long, 1 to 4 mm. wide, acuminate at both ends, 1-nerved, roughish above, densely and finely canescent-tomentulose beneath; heads in terminal clusters of 3 to 7, the pedicels 3 to 40 mm. long; involucre 4 to (fruit) 7 mm. high, the phyllaries obtuse to rounded.

- 29. *Perymenium angustifolium*** T. S. Brandeg. Zoe **5**: 260. 1908.

Puebla; type from Cerro San Luis.

Shrub; branches strigose; leaves short-petioled, elliptic-lanceolate, 2 to 5 cm. long, 4 to 7 mm. wide, usually obtusish, cuneate at base, serrate, rough and rugose above, beneath densely and canescently or cinereously subtomentose-hispidulous; heads in small terminal cymes or cymose panicles; involucre 5 to 6 mm. high, the phyllaries acute or acuminate.

- 30. *Perymenium lasiolepis*** Blake, Contr. U. S. Nat. Herb. **22**: 625. 1924.

Known only from the type locality, San Simón, Puebla.

Shrub; branches spreading-hispidulous; leaves short-petioled, rhombic-ovate, 2 to 3.3 cm. long, 1 to 1.8 cm. wide, acutish, rounded-cuneate at base, hispid-pilose above, beneath densely and canescently pilose-tomentose; heads in rather small panicles; involucre 6 to 7 mm. high, the phyllaries lance-ovate, acuminate, spreading-tipped, densely pubescent.

- 31. *Perymenium blepharolepis*** Blake, Proc. Amer. Acad. **51**: 522. 1916.

Known only from the type locality, Coxcatlán, Puebla.

Shrub; branches strigillose; leaves short-petioled, ovate, 2.5 to 3.8 cm. long, 1 to 1.8 cm. wide, subacuminate, cuneate or rounded-cuneate at base, above strigillose, beneath subcanescently antrorse-hispid and hispidulous; heads 5 to 7, cymose-panicled; involucre 7 mm. high, the phyllaries ovate to lance-ovate, subacute.

- 32. *Perymenium hypoleucum*** Blake, Proc. Amer. Acad. **51**: 523. 1916.

Known definitely only from the type locality, San Luis Tultitlanapa, Puebla.

Shrub; branches strigillose; leaves short-petioled, ovate or elliptic-ovate, 2 to 3 cm. long, 1 to 2 cm. wide, obtuse to acute, cuneate-rounded at base, harsh above, densely and glaucescently subtomentose-hispidulous beneath; heads several, closely cymose-panicled; involucre 4 to 4.5 cm. high, the phyllaries densely strigillose, obtuse or rounded.

- 33. *Perymenium consobrinum*** Blake, Contr. U. S. Nat. Herb. **22**: 626. 1924.

Known only from the type locality, Los Naranjos, Oaxaca.

Shrubby; branches reflexed-hispidulous; leaves short-petioled, ovate or lance-ovate, 2.5 to 4 cm. long, 1.2 to 2 cm. wide, acute, cuneate at base, roughish and rugose above, beneath densely and subtomentosely hispid-pilose with glaucescent hairs; heads about 5, in umbelliform cymes, on pedicels 1 to 5 cm. long; involucre about 6 mm. high, the phyllaries obtuse, with spreading herbaceous tips.

- 34. *Perymenium collinum*** T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 395. 1909.

Known only from the type locality, Cerro de Gentile, Puebla.

Shrub; branches subtomentose-pilosulous with spreading hairs; leaves short-petioled, broadly ovate, 1 to 1.8 cm. long, 8 to 14 mm. wide, acute, at base rounded or subcordate, harsh above, densely and ochroleucously subtomentose-hispidulous beneath; heads 3 to 5, short-pedicled; involucre 7 mm. high, the phyllaries ovate, obtuse, pubescent.

35. *Perymenium ovatum* T. S. Brandeg. Zoe 5: 261. 1908.

Known only from the type locality, Barranca de Tlaquilostó, Puebla.

Small shrub; branches strigose or short-hispid; leaves short-petioled, ovate, 1.5 to 3 cm. long, 0.8 to 1.5 cm. wide, obtuse, serrate, rugose and scabrous above, densely subtomentose-hispidulous with bluish white hairs beneath; heads 1 to 3, terminating the branches, the pedicels 0.5 to 2.5 cm. long; involucre 7 to 8 mm. high, the phyllaries ovate to oblong, obtuse or the outer acutish, pubescent and ciliate.

36. *Perymenium acuminatum* (Llave) Blake, Contr. U. S. Nat. Herb. 22: 627. 1924.

Oteiza acuminata Llave, Reg. Trim. 1: 41. 1832.

Calea elegans DC. Prodr. 5: 674. 1836.

San Luis Potosí and State of Mexico.

Suffrutescent; stem glabrous or sparsely pubescent; leaves subsessile or very short-petioled, lance-ovate or ovate, 3 to 6 cm. long, 1.2 to 2.8 cm. wide, acuminate, rounded to subcordate at base, callous-denticulate or subentire, smooth above, strigose or antrorse-hirsute on the veins beneath; heads 2 to 3.5 cm. wide, few on very long peduncles, or several and closely cymose-panicled; rays white; involucre 7 to 9 mm. high, the phyllaries many-nerved, with subscarious, often purplish tips, the outer acute, the inner obtuse or rounded.

37. *Perymenium macrocephalum* Greenm. Proc. Amer. Acad. 39: 108. 1903.
Guerrero; type from Iguala.

Herbaceous or suffrutescent (?), 1 to 2 meters high; stem slender, strigillose or hispidulous; petioles of the larger leaves 1 to 3 cm. long; blades ovate, 6 to 12 cm. long, 3.5 to 7 cm. wide, acuminate, rounded to subcordate at base, serrate, rough above, hispid and hispidulous beneath chiefly on the veins; heads few, large, on pedicels 2 to 8.5 cm. long; involucre 7 to 9 mm. high.

38. *Perymenium nelsonii* Robins. & Greenm. Proc. Amer. Acad. 34: 529. 1899.

Chiapas; type collected between San Cristóbal and Teopisca.

Shrub; branches strigose to sordidly subtomentose; petioles 1.2 to 2 cm. long; blades ovate, 6 to 10 cm. long, 3.2 to 5.5 cm. wide, acuminate, rounded or subcordate at base, serrate, rough above, rather densely pilosulous to subtomentose beneath; heads cymose or cymose-panicled, large, about 3 cm. wide; involucre 8 to 11 mm. high, the phyllaries obtuse or rounded.

39. *Perymenium latisquamum* Blake, Contr. U. S. Nat. Herb. 22: 626. 1924.

Chiapas; type from Sierra de Tonalá. El Salvador.

Probably shrubby; stem strigillose; petioles 8 to 27 mm. long; blades broadly ovate, 6 to 13 cm. long, 4.5 to 7.5 cm. wide, acuminate, cuneate to subtruncate at base, serrate, roughish above, strigose or antrorse-hispid, chiefly along the veins, beneath and more or less gland-dotted; heads rather numerous, large, about 2.8 cm. wide; involucre 8 to 10 mm. high, the phyllaries broadly ovate (outermost) to broadly oval or suborbicular, broadly rounded or the outermost obtuse. "Tatascamito" (El Salvador).

DOUBTFUL SPECIES.

PERYMENIUM BARCLAYANUM DC. Prodr. 5: 609. 1836. Described as suffruticose and subscandent. According to Robinson & Greenman, it is very close to *P. tenellum* A. Gray, an herbaceous species.

PERYMENIUM CERVANTESII DC. Prodr. 5: 609. 1836. This may be the same as *P. rude* Robins. & Greenm.

PERYMENIUM GYMNOLOMOIDES (Less.) DC. Prodr. 5: 609. 1836. *Lipotriche gymnomoloides* Less. Linnaea 6: 408. 1831. Imperfectly described; type from Misantla, Veracruz.

65. FLOURENSIA DC. Prodr. 5: 592. 1836.

REFERENCE: Blake, Revision of the genus *Flourensia*, Contr. U. S. Nat. Herb. 20: 393-409. 1921.

Resinous shrubs; leaves alternate; heads yellow, radiate or discoid; involucre 2 to 4-seriate, the phyllaries herbaceous or subherbaceous; rays neutral; achenes more or less thickened; pappus of 2 awns and rarely a few squamellae.

Heads discoid.

Leaves entire.

Leaves ovate to obovate, 2 to 6 cm. wide.....1. **F. laurifolia**.

Leaves 4 to 11.5 mm. wide.

Leaves narrowly lanceolate, 4 to 7.5 mm. wide.....2. **F. retinophylla**.

Leaves ovate to oval, 6.5 to 11.5 mm. wide.....3. **F. cernua**.

Leaves mucronate-dentate.....4. **F. ilicifolia**.

Heads radiate.

Young branches densely pilose-lanate; heads numerous, in regular cymose panicles.....5. **F. glutinosa**.

Young branches not pilose-lanate; heads solitary to several at tips of branches, not regularly cymose-panicled.

Petioles 7 to 15 mm. long; leaf blades ovate, 6 to 10 cm. long.

6. **F. collodes**.

Petioles 1 to 4 mm. long; leaf blades oblong to lanceolate, or if ovate only 1.5 to 2.5 cm. long.

Phyllaries 13 to 23 mm. long, with ovate or lanceolate base and elongate linear-attenuate tips.....7. **F. pringlei**.

Phyllaries 7 to 15 mm. long, without linear-attenuate tips.

Leaf blades oblong-elliptic to lanceolate, 3.3 to 6.5 cm. long.

8. **F. resinosa**.

Leaf blades ovate or elliptic-ovate, 1.5 to 2.5 cm. long.

9. **F. microphylla**.

1. Flourensia laurifolia DC. Prodr. 5: 592. 1836.

Helianthus laurifolius Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 179. 1881.

Tamaulipas and San Luis Potosí; type collected between Victoria and Tula, Tamaulipas.

Shrub 1.5 to 3 meters high; leaf blades 5.5 to 13 cm. long; heads in cymose panicles of 3 to 7, the disk 1 to 1.3 cm. thick in flower.

2. Flourensia retinophylla Blake in Robinson, Proc. Amer. Acad. 49: 505. 1913.

Known only from the type locality, Sierra de la Paila, Coahuila.

Much-branched low viscid shrub; leaf blades 2.5 to 3.5 cm. long; heads 1 to 1.3 cm. high.

3. Flourensia cernua DC. Prodr. 5: 593. 1836.

Helianthus cernuus Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 179. 1881.

Sonora to Nuevo León, south to Zacatecas and San Luis Potosí; type collected between Monterrey and Lampasos, Nuevo León. Texas to Arizona.

Much-branched shrub 1 to 2 meters high, erect or procumbent; leaf blades 1.7 to 2.5 cm. long; heads nodding, solitary in the leaf axils, forming long leafy inflorescences. "Hojasé," "hojasén."

This shrub has a hoplike odor and a bitter taste. The leaves and heads are commonly sold in the markets of northern Mexico, and are taken as a remedy for indigestion. According to Palmer, it is employed also as a remedy for female diseases. In the United States the plant is known most commonly as "tar-bush."

4. *Flourensia ilicifolia* T. S. Brandeg. Zoe 5: 238. 1906.

Known only from the type locality, Sierra de Parras, Coahuila.

Shrub, much branched; leaf blades rhombic-ovate, 1.6 to 2.4 cm. long, coarsely dentate; heads 1.3 to 1.6 cm. high.

5. *Flourensia glutinosa* (Robins. & Greenm.) Blake, Proc. Amer. Acad. 49: 374. 1913.

Encelia glutinosa Robins. & Greenm. Amer. Journ. Sci. III. 50: 155. 1895.

Puebla and Oaxaca; type from Las Hoyas Canyon, Oaxaca.

Shrub 3 to 5 meters high; leaf blades ovate to ovate-lanceolate, 6.5 to 9 cm. long, entire; heads about 2.5 cm. wide.

It is perhaps this plant for which Dr. Reko reports the name of "raíz del manso."

6. *Flourensia collodes* (Greenm.) Blake, Proc. Amer. Acad. 49: 373. 1913.

Encelia collodes Greenm. Proc. Amer. Acad. 39: 110. 1903.

Known only from the type locality, between Ocuilapa and Tuxtla, Chiapas.

Shrub; leaves entire; heads 4 to 5 toward tips of branches, 4 cm. wide.

7. *Flourensia pringlei* (A. Gray) Blake, Proc. Amer. Acad. 49: 375. 1913.

Helianthella pringlei A. Gray, Proc. Amer. Acad. 21: 389. 1886.

Encelia oblonga Robins. & Fern. Proc. Amer. Acad. 30: 118. 1894.

Chihuahua and Durango; type from Chihuahua City.

Stems numerous, suffrutescent, 30 to 40 cm. high, very leafy; leaf blades elliptic-oblong to oblong-lanceolate, 3.2 to 10 cm. long; heads solitary, terminal, long-peduncled, 2.5 to 4 cm. wide.

8. *Flourensia resinosa* (T. S. Brandeg.) Blake, Proc. Amer. Acad. 49: 375. 1913.

Encelia resinosa T. S. Brandeg. Zoe 5: 240. 1906.

Known only from the type locality, Ixmiquilpan, Hidalgo.

Shrub, very glutinous; heads 1 to 4, long-peduncled, 3.5 to 5.3 cm. wide.

9. *Flourensia microphylla* (A. Gray) Blake, Proc. Amer. Acad. 49: 374. 1913.

Encelia microphylla A. Gray, Proc. Amer. Acad. 15: 37. 1879.

Coahuila; type from Saltillo.

Much-branched shrub about 1 meter high; heads solitary, long-peduncled, about 2.5 cm. wide.

66. *SALMEA* DC. Cat. Hort. Monsp. 140. 1813.

REFERENCE: Blake, A revision of *Salmea* and some allied genera, Journ. Bot. Brit. & For. 53: 193-201. 1915.

Shrubs, often scandent; leaves opposite; heads small, whitish, discoid, cymose-panicled; involucre about 3-seriate, graduate; receptacle conic; achenes strongly compressed, ciliate; pappus of 2 awns.

Heads very numerous, cymose-panicled on widely spreading, axillary and terminal branches.....1. ***S. scandens***.

Heads few to numerous, on erect peduncles or several-headed flowering-branches.

Heads numerous, on 3 to 11-headed peduncles.....2. ***S. palmeri***.

Heads few (5 to 11), on 1 to 3-headed peduncles.....3. ***S. oligocephala***.

1. *Salmea scandens* (L.) DC. Cat. Hort. Monsp. 141. 1813.

Bidens scandens L. Sp. Pl. 833. 1753.

Salmea eupatoria DC. Cat. Hort. Monsp. 141. 1813.

Spilanthus nitidus Llave in Llave & Lex. Nov. Veg. Descr. 1: 28. 1824.

Salmea grandiceps Cass. Dict. Sci. Nat. 47: 88. 1827.

Salmea parviceps Cass. Dict. Sci. Nat. 47: 88. 1827.

Salmea oppositiceps Cass. Dict. Sci. Nat. 47: 89. 1827.

Fornicaria scandens Raf. Sylv. Tell. 116. 1838.

Verbesina scandens Klatt, Leopoldina 25: 106. 1889.

Tamaulipas and Guerrero to Chiapas; type from Veracruz. Guatemala to South America; West Indies.

Scandent shrub, up to 10 meters high; leaf blades ovate to oblong-ovate, 5 to 12.5 cm. long, 2 to 6 cm. wide, remotely serrulate or subentire, coriaceous, shining, essentially glabrous; heads 4.5 to 7 mm. high; phyllaries ovate to ovate-lanceolate, acute to acuminate; corollas white, turning greenish when old. "Hierba de San Antonio" (Puebla, Veracruz); "duerme-boca," "salta-afuera" (El Salvador); "oreja de conejo" (Honduras); "tabacón," "bejuco de muela" (Porto Rico).

The root of this plant, when chewed, is said to deaden all sensation in the tongue, hence the name "duerme-boca" applied in El Salvador. The name "bejuco de muela," reported from Porto Rico, would indicate that because of this property the plant is employed there as a remedy for toothache. The name "salta-afuera" used in El Salvador is an allusion to the fact that the vine is used there as a fish poison or barbasco, as which it is reported to be unusually efficient.

1a. *Salmea scandens obtusata* Blake, Journ. Bot. Brit. & For. 53: 197. 1915. Veracruz. Guatemala; type from Cobán.

Phyllaries oval, rounded; otherwise as in the typical form.

2. *Salmea palmeri* S. Wats. Proc. Amer. Acad. 26: 141. 1891.

Jalisco and Michoacán; type from Río Blanco, Jalisco.

Erect, about 50 cm. high; stem hirsutulous or strigillose, glabrate, erect-branched; leaf blades ovate to oval, 4.5 to 10 cm. long, repand-denticulate; heads 7 to 9 mm. high; phyllaries pubescent, with short loose subherbaceous tips.

3. *Salmea oligocephala* Hemsl. Biol. Centr. Amer. Bot. 2: 194. 1881.

Mexico; type from Zimapán, Hidalgo.

Erect; stem strigillose, the inflorescence hispidulous; leaf blades ovate to ovate-oblong, 4.8 to 9 cm. long; heads 9 to 11 mm. high; phyllaries pubescent, with narrow appressed subherbaceous tips.

67. **NOTOPTERA** Urban, Symb. Ant. 2: 465. 1901.

REFERENCE: Blake, Journ. Bot. Brit. & For. 53: 202, 225-229. 1915.

Shrubs; leaves opposite; heads radiate or discoid, cymose-panicled, the rays yellow, the disk yellow or white; involucre graduate, the phyllaries indurate, usually subherbaceous at apex; rays styliferous; achenes of disk strongly compressed, winged on one or both margins; pappus of 2 unequal awns, without squamellae, the inner awn broadly winged, the outer shorter, nearly or quite wingless.

Heads discoid.

Corollas erect; leaves obtuse or rounded.....1. ***N. gaumeri***.

Corollas strongly reflexed at maturity; leaves acuminate.

Heads subcylindric, 7.5 to 10 mm. high; achene wings ciliolate.

2. ***N. leptocephala***.

Heads campanulate or turbinate-campanulate, 4 to 7 mm. high; achene wings not ciliolate.

Pedicels 4 to 10 mm. long.....3. ***N. scabridula***.

Pedicels 1 to 3 mm. long.....4. ***N. brevipes***.

Heads radiate.

Heads numerous; involucre 4 mm. high.....5. ***N. tequilana***.

Heads few; involucre 8 mm. high.....6. ***N. epaleacea***.

1. *Notoptera gaumeri* Greenm. Field. Mus. Bot. 2: 269. 1907.

Salmea gaumeri Greenm. in Millsp. & Chase, Field Mus. Bot. 3: 124. 1904.

Yucatán; type from Izamal.

Shrub 6 meters high; leaf blades oval-ovate, 5 to 7 cm. long, 3 to 4 cm. wide, grayish-tomentose beneath; heads subsessile, about 15-flowered, white, very aromatic. (Description compiled.)

- 2. *Notoptera leptcephala*** Blake, Proc. Biol. Soc. Washington **34**: 46. 1921.
Yucatán; type from Xnocac.

Shrub 3 meters high or less; leaf blades ovate or elliptic-ovate, 5.5 to 8.5 cm. long, 2 to 3.5 cm. wide, denticulate, rough above, densely hispidulous-pilosulous beneath; pedicels 1 to 4 mm. long; heads subcylindric when young.

This species is said to be used medicinally.

- 3. *Notoptera scabridula*** Blake, Journ. Bot. Brit. & For. **53**: 226. 1915.
Veracruz, Yucatán, Campeche, and Oaxaca; type from Atoyac, Veracruz. Guatemala and Honduras.

Scandent shrub 5 meters high, with widespreading branchlets; leaf blades ovate or oblong-ovate, 5 to 12.5 cm. long, 2 to 6 cm. wide, rough above, rather densely pilosulous beneath; corollas whitish.

- 4. *Notoptera brevipes*** (Robinson) Blake, Journ. Bot. Brit. & For. **53**: 227. 1915.

Otopappus brevipes Robinson, Proc. Amer. Acad. **44**: 621. 1909.

Chiapas (type locality). Guatemala and Honduras.

Scandent shrub; leaf blades ovate or oblong-ovate, 6.5 to 13.5 cm. long, densely reticulate beneath; pedicels short and thick.

- 5. *Notoptera tequilana*** (A. Gray) Blake, Journ. Bot. Brit. & For. **53**: 228. 1915.

Zexmenia tequilana A. Gray in S. Wats. Proc. Amer. Acad. **22**: 425. 1887.

Otopappus tequilanus Robinson, Proc. Amer. Acad. **44**: 622. 1909.

Jalisco and Michoacán or Guerrero; type from Tequila, Jalisco.

Shrub, sometimes scandent, about 2 meters high; stem tuberculate-strigillose; leaf blades ovate or lance-ovate, acuminate, harsh-pubescent on both sides; heads yellow, about 1.5 cm. wide, in axillary and terminal cymose panicles.

- 5a. *Notoptera tequilana acuminata*** (S. Wats.) Blake, Journ. Bot. Brit. & For. **53**: 228. 1915.

Otopappus acuminatus S. Wats. Proc. Amer. Acad. **26**: 140. 1891.

Otopappus tequilanus acuminatus Robinson, Proc. Amer. Acad. **44**: 622. 1909.

Jalisco; type from Guadalajara.

Stem strigose-pilose or hispid-pilose; leaves densely and rather softly pubescent beneath.

- 6. *Notoptera epaleacea*** (Hemsl.) Blake, Journ. Bot. Brit. & For. **53**: 229. 1915.

Otopappus epaleaceus Hemsl. Biol. Centr. Amer. Bot. **2**: 191. 1881.

Morelos; type from Mexico, without definite locality.

Shrubby; stem strigillose; leaf blades ovate, acuminate or acute, harshly pubescent on both sides; heads about 2.5 cm. wide, solitary on axillary and terminal peduncles 0.8 to 5 cm. long.

- 68. *ENCELIA*** Adans. (Fam. Pl. **2**: 128. 1763, hyponym); Lam. Encycl. **2**: 356. 1786.

REFERENCE: Blake, A revision of *Encelia* and some related genera, Proc. Amer. Acad. **49**: 358–376. pl. 1. 1913.

Herbs or shrubs with alternate leaves and solitary to paniced, radiate heads; rays yellow; disk yellow or purple; involucre 2 or 3-seriate; rays neutral; achenes strongly compressed, very flat, oblong or obovate, narrowly white-margined, villous-ciliate; pappus none or of 2 slender awns.

Leaves laciniately lobed.

Leaves with linear rachis and lobes.....1. *E. ventorum*.

Leaves ovate or obovate in outline, the lobes lanceolate.....2. *E. laciniata*.

Leaves entire or toothed.

Leaves linear or linear-filiform.....8. *E. stenophylla*.

Leaves oblong to ovate.

Heads numerous, paniced; peduncles and pedicels glabrous, rarely with a few hairs.....3. *E. farinosa*.

Heads few or solitary; peduncles pubescent.

Disk yellow.....4. *E. albescens*.

Disk purple or brownish purple.

Phyllaries densely pubescent on back as well as on margin.

5. *E. californica*.

Phyllaries conspicuously ciliate, on back glabrous to rather sparsely hispidulous or pubescent.

Leaves cinereous-pubescent, usually cordate or subcordate at base.

6. *E. palmeri*.

Leaves green, cuneate to truncate at base.....7. *E. halimifolia*.

1. *Encelia ventorum* T. S. Brandeg. Proc. Calif. Acad. II. 2: 175. 1889.

Baja California; type from Boca de las Animas.

Shrub about 1 meter high, much branched; leaves 3 to 6.5 cm. long, fleshy, the rachis and the 1 to 5 lobes linear, 1 to 2 mm. wide; heads about 1.7 cm. wide, nodding, fragrant, resinous.

2. *Encelia laciniata* Vasey & Rose, Proc. U. S. Nat. Mus. 11: 535. 1889.

Baja California; type from Lagoon Head.

Shrubby, 60 to 90 cm. high, usually hispid; leaves 3 to 5.5 cm. long, ovate or obovate in outline, unequally lacinate-lobed, the lamina 2.5 to 6 mm. wide between the lobes.

3. *Encelia farinosa* A. Gray in Emory, Mil. Recon. 143. 1848.

Sonora and Sinaloa. Nevada to California and Arizona; type from California.

Shrubby below, 1.6 meters high or less, resinous; stem white-farinose, glabrescent; leaf blades broadly ovate to lanceolate, 3 to 10 cm. long, entire or subentire, white-farinose, sometimes glabrescent; heads about 2.5 cm. wide; disk yellow. "Hierba ceniza" (Sinaloa); "inciense" (Baja California); "palo blanco," "hierba de las ánimas" (Sonora); "hierba del bazo" (Arizona).

The shrub is very abundant in some parts of Sonora, and is gathered for use as firewood. A resin obtained from the stems is sometimes used as incense in churches. The plant has sometimes been mistaken for guayule (*Parthenium argentatum*). The Indians chewed the gum and used it as a varnish for arrows and other objects. The gum also was melted and smeared on the body as a relief for pain in the sides.

3a. *Encelia farinosa phenicodonta* Blake, Proc. Amer. Acad. 49: 362. 1913.

Baja California and Sonora; type from San Quintín, Baja California. California and Arizona.

Disk purple; otherwise as in the typical form. "Inciense" (Baja California).

The resin is burned for incense in the churches of Baja California.

3b. *Encelia farinosa radians* T. S. Brandeg.; Blake, Proc. Amer. Acad. 49: 362. 1913.

Encelia radians T. S. Brandeg. Proc. Calif. Acad. II. 2: 176. 1889.

Cape region of Baja California; type from San Gregorio.

Leaves soon glabrate; involucre essentially glabrous; disk purple.

4. *Encelia albescens* A. Gray, Proc. Amer. Acad. 8: 658. 1873.

Known only from the type locality, somewhere in Sonora.

Frutescent (?); branches rough-pubescent, bearing single pedunculate heads; branch leaves ovate, 2 to 2.5 cm. long, subentire, harshly whitish-pubescent with appressed hairs; heads about 3.5 cm. wide.

A doubtful species, known from a single collection.

5. *Encelia californica* Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 357. 1841.

Northern Baja California. California and Arizona; type from Santa Barbara, California.

Frutescent below, up to 3.5 meters high; stem and peduncles cinereous with fine, chiefly incurved hairs; leaf blades ovate to lanceolate, entire or subentire, green, 3 to 6 cm. long; peduncles elongate; heads about 4 cm. wide.

5a. *Encelia californica asperifolia* Blake, Proc. Amer. Acad. 49: 368. 1913.

Baja California and islands; type from Cedros Island.

Smaller and more woody; leaves smaller, the blades 1 to 3 cm. long, scabrid-pubescent; heads smaller.

6. *Encelia palmeri* Vasey & Rose, Proc. U. S. Nat. Mus. 11: 535. 1889.

Baja California; type from Lagoon Head.

Shrubby below, 1 meter high or less, canescent-hispidulous on the younger parts; leaf blades ovate to rotund-ovate, 1.5 to 4 cm. long, nearly or quite as wide, entire or bluntly toothed; heads 2.5 to 4 cm. wide. "Mirasol" (Baja California).

7. *Encelia halimifolia* Cav. Icon. Pl. 3: 6. pl. 210. 1795.

Pallasia grandiflora Willd. Sp. Pl. 3: 2261. 1804.

Encelia conspersa Benth. Bot. Voy. Sulph. 26. 1844.

Sonora and Baja California; type from Mexico, without definite locality.

Shrubby below; branches strigillose or hispidulous; leaf blades ovate or oblong-ovate, 2 to 4 cm. long, entire, cuneate to truncate at base; heads 1.5 to 2.8 cm. wide; phyllaries densely white-ciliate.

8. *Encelia stenophylla* Greene, Bull. Torrey Club 10: 41. 1883.

Known only from the type locality, Cedros Island, Baja California.

Suffrutescent, about 30 cm. high, glutinous; leaves crowded on the lower part of the stems, narrowly linear, 1-nerved, 2.5 to 8 cm. long, 1 to 2 mm. wide; heads numerous, cymose-panicled, yellow, about 1.5 cm. wide; achenes silky-villous, 2-awned.

69. *HYMENOSTEPHIUM* Benth. (in Benth. & Hook. Gen. Pl. 2: 382. 1873, hyponym); in Hook. Icon. Pl. 12: 48. pl. 1154. 1873.

Suffrutescent or herbaceous; leaves (in ours) ovate, petioled, mostly opposite; heads cymose or cymose-panicled, small or medium, radiate, yellow; involucre 2 or 3-seriate, graduate or subequal, the phyllaries ovate or lance-ovate, usually without conspicuously herbaceous tips; achenes obovoid, somewhat compressed, pubescent or glabrous; pappus of few unequal squamellae without awns, or none.

Disk in anthesis 8 to 13 mm. thick; involucre 5 to 6 mm. high, the phyllaries ovate, their tips herbaceous, gradually acuminate.....4. **H. superaxillare.**

Disk in anthesis usually less than 8 mm. thick; involucre usually 4 mm. high or less, the phyllaries mostly lance-ovate, with attenuate or very narrowly acuminate tips, these obscurely if at all herbaceous.

Heads in anthesis subcylindric, the disk usually about 3 mm. thick; pubescence of the stem usually appressed.....1. **H. microcephalum.**

Heads in anthesis campanulate, the disk usually 5 to 8 mm. thick.

Pubescence of stem and under leaf surface copious, spreading.

2. **H. guatemalense.**

Pubescence of stem and under leaf surface sparse, appressed.

3. **H. cordatum.**

1. **Hymenostephium microcephalum** (Less.) Blake, Contr. Gray Herb. n. ser. 54: 8. 1918.

Gymnolomia microcephala Less. Linnaea 5: 153. 1830.

Hymenostephium mexicanum Benth. in Hook. Icon. Pl. 12: 48. pl. 1154. 1873.

Montanoa thomasi Klatt, Abh. Naturf. Ges. Halle 15: 328. 1882.

?*Gymnolomia ehrenbergiana* Klatt, Leopoldina 23: 90. 1887.

?*Microcephalum ehrenbergianum* Schultz Bip.; Klatt, Leopoldina 23: 90. 1887, as synonym.

Gymnolomia patens abbreviata Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. 29: 94. 1899.

San Luis Potosí to Oaxaca; type from Hacienda de la Laguna, Veracruz. Guatemala.

Suffrutescent or herbaceous, 1 meter high or more; stem slender, strigose or strigillose; petioles slender, mostly 1 to 3 cm. long; blades ovate, 4 to 11 cm. long, 1.5 to 7 cm. wide, acuminate, usually subcordate at base, serrate; heads usually numerous, in rather close cymes or cymose panicles; involucre 2-seriate, 2 to 4 mm. high, the phyllaries mostly lance-ovate, with short, very narrow, mostly spreading tips; achenes glabrous or pubescent; pappus none or of few unequal squamellae.

2. **Hymenostephium guatemalense** (Robins. & Greenm.) Blake, Contr. Gray Herb. n. ser. 54: 8. 1918.

Gymnolomia patens guatemalensis Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. 29: 94. 1899.

Gymnolomia patens brachypoda Robins. & Greenm. Proc. Bost. Soc. Nat. Hist. 29: 95. 1899.

Gymnolomia guatemalensis Greenm. Field Mus. Bot. 2: 347. 1912.

Hymenostephium pilosulum Blake, Journ. Bot. Brit. & For. 53: 268. 1915.

Oaxaca. Guatemala to Panama; type from San Miguel Uspantán, Guatemala.

Suffrutescent or herbaceous, up to 2.6 meters high; stem densely and sordidly spreading-pilose or pilosulous; leaves as in *H. microcephalum*, but rather densely spreading-pilose or hirsute beneath; heads broadly campanulate in anthesis; involucre 4 to 6 mm. high; achenes and pappus as in no. 1.

3. **Hymenostephium cordatum** (Hook. & Arn.) Blake, Journ. Bot. Brit. & For. 53: 268. 1915.

Wedelia cordata Hook. & Arn. Bot. Beechey Voy. 435. 1840-41.

Wedelia subflexuosa Hook. & Arn. Bot. Beechey Voy. 435. 1840-41.

Gymnopsis ? *costaricensis* Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 90. 1852.

Gymnopsis vulcanica Steetz in Seem. Bot. Voy. Herald 157. 1853-54.

Gymnolomia patens A. Gray, Proc. Amer. Acad. 5: 182. 1861.

Gymnolomia subflexuosa Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 163. 1881.

Aspilia costaricensis Klatt, Bull. Soc. Bot. Belg. 31¹: 201. 1892, as to synonym.

Montanoa serrata Rusby, Deser. New S. Amer. Pl. 151. 1920.

San Luis Potosí and Oaxaca. Guatemala to Panama and Colombia; type from Realejo, Nicaragua.

Suffrutescent, 3 to 5 meters high, or herbaceous, erect to reclining or subscandent; stem usually sparsely strigillose; leaves as in no. 1, often cuneate at base; heads and achenes as in no. 2. "Flor amarilla" (El Salvador); "árnica" (Guatemala).

4. **Hymenostephium superaxillare** Blake, Proc. Biol. Soc. Washington 37: 57. 1924.

Known only from the type locality, La Bajada, Tamazula, Durango.

Herbaceous, at least above; stem almost glabrous; branches superaxillary; leaves much as in no. 1; heads usually ternate, the peduncles 2.5 to 8 cm. long; involucre 3-seriate, the phyllaries ovate, acute or acuminate, the herbaceous tips usually spreading; achenes glabrous, epappose.

70. PODACHAENIUM Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 98. 1852.

REFERENCE: Blake, Contr. Gray Herb. n. ser. 52: 50. 1917.

1. **Podachaenium eminens** (Lag.) Schultz Bip. Flora 44: 557. 1861.
Ferdinanda eminens Lag. Gen. & Sp. Nov. 31. 1816.
Podachaenium paniculatum Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 99. 1852.
Dicalymma fragrans Lem. Ill. Hort. 2: Misc. 37. f. 1-3. 1855.
Cosmophyllum cacaliaefolium Koch & Bouché, Ind. Sem. Hort. Berol. 1854: 12. 1854; Walp. Ann. Bot. 5: 219. 1858.

Sinaloa to Veracruz and Oaxaca; type from Mexico, without definite locality. Guatemala to Costa Rica.

Stout shrub, up to 8 meters high, sordid-tomentulose; leaves opposite, or the upper alternate, petioled; blades ovate to suborbicular, up to 30 cm. long and wide, entire or angulate-toothed or lobed, green above, griseous-tomentulose beneath; heads very numerous in a terminal panicle, 1.5 to 2.5 cm. wide; rays white, disk yellow; achenes compressed, about 2 mm. long, with whitish stipitiform base; pappus of 2 awns and several squamellae. "Tacote" (Sinaloa); "tora" (Costa Rica.)

In Sinaloa the fragrant leaves are applied as poultices to wounds.

71. ACHAENIPODIUM T. S. Brandeg. Zoe 5: 239. 1906.

1. **Achaenipodium discoideum** T. S. Brandeg. Zoe 5: 239. 1906.

Known only from the type locality, Mount Ixtaccihuatl, State of Mexico.

Suffrutescent; stem hirsute; leaves opposite, short-petioled, the blades lanceolate, 10 to 14 cm. long, 2 to 3 cm. wide, acuminate, serrate, penninerved, griseous-pilose beneath; heads panicled, yellow, discoid, about 7 mm. wide; achenes compressed, long-stipitate, about 5 mm. long, 1 mm. wide; pappus of 2 setiform awns.

72. ZEXMENIA Llave in Llave & Lex. Nov. Veg. Descr. 1: 13. 1824.

REFERENCE: W. W. Jones, A revision of the genus *Zexmenia*, Proc. Amer. Acad. 41: 143-167. 1905.

Shrubs or herbs; leaves opposite, rarely alternate, usually ovate, serrate, and petiolate; heads solitary, umbellate-cymose, or panicled, radiate, yellow (the rays saffron in one species); involucre 2 to 5-seriate, graduate or subequal, the phyllaries usually ovate or oblong and with herbaceous tips; rays fertile; receptacle paleaceous; disk achenes more or less compressed, mostly oblong or obovate, acute-margined or sometimes winged; pappus of 2 or 3 awns and several usually more or less connate squamellae, the latter sometimes reduced to an entire crown or obsolete.

Heads solitary or ternate at tip of stem, long-peduncled; peduncles mostly 5 to 25 cm. long.

Leaves densely canescent-tomentose beneath.

Leaves toothed.....19. *Z. pringlei*.

Leaves entire.....20. *Z. gnaphalioides*.

Leaves not tomentose beneath.

Leaves smaller, not over 5 cm. long.

Leaves chiefly alternate, entire.....21. *Z. brevifolia*.

- Leaves opposite, toothed.
 Involucre several-seriate-----18. *Z. lantanifolia*.
 Involucre 2-seriate-----22. *Z. strigosa*.
- Leaves large, mostly 10 cm. long or more.
 Leaves densely and rather softly appressed- or incurved-pilose beneath.
 Awns continuous with the very narrow, winglike margins of the achene; phyllaries mostly oblong-----3. *Z. crocea*.
 Awns not continuous with the margins of the achene; phyllaries lanceolate-----22. *Z. strigosa*.
- Leaves sparsely and harshly strigillose, hispidulous, or hirsute beneath.
 Outer phyllaries mostly oval or suborbicular, rounded or rarely acutish at apex-----1. *Z. ghiesbreghtii*.
 Outer phyllaries ovate, usually acuminate-----2. *Z. greggii*.
- Heads usually numerous in umbelliform cymes, or paniced, if sometimes ternate then on pedicels less than 5 cm. long (rarely up to 5.8 cm. in no. 7).
 Leaves elliptic or elliptic-oblong, 1.5 cm. wide or less, strongly 3-nerved.
 17. *Z. seemannii*.
- Leaves ovate or lance-ovate, usually wider, triplinerved.
 Petioles very short, 3 mm. long or less.
 Branches hirsute-pilose with loosely spreading hairs; leaves shallowly cordate at base-----16. *Z. cordifolia*.
 Branches strigose or strigillose; leaves rounded at base.
 Heads 1 to 5, the pedicels mostly 2 to 5.8 cm. long----7. *Z. fruticosa*.
 Heads numerous, the pedicels 1 to 2 cm. long---15. *Z. microcephala*.
- Petioles of the main leaves more than 5 mm. long.
 Heads numerous in close terminal umbelliform cymes or cymose panicles.
 Heads larger, the disk in anthesis 7 to 10 mm. thick.
 Pedicels usually 2 cm. long or less; petioles 1 cm. long or less.
 5. *Z. michoacana*.
 Pedicels usually over 2 cm. long; petioles 1 to 3.5 cm. long.
 8. *Z. frutescens*.
- Heads smaller, the disk in anthesis usually less than 5 mm. thick.
 Phyllaries (at least the outer) acuminate or subacuminate, the tips usually spreading.
 Involucre 9 to 10.5 mm. high; pedicels densely spreading-hirsute, 1.4 cm. long or less-----9. *Z. aggregata*.
 Involucre 9 mm. high or less; pedicels strigose or strigillose, usually 2 to 5 cm. long.
 Involucre 7 to 9 mm. high; heads 3 to 6-----10. *Z. gracilis*.
 Involucre 6 mm. high or less; heads usually more numerous.
 11. *Z. fasciculata*.
- Phyllaries obtuse to broadly rounded (the outermost sometimes acute or acutish), the tips appressed.
 Phyllaries (except the two outermost) all with very broadly rounded tips-----14. *Z. rotundata*.
 Phyllaries obtuse or rarely acutish.
 Awns longer than the body of the disk achenes, conspicuously exerted in the fruiting heads-----12. *Z. ceanothifolia*.
 Awns shorter than the body of the disk achenes, not exerted in fruit-----13. *Z. gradata*.
- Heads several or numerous and loosely paniced, or in terminal cymes of 3 to 5, not numerous and umbelled.
 Involucre 8 to 15 mm. high, the outermost phyllaries with ovate base and abruptly narrower, equal or longer, spreading, herbaceous tips-----24. *Z. leucactis*.

Involucre shorter, or else the phyllaries not with ovate base and abruptly narrowed, long, herbaceous tips.

Involucre in anthesis 1 cm. thick or more; phyllaries broadly ovate or oval, with squarrose, herbaceous tips-----4. *Z. squarrosa*.

Involucre in anthesis less than 1 cm. thick; phyllaries usually ovate and without squarrose herbaceous tips.

Achenes with true wings-----23. *Z. scandens*.

Achenes not with true wings, but usually narrowly wing-margined.

Young branchlets densely spreading-hirsute-5. *Z. michoacana*.

Young branchlets sparsely strigose or nearly glabrous.

6. *Z. elegans*.

1. *Zexmenia ghiesbreghtii* A. Gray, Pl. Wright. 1: 113. 1852, as *Z. ghiesbreghtii*.

Sinaloa to Guerrero; type from Mexico, without definite locality.

Suffrutescent (?), 1.3 to 3 meters high; stem strigillose; leaves subsessile, ovate or lance-ovate, mostly 9 to 13.5 cm. long, 2 to 5 cm. wide, acuminate, serrate or serrulate, rough on both sides; heads 1 to 5, terminal and in the upper axils, large; peduncles usually 5 to 18 cm. long; involucre 1.2 to 1.8 cm. high, strigose and strigillose. "Hierba del pasmo" (Sinaloa).

2. *Zexmenia greggii* A. Gray, Pl. Wright. 1: 113. 1852.

Jalisco; type collected "between the City of Mexico and Mazatlán."

Suffrutescent, 2 to 3.3 meters high, similar in most characters to *Z. ghiesbreghtii*; outer and middle phyllaries triangular-ovate, acuminate.

3. *Zexmenia crocea* A. Gray, Pl. Wright. 1: 114. 1852.

Zexmenia stenantha Hemsl. Biol. Centr. Amer. Bot. 2: 174. 1881.

Morelos to Michoacán and Oaxaca; type from Mexico, without definite locality.

Suffrutescent or truly shrubby, 0.6 to 2.5 meters high; younger branches and peduncles varying from densely pilose to strigose; petioles usually very short, sometimes 1 cm. long; blades ovate, the larger 5 to 10.5 cm. long, acuminate, usually subcordate at base, serrate, rough above, rather softly and densely griseous-pubescent beneath; involucre 1.5 to 2 cm. high, subequal or obgraduate, the phyllaries few, oblong or obovate, with long loose herbaceous tips; rays orange or reddish yellow.

4. *Zexmenia squarrosa* Greenm. in W. W. Jones, Proc. Amer. Acad. 41: 151. 1905.

Guerrero and Michoacán; type from mountains above Iguala, Guerrero.

Shrub 1 to 2 meters high; branches strigose or strigillose; petioles 1 to 1.5 cm. long; blades ovate, 4.5 to 7.5 cm. long, 2.5 to 6 cm. wide, acute or acuminate, cuneate at base, serrate, rough above and usually beneath; heads 1 to 5, cymose, on pedicels 4.5 cm. long or less; involucre 1.1 to 1.4 cm. high, the phyllaries strongly graduate, broadly suborbicular-ovate or oval, hirsute-pilose, with mostly obtuse squarrose herbaceous tips.

5. *Zexmenia michoacana* Blake, Contr. U. S. Nat. Herb. 22: 631. 1924.

Michoacán; type from Loma Santa María, near Morelia.

Shrub; branchlets densely hirsute-pilose with spreading hairs; petioles 2 to 10 mm. long; blades ovate, 5 to 10 cm. long, 2 to 5.5 cm. wide, broadly rounded to cuneate at base, rough or roughish on both sides; heads medium-sized, in umbellate clusters of 1 to 6, the pedicels spreading-hirsute-pilose, 1 to 3.5 cm. long; involucre 7 to 10 mm. high, the outer phyllaries mostly triangular-ovate, obtuse to subacuminate, herbaceous above, mostly appressed, the inner oblong or oval-oblong, rounded.

6. *Zexmenia elegans* Schultz Bip.; W. W. Jones, Proc. Amer. Acad. 41: 157. 1905.

Veracruz; type from Mirador.

Shrub; branches sparsely erect-hirsute, glabrate; petioles 5 to 7 mm. long; blades ovate or lanceolate, 6 to 10 cm. long, 1.5 to 3 cm. wide, acuminate, cuneate at base, smoothish above, sparsely strigose on the veins beneath; heads ternate, the pedicels 8 to 22 mm. long; involucre 9 mm. high, the outermost phyllaries lanceolate or lance-ovate, acuminate, the inner broader, obtuse.

7. **Zexmenia fruticosa** Rose, Contr. U. S. Nat. Herb. 1: 103. 1891.

Known only from the type locality, Alamos, Sonora.

Shrub 2.5 meters high; branches sparsely strigillose; leaves short-petioled, lanceolate to ovate, 5 to 10 cm. long, 1.4 to 2.8 cm. wide, acuminate, serrate, scabrous, hispid beneath; heads 1 to 5, cymose, the pedicels 1.2 to 5.8 cm. long; involucre 8 to 10 mm. high, the outer phyllaries lanceolate or ovate, acute, strigose, the inner longer, strigillose and ciliate.

8. **Zexmenia frutescens** (Mill.) Blake, Contr. Gray Herb. n. ser. 52: 50. 1917.

Bidens fruticosa L. Sp. Pl. 833. 1753. Not *Zexmenia fruticosa* Rose, 1891.

Verbesina fruticosa L. Sp. Pl. ed. 2. 1271. 1763, in part.

Bidens frutescens Mill. Gard. Dict. ed. 8. *Bidens* no. 4. 1768.

Zexmenia costaricensis Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 95. 1852.

Zexmenia nicaraguensis C. Muell. in Walp. Ann. Bot. 5: 226. 1858.

Narvalina fruticosa Urban, Symb. Antill. 5: 265. 1907, as to name-bringing synonym only.

Zexmenia purpusii T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 75. 1914.

Zexmenia frutescens genuina Blake, Contr. Gray Herb. n. ser. 52: 51. 1917.

Chiapas. Guatemala to Panama; type from "Cartagena."

Shrubby or "arborescent," up to 8 meters high; branches glabrous or somewhat pubescent and glabrate; leaf blades ovate, 6 to 16 cm. long, 2 to 6.5 cm. wide, acuminate, cuneate at base, serrate, rough above, from nearly glabrous to strigose or hispidulous beneath; heads medium-sized, usually numerous in umbelliform cymes, the pedicels hispidulous, usually 2 to 5 cm. long; involucre 7 to 12 mm. high, few-seriate, subequal or somewhat graduate, the phyllaries mostly oblong and obtuse, the outer sometimes ovate and acute or acuminate. "Tisate" (El Salvador); "faciscón" (Guatemala).

In El Salvador the white ashes derived from the wood are used by spinning women to keep the fingers smooth. In Guatemala the plant is said to furnish a medicine for infantile fevers. The species has been reported from Yucatán with the name "sactah" or "zactah."

9. **Zexmenia aggregata** Blake, Contr. U. S. Nat. Herb. 22: 634. 1924.

Known only from the type locality, Santa Catarina, Oaxaca.

Shrub; branchlets densely spreading-hirsute; petioles 4 to 6 mm. long; blades ovate, 4 to 5.5 cm. long, 1.8 to 2.5 cm. wide, acuminate, cuneate at base, serrulate, rough above, rather softly hirsute-pilose beneath; heads in close umbelliform cymes, the pedicels densely spreading-hirsute, 1.4 cm. long or less; involucre 9 to 10.5 mm. high, the phyllaries subequal, lance-ovate, hispid-pilose, with acuminate herbaceous tips.

10. **Zexmenia gracilis** W. W. Jones, Proc. Amer. Acad. 41: 154. 1905.

Colima (type locality) and Michoacán or Guerrero.

Shrub 2 to 3 meters high; branches sparsely strigillose; petioles 1 to 1.5 cm. long; blades lanceolate to ovate, 5 to 11.5 cm. long, 2 to 4 cm. wide, acuminate, at base acuminate to rounded, serrate, sparsely tuberculate-strigose above, sparsely strigillose beneath; heads in terminal umbelliform cymes of 3 to 7, also solitary in the upper axils, the pedicels 1.5 to 8 cm. long, strigillose; involucre 7 to 9 mm. high, graduate, the outer and middle phyllaries lanceolate or lance-ovate, with mostly spreading, acuminate, herbaceous tips.

- 11. *Zexmenia fasciculata*** (DC.) Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856.

Lipochaeta fasciculata DC. Prodr. 5: 610. 1836.

Sinaloa and Chihuahua to Tamaulipas, south to Jalisco and San Luis Potosí; type from Tula, Tamaulipas.

Shrub; branches strigillose, glabrate; petioles mostly 1 to 2.2 cm. long; blades lanceolate to ovate, 6 to 14 cm. long, 1.5 to 6 cm. wide, acuminate, cuneate at base, serrate, rough above, sparsely to densely hispidulous or strigose beneath; heads small, usually numerous in umbelliform cymes, the pedicels strigose, 1 to 3 cm. long; involucre 5 to 6 mm. high, slightly graduate, the outer and middle phyllaries lance-ovate or ovate, with acuminate or subacuminate, loose, herbaceous tips.

- 12. *Zexmenia ceanothifolia*** (Willd.) Schultz Bip. in Seem. Bot. Voy. Herald 305. 1856.

Verbesina ceanothifolia Willd. Sp. Pl. 3: 2225. 1804.

Lipochaeta umbellata DC. Prodr. 5: 610. 1836.

Jalisco and Guanajuato to Veracruz and Oaxaca; type from Acapulco, Guerrero.

Shrub 2 to 3.3 meters high; branches strigose, glabrate; petioles 3 to 12 mm. long; blades ovate to lance-oblong, 6 to 11.5 cm. long, 2 to 5 cm. wide, acuminate, cuneate at base, rough and rugose above, reticulate and strigillose to short-hispid beneath; heads as in *Z. fasciculata*; involucre 5 to 7 mm. high, strongly graduate, the phyllaries broadly ovate to oval, obtuse to merely acute or apiculate.

- 13. *Zexmenia gradata*** Blake, Contr. U. S. Nat. Herb. 22: 632. 1924.

Sinaloa; type from Lodiago.

Shrub, up to 3 meters high; branches strigose or strigillose; petioles 4 to 12 mm. long; blades ovate to oblong-elliptic, 7 to 12.5 cm. long, 2.3 to 5.3 cm. wide, acuminate, at base cuneate to rounded-cuneate, rough above, beneath densely and rather softly hirsute-pilose on all the veins and veinlets, sometimes also between them, with usually spreading or divergent hairs; heads small, in umbelliform clusters, the pedicels strigillose, mostly 7 to 15 mm. long; involucre 6 to 7.5 mm. high, strongly graduate, the phyllaries ovate to broadly oval or suborbicular, obtuse to acute.

- 14. *Zexmenia rotundata*** Blake, Contr. U. S. Nat. Herb. 22: 632. 1924.

Known only from the type locality, Huasemote, Durango.

Shrub; branchlets sparsely strigillose; petioles 6 to 8 mm. long; blades lance-ovate, 5.5 to 8 cm. long, 2 to 2.8 cm. wide, acuminate, cuneate at base, sparsely hirsute on both sides; heads small, in terminal umbelliform cymes of 3 to 6; involucre 8 to 9 mm. high, strongly graduate, the phyllaries suborbicular to oval, with rounded thin-herbaceous tips.

- 15. *Zexmenia microcephala*** Hemsl. Biol. Centr. Amer. Bot. 2: 173. 1881.

Lipochaeta umbellata conferta DC. Prodr. 5: 610. 1836.

Zexmenia ceanothifolia conferta A. Gray; W. W. Jones, Proc. Amer. Acad. 41: 155. 1905.

Tepic and Morelos; type from San Blas, Tepic.

Shrub; branches strigose, glabrate; leaves sessile, oblong or oval-elliptic to ovate or lance-ovate, 3.5 to 10 cm. long, 1.5 to 3.8 cm. wide, acute, at base rounded, smoothish above, strigillose beneath; heads numerous in close umbelliform cymes or cymose panicles, the pedicels strigillose, 1 to 2 cm. long; involucre campanulate, 6 to 8 mm. high, graduate, the phyllaries oblong or oval, obtuse or apiculate, or the outermost acute.

- 16. *Zexmenia cordifolia*** Blake, Contr. U. S. Nat. Herb. 22: 633. 1924.

Known only from the type locality, near Acaponeta, Tepic.

Shrub; branches densely sordid-pilose with spreading hairs, glabrate; leaves subsessile, ovate, 5 to 6 cm. long, 2.8 to 3.5 cm. wide, acute, shallowly cordate at base, roughish above, strigose and strigillose beneath; heads small, in umbelliform cymes; pedicels 6 to 27 mm. long; involucre 8 mm. high, strongly graduate, the phyllaries ovate to oval, appressed, the outermost acute, the others obtuse.

17. *Zexmenia seemannii* A. Gray, Pl. Wright. 1: 114. 1852.

Sonora, Sinaloa, Durango, and Tepic; type from Cerro de Pinal, Sinaloa.

Shrub about 1 meter high; branches strigillose; petioles 3 to 10 mm. long; blades linear-elliptic to linear-oblong or oblong-lanceolate, 4 to 10 cm. long, 7 to 15 mm. wide, obtuse to acuminate, cuneate at base, strongly 3-nerved, shining, sparsely strigose or strigillose; heads medium-sized, in terminal umbelliform cymes of 3 to 5, the pedicels 12 mm. long or usually less; involucre 1 to 1.2 cm. high, strongly graduate, the phyllaries mostly suborbicular-oval to oblong, the rounded outer and middle ones with short, thick-herbaceous, rather loose tips.

18. *Zexmenia lantanifolia* (Schauer) Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856.

Lipochaeta lantanifolia Schauer, Linnaea 19: 729. 1847.

Tamaulipas and San Luis Potosí to Hidalgo; type from Zimapán, Hidalgo.

Shrub; branchlets spreading or ascending-hispidulous, glabrate; petioles 5 to 10 mm. long; blades ovate, 1.8 to 4.5 cm. long, 1 to 2.8 cm. wide, acute, cuneate to truncate or subcordate at base, rough above, hirsute or hispid and often griseous beneath; heads solitary, leafy-bracted, rather large, the peduncles 2.5 to 7.5 cm. long; proper involucre 8 to 10 mm. high, campanulate-subglobose, the phyllaries ovate to lance-oblong, mostly acute or acuminate, the outer with usually appressed herbaceous tips.

19. *Zexmenia pringlei* Greenm. Proc. Amer. Acad. 33: 489. 1898.

Puebla; type from Tehuacán.

Shrub; branchlets canescently arachnoid-tomentose, glabrescent; petioles about 5 mm. long; blades deltoid-ovate, 1.3 to 3.5 cm. long, 1 to 2.5 cm. wide, acute or obtuse, cordate at base, rugose and green above, canescently lanate-tomentose beneath; heads solitary, rather large, leafy-bracted, the peduncles 5 to 17 cm. long; proper involucre about 10 mm. high, the inner phyllaries oblong, acute or acuminate, arachnoid-ciliate.

20. *Zexmenia gnaphalioides* A. Gray, Proc. Amer. Acad. 15: 36. 1879.

Known only from the type locality, between San Luis Potosí and Tampico.

Shrub, floccose-lanate; leaves short-petioled, deltoid-ovate or cordate-lanceolate, 1.2 to 1.8 cm. long, acute, entire, revolute-margined, above sericeous-hispidulous, beneath pannose-tomentose; heads solitary, about 1.2 cm. thick, leafy-bracted, on long peduncles; phyllaries oblong to linear, obtuse, appressed. (Description compiled.)

21. *Zexmenia brevifolia* A. Gray, Pl. Wright. 1: 112. 1852.

Chihuahua and Coahuila, south to Zacatás and San Luis Potosí. Texas; type collected between the Limpio and Rio Grande.

Shrub about 1 meter high, cinereously strigillose or retrorse-hispidulous; leaves short-petioled, suborbicular to ovate, 1.8 cm. long and 1.3 cm. wide or smaller, obtuse or rounded, broadly rounded to subcordate at base, entire, harshly tuberculate-strigillose or hispidulous; heads medium-sized, solitary, long-peduncled; involucre 6 to 10 mm. high, subequal or graduate, the outer and middle phyllaries mostly obovate or spatulate, the tips herbaceous, spreading.

22. *Zexmenia strigosa* (DC.) Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856.

Lipochaeta strigosa DC. Prodr. 5: 610. 1836.

Known only from the type locality, near Tehuantepec, Oaxaca.

Suffruticose; branches nearly glabrous; leaves short-petioled, lance-ovate, acuminate, serrulate, sparsely strigose above, appressed-villous beneath; peduncles monocephalous; involucre 2-seriate, the outer phyllaries foliaceous, strigose; achenes slender, 5 to 7 mm. long. (Description compiled.)

23. *Zexmenia scandens* Hemsl. Biol. Centr. Amer. Bot. **2**: 174. 1881.

Zexmenia trachylepis Hemsl. Biol. Centr. Amer. Bot. **2**: 175. 1881.

Zexmenia dulcis Coulter, Bot. Gaz. **16**: 99. 1891.

Verbesina sylvicola T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 419. 1924.

Veracruz and Tabasco to Chiapas; type from Valley of Córdoba, Veracruz. Guatemala.

Shrub, scandent or subscandent; branches sordidly tomentose-pilose or hispid-pilose; petioles 5 to 15 mm. long; blades ovate or oblong-ovate, 7.5 to 11.5 cm. long, 3 to 5 cm. wide, acuminate or acute, rounded or cuneate-rounded at base, serrate, rough above, sordidly hirsute-pilose or hispid beneath; heads usually numerous and cymose-panicled, sometimes in cymes of 1 to 3, medium-sized, the pedicels usually 1 to 5 cm. long; involucre 5 to 7 mm. high, subequal or graduate, the phyllaries mostly ovate to oblong or oval, obtuse or sometimes acute, with short, often spreading, subherbaceous tips; achenes winged.

24. *Zexmenia leucactis* Blake, Journ. Bot. Brit. & For. **53**: 307. 1915.

Zexmenia chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 197. 1915.

Chiapas. Guatemala; type from Retahuleu.

Shrub about 2.5 meters high; branches densely sordid-pilose, glabrate; petioles 7 to 15 mm. long; blades ovate or oblong-ovate, 6 to 11 cm. long, 2.8 to 4 cm. wide, acuminate, cuneate or rounded at base, serrate, harsh above, densely and softly griseous-pilosulous beneath; heads medium-sized, few, loosely cymose, the pedicels sordid-pilose, 1 to 4 cm. long; rays yellow; involucre about 3-seriate, obgraduate, the outermost phyllaries with ovate base and much narrower and longer, loosely spreading, acuminate, herbaceous tips, the innermost much shorter, unappendaged; achenes winged.

DOUBTFUL SPECIES.

ZEXMENIA IMBRICATA Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856.

Mexico, without definite locality.

Suffruticose, canescent, the stem glabrescent; petioles 1.6 cm. long; blades triangular-ovate, 10 cm. long, 5 cm. wide and more, acute, subcordate at base, dentate, scabrous; heads in the upper axils, about equaling the pedicels; involucre 6 mm. high, graduate, the phyllaries ovate-linear, obtuse, scabrous; achenes winged. (Description compiled.)

ZEXMENIA LINDENII Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856.

Lasianthaea lindenii Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856, as synonym.

Known only from the type locality, Mirador, Veracruz.

Leaves alternate, elliptic-lanceolate, 9 cm. long, 1.8 to 2.5 cm. wide, attenuate at each end, petioled, serrate, featherveined, harsh above, tomentose beneath; heads numerous. (Description compiled.)

Perhaps a species of *Verbesina*.

ZEXMENIA MACROCEPHALA (Hook. & Arn.) Hemsl. Biol. Centr. Amer. Bot. **2**: 173. 1881.

Lipochaeta macrocephala Hook. & Arn. Bot. Beechey Voy. 436. 1840-41.

Closely allied to *Z. ghiesbreghtii* A. Gray, and perhaps identical; type from Tepic.

ZEXMENIA MONOCEPHALA (DC.) Heynh. Nomencl. **2**: 772. 1846.

Lipochaeta monocephala DC. Prodr. **5**: 610. 1836.

Mexico, without definite locality (type); Veracruz (according to W. W. Jones).

Shrub; stem glabrous; petioles 5 to 13 mm. long, villous; blades lance-ovate, 2 to 10 cm. long, 0.5 to 5 cm. wide, acuminate, rounded or acutish at base, serrate, scabrous above, sparsely strigillose beneath; peduncles solitary, moncephalous, shorter than the upper leaves; heads 15 mm. high; involucre campanulate, 1 to 1.5 cm. wide, the phyllaries about 2-seriate, few, ovate, submembranaceous; achenes margined; squamellae well developed. (Description compiled.)

ZEXMENIA SERRATA Llave in Llave & Lex. Nov. Veg. Descr. 1: 13. 1824.

Known only from the type locality, San José del Corral, Mexico.

Sarmentose shrub 4 meters high; branches pubescent; leaves opposite, petioled, sublanceolate, serrate, rough on both sides, the younger pubescent beneath; heads in umbelliform cymes; involucre 2-seriate, the phyllaries few, ovate, recurved at apex; rays 10 to 12. (Description compiled.)

73. OTOPAPPUS Benth. (in Benth. & Hook. Gen. Pl. 2: 380. 1873, hyponym) in Hook. Icon. Pl. 12: 47. *pl. 1153*. 1873.

REFERENCE: Blake, Journ. Bot. Brit. & For. 53: 229-235. 1915.

Shrubs; leaves opposite; heads radiate or discoid, yellow; involucre 3 to 6-seriate, graduate, the phyllaries indurate, often herbaceous-tipped; rays when present fertile; achenes compressed, 2-winged, the wings decurrent on the awns, the inner much larger; pappus of 2 awns and a lacerate corona of connate squamellae.

Heads radiate.

Leaves strigillose but smooth to the touch above, the hairs not tuberculate-based.

Pedicels 1 to 3 cm. long.....1. **O. verbesinoides**.

Pedicels 2 to 7 mm. long.

Outer phyllaries with conspicuous, spreading or reflexed, spatulate, herbaceous tips.....2. **O. trinervis**.

Outer phyllaries without conspicuous spatulate herbaceous tips.

4. **O. microcephalus**.

Leaves rough above with tuberculate-based hairs.

Branches and pedicels densely spreading-hispidulous.....6. **O. pringlei**.

Branches and pedicels strigillose.

Rays 1 cm. long; outer phyllaries with spreading or reflexed, spatulate, herbaceous tips 5 to 13 mm. long.....5. **O. scaber**.

Rays 2 to 6 mm. long; outer phyllaries without conspicuous spatulate herbaceous tips.

Heads 1.2 to 1.5 cm. wide.....3. **O. salazari**.

Heads 6.5 to 8 mm. wide.....4. **O. microcephalus**.

Heads discoid.

Leaves 3 to 5.5 cm. long; branches hispidulous.....7. **O. xanthocarphus**.

Leaves 6.5 to 13.5 cm. long; branches loosely pilose.....8. **O. robustus**.

1. Otopappus verbesinoides Benth. in Hook. Icon. Pl. 12: 47. *pl. 1153*. 1873.

Perymenium sartori Schultz Bip.; Klatt, Leopoldina 23: 144. 1887, as synonym.

Veracruz and Chiapas. Guatemala to Costa Rica; type from Chontales, Nicaragua.

Scandent or straggling shrub; stem strigillose; leaf blades ovate to lance-ovate or oblong-elliptic, 7 to 18 cm. long, 1.8 to 4.5 cm. wide, repand-dentate to serrulate, acuminate; heads 1.5 to 2.3 cm. wide, in cymose panicles of 3 to 5 at tips of stem and branches, or solitary in the upper axils; outer phyllaries with reflexed, linear to spatulate, herbaceous tips.

2. Otopappus trinervis Blake, Journ. Bot. Brit. & For. 53: 231. 1915.

Known only from the type locality, Finca Irlanda, Chiapas.

Branching shrub; stem strigillose; leaf blades oblong-ovate or ovate-lanceolate, 7 to 11 cm. long, obscurely serrulate; heads 1 cm. wide; rays very small; outer phyllaries with spreading spatulate tips.

3. **Otopappus salazari** Blake, Proc. Biol. Soc. Washington **32**: 192. 1919.

Southern Sinaloa; type from Ixtagua.

Scandent shrub; stem strigillose; leaf blades lance-ovate, 9.5 to 12 cm. long, 2.5 to 4 cm. wide, denticulate, slightly rough-strigillose above with somewhat tuberculate-based hairs; heads about 13 in a ternately divided panicle; phyllaries with slightly spreading apex; rays about 5 mm. long.

4. **Otopappus microcephalus** Blake, Journ. Bot. Brit. & For. **53**: 232. 1915.

Colima and Guerrero; type from Manzanillo, Colima.

Shrub 2 to 3 meters high; stem strigillose; leaf blades ovate, 4.5 to 9 cm. long, rough or roughish above; heads rather numerous, cymose-panicled; phyllaries with small spreading herbaceous tips; rays about 2 mm. long.

5. **Otopappus scaber** Blake, Contr. U. S. Nat. Herb. **22**: 636. 1924.

Known only from the type locality, Apazote, near Yohaltún, Campeche.

Apparently scandent; leaf blades oblong-ovate, 5 to 9 cm. long, 2 to 3.5 cm. wide, serrulate, rough on both sides; heads and involucre much as in *O. verbesinoides*, 2.7 to 3 cm. wide.

6. **Otopappus pringlei** (Greenm.) Blake, Journ. Bot. Brit. & For. **53**: 232. 1915.

Otopappus epaleaceus pringlei Greenm. Proc. Amer. Acad. **40**: 42. 1904.

Morelos and Guerrero; type from Cuernavaca, Morelos.

Shrub; leaf blades ovate, 4.5 to 7.5 cm. long, dentate, very harsh above, rather densely hispidulous and strongly prominulous-reticulate beneath; heads 1 to 1.2 cm. wide, in terminal cymes of 5 to 7; phyllaries with minute herbaceous tips; rays about 2 mm. long.

7. **Otopappus xanthocarpus** T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 394. 1909.

Known only from the type locality, Cerro de Castillo, near Zapotitlán, Puebla.

Trichotomously branched shrub; leaf blades ovate or ovate-oblong, 1.2 to 2.7 cm. wide, acute, serrate-dentate, very rough above, roughish-hispidulous beneath; heads about 1 cm. thick, in terminal 3 or 5-headed cymes; involucre 5 mm. high, the outer phyllaries herbaceous.

8. **Otopappus robustus** Hemsl. Biol. Centr. Amer. Bot. **2**: 191. pl. 49. 1881.

Zexmenia robusta O. Hoffm. in Engl. & Prantl, Pflanzenfam. **4**⁵: 230. f. 116, O. 1890.

Known only from the type locality, Valley of Córdoba, Veracruz.

Scandent shrub; leaf blades ovate, acuminate, roughish above, densely and rather softly pilosulous beneath; heads rather numerous, cymose-panicled; involucre 6 to 7 mm. high.

74. **OYEDAEA** DC. Prodr. **5**: 576. 1836.

REFERENCE: Blake, Revision of the genus *Oyedaea*, Contr. U. S. Nat. Herb. **20**: 411-422. 1921.

1. **Oyedaea ovalifolia** A. Gray, Proc. Amer. Acad. **5**: 183. 1861.

Oyedaea ampeloides Hemsl. Biol. Centr. Amer. Bot. **2**: 176. 1881.

Veracruz and San Luis Potosí; type from Huautla, Veracruz.

Reclining or scandent shrub, 3 to 6 meters long or more; stem strigillose, glabrate; leaf blades oval to ovate, 8 to 18.5 cm. long, 5 to 8 cm. wide, acute or obtuse, crenate-mucronulate, harshly strigillose above, strigillose beneath, on petioles 5 to 17 mm. long; heads 3 to 5.5 cm. wide, radiate, yellow, several or numerous in an open panicle; involucre 3-seriate, 4 to 5.5 mm. high, of triangular-ovate to oval indurate phyllaries; rays neutral; achenes compressed, 2-winged; pappus of 2 slender awns and about 10 basally united squamellae.

75. **VERBESINA** L. Sp. Pl. 901. 1753.

REFERENCE: Robinson & Greenman, Synopsis of the genus *Verbesina*, with an analytical key to the species, Proc. Amer. Acad. 34: 534-566. 1899.

Shrubs or herbs; leaves opposite or alternate; heads radiate or discoid, solitary to numerous and paniced, usually yellow, sometimes orange or white; involucre usually about 2-seriate, the phyllaries usually unequal and more or less herbaceous; rays usually fertile; achenes strongly compressed, 2-winged; pappus of 2 awns, very rarely wanting.

Rays white or none.

Rays none.

Stem winged; heads many-flowered.

Leaves dentate, the larger usually sinuately lobed or pinnatifid; phyllaries ovate to linear-lanceolate.....1. *V. crocata*.

Leaves serrulate, ovate; phyllaries ovate to oblong.....2. *V. ovatifolia*.

Stem wingless; heads 7 to 9-flowered.

Leaves lance-oblong.....59. *V. pauciflora*.

Leaves ovate or elliptic-ovate.....60. *V. oligantha*.

Rays present, white.

Stem densely puberulous or subtomentose-pubescent.

Stem winged nearly or quite to the inflorescence....56. *V. turbacensis*.

Stem wingless.

Leaves dentate; heads few; phyllaries broadly ovate.

27. *V. auriculata*.

Leaves sinuate-lobed; heads numerous; phyllaries linear to oblanceolate.

55. *V. sublobata*.

Stem glabrous or sparsely puberulous, usually glaucous or glaucescent.

Internodes winged throughout.....57. *V. hypsela*.

Internodes and whole stem wingless.....58. *V. gigantoides*.

Rays present, yellow.

Lamina of the rays 1 to 2.5 cm. long.

Leaf bases decurrent, forming wings on the stem.

Larger leaves sinuately 3-lobed; disk about 2 cm. thick 5. *V. klattii*.

Leaves unlobed; disk much smaller.

Leaves very finely and closely canescent beneath with appressed hairs.

19. *V. neriifolia*.

Leaves rather loosely griseous- or canescent-tomentose or merely puberulent beneath.

Leaves sessile.

Leaves coarsely dentate.....14. *V. coahuilensis*.

Leaves subentire.....21. *V. petrophila*.

Leaves short-petioled.

Leaves canescently pilose-tomentose beneath...20. *V. gracilipes*.

Leaves green and merely puberulent beneath...22. *V. liebmännii*.

Leaf bases not decurrent, the stem wingless.

Leaves canescent-tomentose or finely canescent-sericeous beneath.

Leaves sessile, amplexicaul.....15. *V. hypoleuca*.

Leaves petioled, not amplexicaul.

Leaves densely pilose-tomentose beneath.....20. *V. gracilipes*.

Leaves not densely pilose-tomentose beneath.

Leaves very finely and densely canescent-sericeous beneath; involucre 4 to 5 mm. high.....18. *V. hypoglauc*.

Leaves not densely canescent-sericeous beneath; involucre 5 to 8 mm. high.

Heads long-peduncled; leaf blades lanceolate to ovate, 2 to 7 cm. long.....12. *V. chihuahuensis*.

- Heads on peduncles 2 cm. long or less; leaf blades rhombic-ovate, widest near middle, about 10 cm. long. 17. *V. intermissa*.
 Leaves green or griseous-pubescent beneath.
 Leaves lanceolate to oval-ovate, narrowed to both ends from near the middle.
 Leaves sessile, entire. 21. *V. petrophila*.
 Leaves petioled, serrate or serrulate.
 Leaves griseously subtomentose-pilose beneath; disk in anthesis about twice as high as thick. 16. *V. sororia*.
 Leaves merely puberulous, strigillose, or strigose beneath; disk in anthesis as thick or thicker than high.
 Involucre 7 to 8 mm. high. 17. *V. intermissa*.
 Involucre 3 to 5 mm. high. 22. *V. liebmännii*.
 Leaves chiefly ovate, broad at base or only shortly cuneate.
 Leaves sessile or subsessile, or on short, broadly winged, clasping petioles.
 Leaves on broadly winged auriculate-clasping petioles. 7. *V. palmeri*.
 Leaves sessile or subsessile.
 Leaves chiefly obovate; disk about 1 cm. thick. 21. *V. petrophila*.
 Leaves ovate; disk more than 1 cm. thick.
 Leaves entire or subentire. 6. *V. dissita*.
 Leaves coarsely toothed. 10. *V. peninsularis*.
 Leaves slender-petioled.
 Leaves dull green, not conspicuously reticulate; phyllaries linear to lanceolate. 12. *V. chihuahuensis*.
 Leaves bright green, conspicuously reticulate on both sides; phyllaries oval to obovate. 13. *V. hastata*.
 Lamina of the rays less than 1 cm. long.
 A. Stem more or less winged, or else leaves auriculate at base.
 Stem wingless; leaves auriculate at base.
 Leaves entire or subentire, canescent-tomentose beneath, lanceolate. 25. *V. potosina*.
 Leaves serrate or serrulate, usually green beneath.
 Leaves abruptly contracted into broadly winged auriculate-amplexicaul petioles. 7. *V. palmeri*.
 Leaves gradually narrowed to base.
 Leaves distinctly petioled, the petioles with deciduous auricles at base.
 Leaves strigillose to pilose beneath, chiefly on the veins; pales with spreading or reflexed cuspidate tips. 22. *V. liebmännii*.
 Leaves tomentose-pilosulous beneath; pales blunt or with short erect mucros. 31. *V. oncophora*.
 Leaves sessile or subsessile.
 Leaves distinctly pubescent or tomentose beneath.
 Leaves 2.5 to 15 cm. long, 0.8 to 2.5 cm. wide.
 Leaves about 4 cm. long, acute. 15. *V. hypoleuca*.
 Leaves 5 to 15 cm. long, attenuate. 26. *V. oreopola*.
 Leaves 18 to 27.5 cm. long, 5 to 11 cm. wide. 27. *V. auriculata*.
 Leaves glabrous or sparsely strigillose on the costa beneath.
 Leaves oblong, 3.7 to 5 cm. wide. 23. *V. nelsonii*.
 Leaves lanceolate, 1 to 1.3 cm. wide. 24. *V. otophylla*.

Stem winged.

Leaves densely silky-tomentose beneath.....30. *V. mollis*.

Leaves not silky-tomentose beneath.

Leaves alternate.

Leaves tomentose or tomentulose beneath.

Leaves unlobed.....28. *V. acapulcensis*.

Leaves palmately 3-lobed.....51. *V. fastigiata*.

Leaves subglabrous to puberulent beneath.

Involucre 2 mm. high; stem densely spreading-hispidulous.

47. *V. cymbipalea*.

Involucre 3 to 6 mm. high; stem usually strigillose or erectish-hispidulous.

Leaves oblong, 15 to 20 cm. long, 3.7 to 5 cm. wide.

23. *V. nelsonii*.

Leaves much smaller.

Petioles 2 to 15 mm. long; leaves usually rhombic-ovate.

22. *V. liebmännii*.

Petioles very short or none; leaves lanceolate or lance-oblong.....32. *V. virgata*.

Leaves chiefly opposite.

Leaves unlobed; phyllaries mostly squarrose-tipped; disk 6 to 10 mm. thick or more.

Leaves strigillose beneath.....29. *V. xanthochlora*.

Leaves hispidulous or pilosulous beneath.

Leaves chiefly ovate; disk in anthesis 1 cm. thick or more.

3. *V. sphaerocephala*.

Leaves oblong-lanceolate; disk in anthesis about 6 mm. thick.

4. *V. langlassei*.

Leaves usually 3-lobed or pinnatifid; phyllaries mostly appressed; disk 3 to 6 mm. thick.

Stem broadly winged; phyllaries mostly acute or acuminate.

52. *V. greenmani*.

Stem narrowly winged; phyllaries obtuse.

53. *V. montanoifolia*.

AA. Stem wingless; leaves not auriculate at base.

B. Leaves chiefly opposite.

Leaves bright green, shining at least above, subcoriaceous.

Young branches white-tomentose.....8. *V. oligocephala*.

Young branches not tomentose.....13. *V. hastata*.

Leaves usually dull green, not subcoriaceous.

Leaves trilobate; heads subcylindric in anthesis....54. *V. trilobata*.

Leaves not trilobate; heads broader.

Leaves lance-oblong, about 4 times as long as wide, griseous or canescent beneath.

Leaves finely canescent-strigillose beneath..18. *V. hypoglauca*.

Leaves tomentose or tomentulose beneath.

Leaves tomentulose and prominently reticulate beneath.

36. *V. grayii*.

Leaves tomentose and not prominently reticulate beneath.

37. *V. molinaria*.

Leaves chiefly ovate or lance-ovate, usually much less than 4 times as long as wide.

Heads solitary or few, on usually elongate peduncles.

Branchlets white-tomentose at apex.....8. *V. oligocephala*.

Branchlets not white-tomentose at apex.

Leaves hirsute with subappressed hairs.....11. *V. erosa*.

Leaves scabrous-hispidulous.

Leaves opposite essentially throughout, serrate.

9. *V. leptochaeta*.

Leaves alternate above, coarsely toothed.

10. *V. peninsularis*.

Heads usually numerous, in close cymes or panicles.

Heads subcylindric when young.

Heads 2 to 4; rays about 12.....8. *V. oligocephala*.

Heads 4 to 10; rays about 2.....35. *V. luisana*.

Heads campanulate or subglobose.

Leaves serrate, dentate, or laciniate-lobed, usually densely pubescent beneath.....33. *V. serrata*.

Leaves serrulate, green and sparsely pubescent beneath.

34. *V. resinosa*.

BB. Leaves alternate.

Leaves very densely and finely silvery-strigillose beneath.

42. *V. hypargyrea*.

Leaves not silvery-strigillose beneath.

Heads larger, in fruit 1 to 1.5 cm. thick.

Leaves green and essentially glabrous beneath, except for the strigose or strigillose costa and veins43. *V. persicifolia*.

Leaves more or less pubescent on the surface as well as the veins beneath.

Involucre 7 to 10 mm. high.

Leaves canescent-tomentose beneath.....38. *V. robinsonii*.

Leaves green and finely hispidulous beneath.

10. *V. peninsularis*.

Involucre 6 mm. high or less (rarely higher in *V. olivacea*).

Fruiting pales with cuspidate, mostly recurved tips.

Leaves green and not subtomentose beneath.

22. *V. liebmannii*.

Leaves cinerascently subtomentose beneath.

40. *V. cinerascens*.

Fruiting pales rarely cuspidate, not recurved at tip.

Leaves sessile, obovate-lanceolate; pales acute; pedicels thick and very short.....41. *V. crassipes*.

Leaves usually petioled, lanceolate to lance-oblong; pales acute or obtuse; pedicels mostly slender, not very short.

Pales and phyllaries obtuse or merely acutish; involucre 5 to 7.5 mm. high.....44. *V. olivacea*.

Pales abruptly short-pointed; involucre 3 to 4 mm. high.

Leaves 1 to 2.5 cm. wide.....26. *V. oreopola*.

Leaves 3.2 to 6 cm. wide.....39. *V. chiapensis*.

Heads smaller, in fruit usually 5 to 7 mm. thick.

Tips of the pales recurved, at least in fruit.

Branches glabrous; leaves glabrescent beneath.

45. *V. seemannii*.

Branches densely hispidulous or pilosulous; leaves rather densely hispidulous or pilosulous beneath.

Leaves cinerascently subtomentose-pilosulous beneath.

40. *V. cinerascens*.

Leaves hispidulous beneath.

Leaves lanceolate, 1.4 to 2.2 cm. wide; petioles 1 to 2 mm. long-----46. *V. angustifolia*.

Leaves lance-elliptic, 1.5 to 4 cm. wide; petioles 3 to 6 mm. long-----47. *V. cymbipalea*.

Tips of the pales not recurved.

Leaves strigillose beneath-----50. *V. ortegae*.

Leaves hispidulous or pilosulous beneath.

Leaves very rough above; pedicels spreading-pubescent.

48. *V. abscondita*.

Leaves smooth or smoothish above; pedicels appressed-pubescent-----49. *V. perymenioides*.

1. ***Verbesina crocata*** (Cav.) Less.; DC. Prodr. 5: 617. 1836.

Bidens crocata Cav. Icon. Pl. 1: 66. pl. 99. 1791.

Spilanthus crocata Sims in Curtis's Bot. Mag. 39-40: pl. 1627. 1814.

Platypteris crocata H. B. K. Nov. Gen. & Sp. 4: 201. 1820.

Tepic to Veracruz and Oaxaca; type from Mexico, without definite locality.

Shrubby, sometimes scandent, 2 to 5 meters high, hispidulous or hirsutulous; stems with 4 herbaceous wings; leaves opposite, ovate in outline, the lower or sometimes all deeply pinnatifid, usually 10 to 23 cm. long, the petioles broadly winged; heads few to numerous, long-peduncled, orange-red, 1.5 to 3 cm. thick; involucre graduate. "Capitaneja," "nahuítput" (*Urbina*).

The plant is reported to be used a remedy for wounds.

2. ***Verbesina ovatifolia*** A. Gray, Proc. Amer. Acad. 19: 15. 1883.

Known only from the type locality, Chiapas.

Suffrutescent (?), 2.6 to 3.3 meters high, scabrous; leaves ovate, acute, subsessile, denticulate; heads subcymose, short-peduncled, about 1.2 cm. high; phyllaries small, ovate or oblong, appressed. (Description compiled.)

3. ***Verbesina sphaerocephala*** A. Gray in S. Wats. Proc. Amer. Acad. 22: 428. 1887.

Jalisco and Colima; type from Guadalajara, Jalisco.

Suffrutescent, 2 meters high, hispidulous to pilosulous; stem narrowly 4-winged; leaves opposite, ovate or rhombic-ovate, 7.5 to 14.5 cm. long, 3 to 6 cm. wide, acute or acuminate, subsessile, serrate, rough above, hispidulous or pilosulous beneath; heads few at apex of stem and branches, short-pedicled; involucre 7 to 11 mm. high, graduate, the phyllaries mostly oval or oblong, all but the innermost with blunt squarrose herbaceous tips.

4. ***Verbesina langlassei*** Robinson, Proc. Amer. Acad. 44: 621. 1909.

Known only from the type locality, Sierra Madre of Michoacán or Guerrero.

Similar to *V. sphaerocephala*; leaves lance-oblong, 8 to 13 cm. long, 2.5 to 3.2 cm. wide; heads rather numerous, cymose-panicled at tips of stem and branches; involucre about 6 mm. high, the outer phyllaries broadly obovate, herbaceous, scarcely squarrose.

5. ***Verbesina klattii*** Robins. & Greenm. Proc. Amer. Acad. 34: 538. 1899.

Verbesina heterophylla Klatt, "Arbeit. Bot. Mus. Hamb. 1892-93: 3. 1893."

Not *V. heterophylla* A. Gray, 1883.

Known only from the type locality, mountains near Pátzcuaro, Michoacán.

Suffrutescent, 1.5 to 3.5 meters high, hirsutulous; stem rather broadly winged; leaves alternate, ovate or rhombic-ovate in outline, 10 to 22 cm. long (including the broadly winged petiole), 4 to 11 cm. wide, the larger 3-lobed, denticulate, rough above; heads few, short-pedicled, large; involucre 1 to 1.2 cm. high, the phyllaries ovate to suborbicular, obtuse or obtusish, herbaceous, subequal; rays about 1.4 cm. long.

6. *Verbesina dissita* A. Gray, Proc. Amer. Acad. 20: 299. 1885.

Northern Baja California; type from Todos Santos Bay.

Suffrutescent; stem sparsely strigillose or hispidulous, rather remotely leafy; leaves opposite below, alternate above, ovate, 4 to 5 cm. long, acute, at least the upper sessile and auriculate-clasping at base, entire or remotely denticulate; heads several, large, the disk about 2 cm. wide, the pedicels 2 to 12.5 cm. long; involucre about 1 cm. high, graduate, the phyllaries oblong or obovate, obtuse or rounded, appressed; rays 1.2 to 2 cm. long.

7. *Verbesina palmeri* S. Wats. Proc. Amer. Acad. 24: 56. 1889.

Known only from the type locality, Los Angeles Bay, Baja California.

Suffruticose, about 1.3 meters high, forming large clumps, hispid-scabrous throughout with mostly deciduous spreading hairs with persistent tuberculate bases; leaves opposite; petioles 0.5 to 1.5 cm. long, very broadly winged, auriculate-clasping; blades deltoid-ovate, 3 to 7 cm. long, 2.5 to 4.8 wide, coarsely dentate; heads rather numerous, cymose-panicked, the pedicels 1.5 to 5.5 cm. long; involucre 5 to 6 mm. high, 2-seriate, the phyllaries oblong, obtuse or rounded, with somewhat squarrose herbaceous tips; rays 6 to 10 mm. long.

8. *Verbesina oligocephala* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1200. 1924.

Known only from the type locality, Agua Verde Bay, Baja California.

Shrub about 1 meter high; branchlets white-tomentose; leaves opposite; petioles winged, 5 to 8 mm. long; blades ovate or lance-ovate, 4 to 7 cm. long, acute, cuneate or rounded at base, light green, tuberculate-scabrous; heads 2 to 4 in a terminal cyme hidden by the leaves, the pedicels 4 to 11 mm. long; involucre 3 to 4 mm. high, the phyllaries 2-seriate, ovate-oblong, obtuse, with spreading herbaceous tips; rays orange-yellow, about 6 mm. long. (Description compiled.)

9. *Verbesina leptochaeta* A. Gray, Proc. Amer. Acad. 21: 389. 1886.

Known only from the type locality, near Batopilas, Chihuahua.

Shrubby, 1.5 to 2.5 meters high; leaves opposite, those of the stem deltoid, 10 to 12.5 cm. long, serrate, hispidulous-scabrous, abruptly narrowed into a long narrowly winged petiole; heads subsolitary, rather large; outer phyllaries narrowly oblong, spreading, herbaceous; rays small. (Description compiled.)

10. *Verbesina peninsularis* Blake, Proc. Biol. Soc. Washington 37: 58. 1924.

Known only from the type locality, 20 miles east of San Ignacio, Baja California.

Suffrutescent or fruticose; stem finely hispidulous-pilosulous; leaves opposite below, alternate above; blades triangular-ovate, 9 to 11 cm. long, 4.5 to 5.5 cm. wide, acuminate, cuneately decurrent to the base of the short petiole, coarsely toothed, somewhat hastate-lobed at base, green and hispidulous on both sides, the hairs especially of the upper surface tuberculate-based; heads about 10, the pedicels 1 to 8 cm. long; involucre 7 to 8 mm. high, the phyllaries herbaceous, oblong-ovate, acutish to obtuse, erect; rays about 1 cm. long.

11. *Verbesina erosa* T. S. Brandeg. Proc. Calif. Acad. II. 3: 146. 1891.

Baja California; type from Sierra de San Francisquito.

Suffrutescent; stem spreading-hirsute or hirsutulous; leaves opposite below, alternate above, ovate or lance-ovate, the larger 8 to 11 cm. long, 3 to 7 cm. wide, acuminate, subsessile or on winged petioles 1.8 cm. long or less, sharply serrate or the upper subentire, rough above, hirsute or hirsute-pilose with antrorse hairs beneath; heads few, the pedicels 1 to 8 cm. long; involucre 6 to 8 mm. high, the phyllaries chiefly lanceolate or linear, acute or acuminate.

12. *Verbesina chihuahuensis* A. Gray, Proc. Amer. Acad. 21: 389. 1886.

Verbesina parrasana T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 191. 1911.

Sonora, Chihuahua, Coahuila, and Durango; type from Santa Eulalia Mountains, near Chihuahua.

Shrubby; stem and leaves hispidulous or spreading-pilosulous, sometimes subsericeously appressed-pilose; leaves opposite below, alternate above; petioles narrowly winged, 0.5 to 2 cm. long; blades triangular-ovate or ovate, sometimes lanceolate, 2 to 7 cm. long, 0.8 to 3.5 cm. wide, acute, cuneate to subcordate at base, serrate to coarsely dentate, rarely entire; heads solitary or several, long-peduncled; involucre 5 to 8 mm. high, the phyllaries subequal, linear or lanceolate, acutish to acuminate, somewhat loose; rays usually 1 to 1.5 cm. long.

13. *Verbesina hastata* Kellogg; Curran, Bull. Calif. Acad. **1**: 140. 1885.

Lipochaeta hastata Kellogg, Proc. Calif. Acad. **2**: 106. f. 31. 1863.

Verbesina venosa Greene, Bull. Torrey Club **9**: 110. 1882.

Encelia cedrosensis Rose, Contr. U. S. Nat. Herb. **1**: 17. 1890.

Known only from the type locality, Cedros Island, Baja California.

Shrub; branchlets strigillose; leaves chiefly opposite; petioles narrowly winged, 2 to 15 mm. long; blades rhombic-ovate or ovate, 2.5 to 7.5 cm. long, 1.8 to 5.7 cm. wide, obtuse to acuminate, short-cuneate to subcordate at base, coarsely toothed or sometimes merely hastate-lobed at base, bright green, shining above, reticulate on both sides, strigillose or antrorse-hispidulous; heads few or several; involucre 5 to 7 mm. high, graduate, the phyllaries ovate, obovate, or oblong, obtuse, mostly herbaceous.

14. *Verbesina coahuilensis* A. Gray, Proc. Amer. Acad. **19**: 14. 1883.

Coahuila and Nuevo León: type collected east of Saltillo, Coahuila.

Suffrutescent (?), low, subsimple: stem spreading-hirsute and sessile-glandular; leaves alternate, or opposite below, lance-oblong, 4.5 to 10 cm. long, 1 to 2.3 cm. wide, acutish to acuminate, sessile, decurrent, coarsely and irregularly dentate, green and rough above, griseously subtomentose-pilose beneath; heads solitary or few, pedunculate; involucre about 8 mm. high, the phyllaries slightly graduate, linear, acutish to acuminate, hirsute; rays 1 to 1.7 cm. long.

14a. *Verbesina coahuilensis viridior* Robins. & Greenm. Proc. Amer. Acad. **34**: 546. 1899.

Known only from the type locality, Carneros Pass, Coahuila.

Lower surface of the leaves green and merely scabrous-puberulent.

15. *Verbesina hypoleuca* A. Gray, Proc. Amer. Acad. **15**: 37. 1879.

Known only from the type locality, near city of San Luis Potosí.

Suffrutescent, about 60 cm. high, simple; stem cinereous-puberulous; lowest leaves opposite, the others alternate, lance-oblong or obovate-oblong, 2.5 to 4.5 cm. long, 0.8 to 1.8 cm. wide, dentate, sessile, auriculate-clasping, velvety-puberulous above, canescent-tomentose beneath; heads few, slender-pedicled; phyllaries linear-lanceolate, acuminate, 5 mm. long; rays about 6 mm. long.

16. *Verbesina sororia* A. Gray, Proc. Amer. Acad. **15**: 37. 1879.

San Luis Potosí; type from city of San Luis Potosí.

Suffrutescent (?), tall; stem pilosulous, glabrate below; leaves opposite below or nearly throughout; petioles scarcely winged, 1 cm. long or less; blades lance-elliptic to oval-oblong, 8 to 17 cm. long, 2 to 6.5 cm. wide, acuminate at both ends, acutely serrate or serrulate, scarcely rough above, griseously subtomentose-pilose beneath; heads numerous, cymose-panicled; disk in anthesis 1 to 1.2 cm. high, 5 to 7 mm. thick; involucre 4 to 5 mm. high, the phyllaries few, linear, acute or acutish; rays about 1.2 cm. long.

17. *Verbesina intermissa* Blake, nom. nov.

Coreopsis liebmanni Schultz Bip.; Klatt, Leopoldina **23**: 145. 1887. Not

Verbesina liebmanni Schultz Bip. 1887.

Known only from the type locality, Pelado, Mexico.

Probably shrubby; "stem hirtous"; leaves opposite; petioles about 3 to 8 mm. long; blades rhombic-ovate, 7 to 10 cm. long, 3.5 to 4 cm. wide, acuminate to each end from near the middle, serrate or serrulate, above roughish, strigose

and strigillose, beneath rather densely griseous or subcanescent-strigillose and gland-dotted, glabrescent; heads 3 to 6, cymose or cymose-panicled, the pedicels 1 to 2 cm. long; involucre 7 to 8 mm. high, the outer phyllaries linear, acute, spreading; pales with short erectish points; rays 1.5 cm. long.

Fragments of the type have been examined in the Gray Herbarium.

18. *Verbesina hypoglauca* Schultz Bip.; Klatt, Leopoldina **23**: 144. 1887.

Encelia konzattii Greenm. Proc. Amer. Acad. **39**: 111. 1903.

Puebla and Oaxaca; type from Cumbre de Acalcingo.

Shrub 3 to 5 meters high; branches appressed-puberulent; leaves opposite nearly throughout; petioles about 5 mm. long, naked; blades lance-oblong or elliptic, 4.5 to 9.5 cm. long, 1.5 to 3 cm. wide, acuminate at each end, callous-denticulate, green above, subsericeous-canescient beneath with very dense and short appressed hairs; heads usually numerous, cymose-panicled; involucre 4 to 5 mm. high, the outermost phyllaries the longer, linear to oblanceolate, canescent on back; rays 8 to 12 mm. long.

19. *Verbesina neriifolia* Hemsl. Biol. Centr. Amer. Bot. **2**: 188. 1881.

Chiapas.

Similar to *V. hypoglauca*; stem with narrow herbaceous wings; leaves alternate, pubescent as in *V. hypoglauca*; heads few, short-pedicled, the pedicels usually winged; rays 1 to 1.3 cm. long.

20. *Verbesina gracilipes* Robinson, Proc. Bost. Soc. Nat. Hist. **31**: 269. 1904.

Puebla; type from Tehuacán.

Shrub; branches spreading-pubescent; leaves alternate; petioles 5 mm. long or less, often with auricles or decurrent wings at base; blades elliptic or obovate, 2.5 to 8 cm. long, 1 to 2.5 cm. wide, acute or obtusish, long-cuneate at base, green above, canescently tomentose-pilose beneath; heads 1 to 4, long-peduncled; involucre 5 to 7 mm. high, the outermost phyllaries herbaceous, obovate or oblanceolate, loose; rays 1 to 1.5 cm. long.

21. *Verbesina petrophila* T. S. Brandeg. Univ. Calif. Publ. Bot. **3**: 395. 1909.

Puebla; type from Barranca de Tlacuilosto and San Luis Tultitlanapa.

Shrub 0.5 to 1 meter high; branches tuberculate, often narrowly corky-winged by the decurrent leaf bases; leaves alternate, chiefly obovate or elliptic, 3 to 5 cm. long, 1 to 2 cm. wide, obtuse, narrowed to the sessile base, entire, tuberculate-hispidulous, the hairs mostly deciduous; heads 1 to 5, the pedicels 1.5 to 3.5 cm. long; involucre about 8 mm. high, the phyllaries linear-lanceolate, acuminate, loose; rays about 1 cm. long.

22. *Verbesina liebmannii* Schultz Bip.; Klatt, Leopoldina **23**: 144. 1887.

Verbesina variabilis Robins. & Greenm. Proc. Amer. Acad. **32**: 47. 1896.

Chihuahua to Mexico and Oaxaca; type from Cumbre de Estepa, Oaxaca.

Shrubby, 1 to 1.5 meters high; stem puberulous; leaves chiefly alternate; petioles 2 to 15 mm. long, usually with corky auricles or decurrent wings at base; blades lanceolate to rhombic-ovate, 5 to 11.5 cm. long, 1.5 to 5.5 cm. wide, acuminate or acute at both ends, serrate or serrulate, usually rough above, strigillose to pilose beneath chiefly on the veins; heads several or numerous, cymose-panicled, the pedicels 1 to 3.8 cm. long; involucre about 2-seriate, 3 to 5 mm. high, the phyllaries chiefly ovate or oblong, obtuse or acutish; pales with short, cuspidate, spreading or reflexed tips; rays 7 to 12 mm. long.

23. *Verbesina nelsonii* Robins. & Greenm. Proc. Amer. Acad. **32**: 46. 1896.

Known only from the type locality, between Ayusinapa and Petatlán, Oaxaca.

Herbaceous (?), stout; stem appressed-puberulous; internodes sometimes with a corky wing near summit; leaves oblong, 15 to 20 cm. long, 3.7 to 5 cm. wide, acuminate, auriculate-amplexicaul at base, crenate-serrate, practically glabrous; heads numerous, densely cymose-panicled; disk in fruit 8 to 10 mm. thick; involucre barely 2-seriate, 4 mm. high, the phyllaries oblong, obtusish; pales with spreading or reflexed cusps; rays 4 to 5 mm. long.

24. *Verbesina otophylla* Blake, Contr. U. S. Nat. Herb. 22: 638. 1924.

Known only from the type locality, Hacienda Buena Vista, 20 miles east of Abasolo, Tamaulipas.

Shrub; branches strigillose; leaves alternate, lanceolate or elliptic-lanceolate, 7.5 to 10.5 cm. long, 1 to 1.3 cm. wide, acuminate, sessile and narrowly auriculate-clasping at base, serrate, strigillose above, practically glabrous beneath; heads 5, cymose, the pedicels 6 to 20 mm. long; involucre 6 to 7 mm. high, slightly graduate, the phyllaries oblong, obtuse to acutish, appressed; rays 4.5 mm. long. "Jara."

25. *Verbesina potosina* Robinson, Proc. Amer. Acad. 27: 175. 1892.

San Luis Potosí; type from Hacienda de Angostura.

Suffrutescent (?); stem simple below the inflorescence, spreading-pilose, very leafy; leaves alternate, lanceolate or lance-oblong, 5.5 to 16 cm. long, 8 to 20 mm. wide, acuminate, sessile and auriculate-clasping, entire or slightly denticulate, grayish green above, densely canescent-tomentose beneath; heads several or many, cymose-panicled, the pedicels 1.5 to 6.5 cm. long; involucre about 6 mm. high, scarcely graduate, the phyllaries lanceolate, acuminate; rays about 2 mm. long.

26. *Verbesina oreopola* Robins. & Greenm. Proc. Amer. Acad. 34: 550. 1899.

Known only from the type locality, San Luis Potosí.

Shrub; branchlets hirsutulous; leaves alternate, lanceolate or narrowly lance-oblong, 5 to 15 cm. long, 1 to 2.5 cm. wide, attenuate, narrowed to the sessile, usually biauriculate base, smoothish above, rather sparsely pilosulous to canescent-tomentose beneath, obscurely serrulate; heads several in a flattish cymose panicle; involucre 4 mm. high, about 2-seriate, the phyllaries ovate or oblong-ovate, obtusish; pales with short, erect or incurved mucros; rays 5 mm. long.

27. *Verbesina auriculata* DC. Prodr. 5: 617. 1836.

Oaxaca; type from Tehuantepec.

Shrubby; stem finely velvety; leaves alternate, elliptic-oval, 18 to 27.5 cm. long, 5 to 11 cm. wide, acuminate, attenuate to the obtusely auriculate sessile base, dentate, scabrous above, sordid-tomentulose beneath; heads numerous, cymose, with small rays; involucre 2 or 3-seriate, the phyllaries broadly ovate, acute or obtuse; pales subulate-tipped, stiff, nearly glabrous.

28. *Verbesina acapulcensis* Robins. & Greenm. Proc. Amer. Acad. 34: 551. 1899.

Known only from the type locality, vicinity of Acapulco, Guerrero.

Stem puberulent, winged by the decurrent leaf bases; leaves alternate; petioles short, winged; blades ovate or oval-ovate, 10 to 22 cm. long, 2.5 to 12 cm. wide, acuminate at each end, callous-denticulate, scabrous above, sordidly subtoomentose-pilosulous beneath; heads numerous, short-pedicelled; involucre 5 to 6 mm. high, the phyllaries oblong-ovate, acute; rays about 4 mm. long.

29. *Verbesina xanthochlora* Robins. & Greenm. Proc. Amer. Acad. 34: 551. 1899.

Known only from the type locality, Atlixco, Puebla.

Herb (?); stem canescent-puberulent, narrowly winged by the decurrent leaf bases; leaves mostly opposite, ovate-oblong, about 12 cm. long, 5 cm. wide, obtuse, subentire or dentate-serrate, green on both sides, strigillose; heads short-pedicelled, cymose; involucre 5 mm. high, the phyllaries suborbicular, with obtuse or rounded, squarrose, herbaceous tips; rays about 5 mm. long.

30. *Verbesina mollis* H. B. K. Nov. Gen. & Sp. 4: 203. 1820.

Verbesina sericea Kunth & Bouché, "Ind. Sem. Hort. Berol. 1848: 14. 1848;" Ann. Sci. Nat. III. Bot. 11: 228. 1849.

Vernonia exaltata Hort.; Kunth & Bouché, Ann. Sci. Nat. III. Bot. 11: 228. 1849, as synonym.

Vernonia karwinskiana Hort.; Kunth & Bouché, Ann. Sci. Nat. III. Bot. 11: 228. 1849, as synonym. Not *Vernonia karvinskiana* DC. 1836.

Oaxaca; type collected between Guanajuato and Villalpando.

Shrubby; stem densely subtomentose-pilose, narrowly winged; leaves alternate, elliptic to ovate, 5 to 9.5 cm. long, 1.5 to 3.5 cm. wide, acute, sessile, entire or callous-denticulate, densely and rather softly pubescent but green or greenish above, densely and canescently silky-tomentose beneath; heads several or numerous, cymose-panicled; pales with erect acuminate tips; rays about 2 mm. long. "Ich-peyotl" (*Reko*).

31. *Verbesina oncophora* Robins. & Seat. Proc. Amer. Acad. 28: 109. 1893.

Verbésina virgata conyzoides DC. Prodr. 5: 616. 1836.

Verbesina conyzoides Moc. & Sessé; DC. Prodr. 5: 616. 1836, as synonym.

Not *V. conyzoides* "Trew, 1769."

Mexico and Morelos; type from Sierra de las Cruces, State of Mexico.

Shrub 2 to 3.5 meters high; stem cinereous-puberulent; leaves alternate, rarely partly opposite; petioles 1 to 2.5 cm. long, naked, bearing at base a pair of corky, usually deciduous auricles; blades elliptic-oblong or oblong-ovate, 6 to 18 cm. long, 2.5 to 6.3 cm. wide, acute or acuminate at each end, serrulate, rough above, cinereously or subcanescently tomentose-pilosulous beneath; heads numerous, cymose-panicled, short-pedicled; involucre 2.5 to 3.5 mm. high, the phyllaries ovate or oblong, obtuse to acute; pales blunt or with short erect mucros; rays about 3 mm. long.

32. *Verbesina virgata* Cav. Icon. Pl. 3: 38. pl. 275. 1795.

Verbesina salicifolia H. B. K. Nov. Gen. & Sp. 4: 205. 1820.

Zacatecas to Oaxaca; type from Mexico, without definite locality.

Shrubby, up to 2.5 meters high; stem puberulous; leaves sessile or short-petioled, at base usually with corky auricles or decurrent on the stem, the blades lanceolate or lance-oblong, 6 to 16 cm. long, 1 to 3 cm. wide, acuminate, usually rounded at base, serrate or serrulate, smooth or smoothish above, sparsely puberulous or pubescent beneath; heads numerous, in a usually concave panicle; involucre about 5 mm. high, the phyllaries obtuse to acuminate; pales with recurved cusps; rays 4 to 6 mm. (rarely 1 cm.) long.

33. *Verbesina serrata* Cav. Icon. Pl. 3: 7. pl. 214. 1795.

Durango to Jalisco and Hidalgo; type from Mexico, without definite locality.

Shrub 1 to 1.5 meters high; stem sparsely or densely pubescent; leaves opposite, very rarely alternate or ternate; petioles 5 to 10 mm. long; blades ovate or lance-ovate, 5 to 12 cm. long, 2 to 7 cm. wide, acuminate, cuneate to rounded at base, sharply and usually coarsely toothed, green and rough above, beneath paler, densely cinereous-pilose or hirsute-pilose and usually prominently reticulate; heads usually numerous, cymose-panicled; involucre 4 to 7 mm. high, subequal, the phyllaries mostly oblong or obovate, herbaceous, obtuse; pales acute, erect-tipped; rays about 5 mm. long. "Palo cenizo" (Michoacán); "vara blanca" (Guanajuato).

33a. *Verbesina serrata pringlei* (Robinson) Robins. & Greenm. Proc. Amer. Acad. 34: 553. 1899.

Verbesina pringlei Robinson, Proc. Amer. Acad. 27: 175. 1892.

Jalisco and Michoacán; type from Guadalajara, Jalisco.

Similar; leaves triangular-ovate in outline, coarsely incised-toothed or lobed.

33b. *Verbesina serrata amphichlora* Robins. & Greenm. Proc. Amer. Acad. 34: 553. 1899.

Known only from the type locality, between Ramos and Inde, Durango.

Leaves lance-ovate, finely appressed-puberulent and bright green on both sides.

34. *Verbesina resinosa* Klatt, Leopoldina 23: 144. 1887.

Known only from the type locality, Yavesia, Oaxaca.

Branchlets pubescent, resiniferous; leaves opposite; petioles 4 to 6 mm. long; blades oblong, 7.5 cm. long, 2.5 cm. wide, serrulate, glabrous above, beneath paler, pilose along the veins, reticulate-venose; heads cymose-panicled; phyllaries 2-seriate, obtuse, pilose above and ciliate; rays 6. (Description compiled.)

35. *Verbesina luisana* T. S. Brandeg. Zoe 5: 259. 1908.

Puebla; type from San Luis Tultitlanapa.

Suffrutescent; branchlets pilosulous; leaves opposite; petioles 5 to 10 mm. long, sometimes narrowly winged; blades ovate or lance-ovate, 5 to 7 cm. long, 2.5 to 4 cm. wide, acuminate, cuneate or rounded at base, serrate, rough above, griseous-pilosulous or hispidulous (the hairs with glandular-tuberculate bases) and reticulate beneath; heads few to rather numerous, in somewhat umbelliform cymes or cymose panicles, subcylindric in anthesis; involucre 3 to 4 mm. high, 2-seriate, the phyllaries ovate, obtuse to acutish; rays about 2, about 2 mm. long.

36. *Verbesina grayii* (Schultz Bip.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 188. 1881, as *V. grayi*.

Zexmenia grayii Schultz Bip. in Seem. Bot. Voy. Herald 305. 1856.

Known only from the type locality, Sierra Madre of northern Mexico.

Suffruticulose, pubescent; leaves opposite; petioles 4 to 6 mm. long; blades ovate-lanceolate, 6.5 to 9 cm. long, 1.4 to 2 cm. wide, attenuate at each end, rough above, beneath pale, tomentulose, and prominently reticulate; heads 1 to 3, about equaling the pedicels; involucre 6 mm. high, the phyllaries linear-lanceolate, acute or acuminate (obtuse according to Robinson & Greenman); rays 4 mm. long. (Description compiled.)

37. *Verbesina molinaria* Robins. & Greenm. Proc. Amer. Acad. 34: 553. 1899.

Morelos; type from Cuernavaca.

Shrub 2.5 to 5 meters high; stem cinereous-puberulous; leaves chiefly opposite; petioles 3 to 7 mm. long; blades elliptic-oblong, 8 to 15.5 cm. long, 2 to 4 cm. wide, acuminate at each end, serrulate or serrate, green and rough above, densely and cinereously pilose-tomentose beneath; heads rather small, numerous, cymose-panicled, exceeded by the leaves; involucre 3 mm. high, the phyllaries oblong to lance-ovate, acutish to acuminate; pales with short erectish mucros; rays about 2 mm. long.

38. *Verbesina robinsonii* (Klatt) Fernald; Robins. & Greenm. Proc. Amer. Acad. 34: 554. 1899.

Otopappus alternifolius Robinson, Proc. Amer. Acad. 26: 165. 1891.

Otopappus robinsonii Klatt, Ann. Naturhist. Hofmus. Wien 9: 362. 1894.

Verbesina alternifolia Blake, Journ. Bot. Brit. & For. 53: 235. 1915. Not *V. alternifolia* Britton, 1893.

San Luis Potosí; type from San José Pass.

Shrubby (?); stem cinereous-pilosulous; leaves alternate; petioles 5 to 7 mm. long; blades oblong-lanceolate, 8 to 10 cm. long, 2 to 3 cm. wide, acuminate at each end, serrate or serrulate, green and scarcely rough above, cinereous-tomentose beneath; heads several, in fruit 1.2 to 1.5 cm. thick, in a flattish cymose panicle, the pedicels 0.8 to 5 cm. long; involucre 7 to 10 mm. high, the phyllaries lanceolate-linear or linear, herbaceous, acute or acutish; rays about 4 mm. long.

39. *Verbesina chiapensis* Robins. & Greenm. Proc. Amer. Acad. 34: 554. 1899.

Known only from the type locality, near Tumbalá, Chiapas.

Shrub; branches strigillose; leaves alternate; petioles about 4 mm. long; blades lance-oblong, 15 to 20 cm. long, 3.2 to 6 cm. wide, attenuate, acuminate at base, serrulate, subglabrous above, green and finely appressed-puberulent beneath;

heads numerous, cymose-panicled, the pedicels 1 to 4 cm. long; disk in fruit 1.2 cm. thick; involucre 2-seriate, 3 mm. high, the phyllaries ovate or ovate-oblong, obtuse to acutish; rays about 8 mm. long.

40. *Verbesina cinerascens* Robins. & Greenm. Proc. Amer. Acad. **34**: 555. 1899.

Known only from the type locality, near Guadalajara, Jalisco.

Shrub 1.5 to 2.5 meters high; branchlets pilosulous; leaves alternate, short-petioled, lanceolate or lance-oblong, 5.5 to 13 cm. long, 1 to 3 cm. wide, acuminate at each end, serrulate or serrate, rough above, cinerascently pilosulous beneath; heads rather numerous, in fastigiate cymose panicles, the pedicels 3 cm. long or less; disk in fruit 7 to 10 mm. thick; involucre 3 to 4 mm. high, the phyllaries ovate or oblong-ovate, acute; pales in fruit with recurved mucros; rays 3 to 8 mm. long.

41. *Verbesina crassipes* Robins. & Greenm. Proc. Amer. Acad. **34**: 555. 1899.

Oaxaca; type from Cañada Santa María.

Shrub; branches scabrous-tomentose; leaves alternate, sessile, obovate-lanceolate, 6 to 9 cm. long, 2 to 3 cm. wide, acute, cuneate at base, serrate, rough above, beneath green and tomentulose (at least on the veins) and at length scabrous; heads numerous, densely cymose, the pedicels thick and short; disk in fruit 1.5 cm. thick; phyllaries ovate-oblong to obovate, obtuse to acute, appressed-pubescent; pales acute; rays 8 to 9 mm. long. (Description compiled.)

42. *Verbesina hypargyrea* Robins. & Greenm. Proc. Amer. Acad. **34**: 556. 1899.

Chiapas; type collected between Hacienda Juncana and San Vicente. Guatemala.

Shrub or tree; branches cinereous-puberulent, glabrate; leaves alternate, sessile or petioled, lance-oblong or lanceolate, 5 to 12.5 cm. long, 1.5 to 3 cm. wide, acute or acuminate, at base acuminate, crenate-serrate, green and smooth above, densely silvery-strigillose beneath; heads numerous, panicled, the pedicels mostly about 1 cm. long or less; disk in fruit 7 to 10 mm. thick; involucre 3 mm. high, the phyllaries ovate or oblong, obtuse or the inner acutish; pales erect-mucronate; rays about 4 mm. long.

43. *Verbesina persicifolia* DC. Prodr. **5**: 614. 1836.

Tamaulipas, San Luis Potosí, and Veracruz; type collected between Santander and Victoria, Tamaulipas.

Shrubby; branches sparsely strigillose; leaves alternate; petioles 7 to 12 mm. long; blades lance-elliptic to oblong-ovate, 7 to 14 cm. long, 1.5 to 5.5 cm. long, acuminate at each end, serrate or serrulate, green and smoothish above, green and glabrous beneath except for the sparsely strigillose costa and chief veins; heads usually numerous, cymose-panicled, the pedicels 1 to 6 cm. long; disk in fruit 1 to 1.3 cm. thick; involucre 5 to 6 mm. high, the phyllaries chiefly narrow-oblong and obtuse, ciliolate, otherwise nearly glabrous; pales obtuse or shortly erect-mucronate; rays about 5 mm. long.

44. *Verbesina olivacea* Klatt, Leopoldina **20**: 93. 1884.

Silphium arborescens Mill. Gard. Dict. ed. 8. *Silphium* no. 4. 1768.

Otopappus olivaceus Klatt, Ann. Naturhist. Hofmus. Wien **9**: 362. 1894.

Verbesina arborescens Blake, Journ. Bot. Brit. & For. **53**: 57. 1915. Not *V. arborescens* Gómez, 1890.

Tamaulipas, Veracruz, and Oaxaca; type from Hacienda de la Laguna, Veracruz.

Shrub 3.5 to 4 meters high; stem puberulous; leaves alternate; petioles 4 to 12 mm. long; blades lance-oblong, ovate-oblong, or subrhombic-ovate, 5 to 11.5 cm. long, 2.3 to 4.3 cm. wide, obtuse to acuminate, acuminate at base, serrate or

serrulate, rough above, sordidly subtomentose-pilosulous beneath; heads rather numerous, cymose or cymose-panicled, the pedicels 1.5 to 8.5 cm. long; disk in fruit 1 to 1.5 cm. thick; involucre 5 to 7.5 mm. high, the phyllaries about 3-seriate, slightly graduate, oblong, obtuse; pales obtuse or acutish; rays about 6 mm. long.

45. *Verbesina seemannii* Schultz Bip. in Seem. Bot. Voy. Herald 306. 1856.

Chihuahua; type from the Sierra Madre of northwestern Mexico.

Shrubby; branches glabrous; leaves alternate; petioles 6 mm. long; blades oblong-lanceolate, 10 cm. long, 2.5 cm. wide, attenuate at each end, serrate, rough above, glabrescent beneath; heads cymose; involucre 2-seriate, 2 mm. high, the phyllaries ovate-oblong, obtuse; pales with reflexed mucro; rays 6 to 8 mm. long. (Description compiled.)

46. *Verbesina angustifolia* (Benth.) Blake, Journ. Bot. Brit. & For. 53: 199. 1915.

Salmea angustifolia Benth. Bot. Voy. Sulph. 117. 1844.

Known only from the type locality, west coast of Mexico.

Shrub; branches densely spreading-hispidulous; leaves alternate; petioles 1 to 2 mm. long; blades lanceolate, 5.5 to 8.5 cm. long, 1.4 to 2.2 cm. wide, acute to acuminate at each end, obscurely serrulate, harsh above, rather densely tuberculate-hispidulous beneath; heads several, exceeded by the leaves, the disk 9.5 mm. wide in fruit; involucre 2-seriate, about 1.5 mm. high, the phyllaries broadly ovate, obtuse, nearly glabrous; pales with recurved tip; rays not seen.

47. *Verbesina cymbipalea* Blake, Contr. U. S. Nat. Herb. 22: 638. 1924.

Known only from the type locality, Tepic, Tepic.

Probably shrubby; stem naked or narrowly winged, densely spreading-hispidulous; leaves alternate; petioles 3 to 6 mm. long; blades lance-elliptic, 7 to 16 cm. long, 1.5 to 4 cm. wide, acuminate at each end, serrulate, rough above, evenly hispidulous beneath; heads numerous, panicled, the pedicels 1.5 to 3 cm. long; disk in fruit 7 to 10 mm. thick; involucre 2-seriate, 2 mm. high, the phyllaries oblong or oval, obtuse; pales with reflexed tip; rays 3 mm. long.

48. *Verbesina abscondita* Klatt, Leopoldina 20: 93. 1884.

Verbesina smithii Robins. & Greenm. Proc. Amer. Acad. 32: 46. 1896.

Puebla and Oaxaca; type from Mexico, without definite locality. Guatemala.

Shrub, up to 5 meters high; branches pilosulous to hispidulous with spreading hairs; leaves alternate; petioles 2 to 8 mm. long; blades elliptic to rhombic-ovate, 5 to 10 cm. long, 2 to 3.8 cm. wide, acute to acuminate at each end, serrate or serrulate, very rough and in age rugose above, beneath densely and griseously or canescently subtomentose-pilosulous or hispidulous; heads numerous, cymose-panicled, the pedicels usually less than 1 cm. long; disk in fruit about 7 mm. thick; involucre about 3 mm. high, the phyllaries obtuse to acutish; pales straight-tipped; rays about 2.5 mm. long.

49. *Verbesina perymenioides* Schultz Bip.; Klatt, Leopoldina 23: 143. 1887.

Oaxaca; type from Yavesia.

Shrub 2 to 5 meters high; branches strigose or strigillose; leaves alternate; petioles 5 to 15 mm. long; blades elliptic-lanceolate or elliptic-ovate, 7.5 to 13 cm. long, 2 to 4.5 cm. wide, acuminate at each end, serrate or serrulate, smooth above, sparsely or rather densely and loosely pilosulous beneath; inflorescence much as in *V. abscondita*, but the pedicels strigillose, usually about 1 cm. long.

50. *Verbesina ortegae* Blake, Proc. Biol. Soc. Washington 32: 191. 1919.

Known only from the type locality, San Ignacio, Sinaloa.

Shrubby; branches strigillose; leaves like those of *V. perymenioides*, but sparsely strigillose beneath; panicles as in *V. perymenioides*.

51. *Verbesina fastigiata* Robins. & Greenm. Proc. Amer. Acad. 34: 558. 1899.

Mexico, without definite locality.

Tomentulose, the young parts white-woolly; stem rather broadly winged; leaves alternate; petioles winged; blades palmately 3-lobed, 8 to 20 cm. long, 5 to 14 cm. wide, scabrid above, loosely canescent-tomentose beneath; heads numerous, in flattish fastigiate cymose panicles; involucre about 3-seriate, the phyllaries narrow-ovate, acute; pales erect-tipped; rays small. (Description compiled.)

52. *Verbesina greenmani* Urban, Symb. Antill. 5: 265. 1907.

Verbesina pinnatifida Cav. Icon. Pl. 1: 67. pl. 100. 1791. Not *V. pinnatifida* Swartz, 1788.

Western Mexico, from Sinaloa to Oaxaca; type from Mexico, without definite locality.

Shrubby, up to 6 meters high; stem pubescent to nearly glabrous, rather broadly winged; leaves opposite, large, mostly 15 to 32 cm. long (including the broadly winged petiole), 7 to 19 cm. wide, ovate in outline, coarsely 3-lobed to pinnatifid, rough above, green or griseous beneath; heads numerous, in fastigiate cymose panicles; involucre about 3.5 mm. high; rays about 3 mm. long. "Capitana," "huichín" (*Ramírez*).

53. *Verbesina montanoifolia* Robins. & Greenm. Proc. Amer. Acad. 34: 559. 1899.

Verbesina montanoifolia leptopoda Robinson, Proc. Amer. Acad. 43: 40. 1907. Michoacán; type from Pátzcuaro.

Shrubby, up to 5 meters high; stem narrowly 4-winged, puberulous; leaves opposite; petioles broadly or narrowly winged at least above, 1 to 3 cm. long; blades broadly ovate in outline, 4.5 to 16 cm. long, 3 to 13 cm. wide, sinuately 3 or 5-lobed or the upper unlobed, serrate, rough above, beneath hispidulous or pilosulous and densely reticulate; heads numerous, in fastigiate cymose panicles; involucre about 3 mm. high; rays 3 to 6 mm. long.

54. *Verbesina trilobata* Robins. & Greenm. Proc. Amer. Acad. 32: 46. 1896.

Oaxaca; type from Monte Alban.

Shrubby, 1.6 to 3.3 meters high; stem wingless, nearly or quite glabrous; leaves opposite; petioles winged at least above, about 2 cm. long; blades rhombic-ovate in outline, 8 to 12 cm. long, about 4.5 cm. wide, 3-lobed, serrulate, rough above, griseous-hispidulous or hirsute beneath, not prominently reticulate; heads in fastigiate cymose panicles; involucre 3 to 4 mm. high, the phyllaries chiefly linear-lanceolate, acutish; rays 4 to 8 mm. long.

55. *Verbesina sublobata* Benth. Pl. Hartw. 76. 1841.

Chiapas. Guatemala; type from Sunil.

Shrub about 1.5 meters high; stem densely and sordidly subtomentose-pilose, wingless; leaves alternate, ovate in outline, up to 22 cm. long (including the broadly winged petiole), 14 cm. wide, sinuately lobed, callous-denticulate, rough above, sordidly pilose-tomentose beneath; heads numerous, in large rounded panicles; involucre about 3 mm. high, the phyllaries linear to oblanceolate, acuminate; rays white, about 2 mm. long; achenes rather narrowly winged.

56. *Verbesina turbacensis* H. B. K. Nov. Gen. & Sp. 4: 203. 1820.

Verbesina verbascifolia Walp. Bot. Zeit. 9: 63. 1851.

Verbesina nicaraguensis Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 97. 1852.

Verbesina microcephala Benth. in Oerst. Nat. For. Kjöbenhavn Vid. Medd. 1852: 98. 1852.

Michoacán or Guerrero to Veracruz and Oaxaca. Guatemala to Costa Rica; Colombia and Venezuela; type from Turbaco, Colombia.

Shrubby or suffrutescent, 1.5 to 6.5 meters high; branches densely sordid-puberulous or tomentose, winged by the decurrent leaf bases; leaves alternate, ovate or rhombic in outline, 12 to 38 cm. long (including the broadly winged petiole), repand-toothed to pinnatifid, rough above, griseous- or cinereous-puberulous to subtomentose beneath; heads small, very numerous in large fastigate cymose panicles; involucre 1.5 to 3 mm. high; rays white, 2 to 4 mm. long. "Camaliote," "chimaliote," "chimaliote blanco" (El Salvador).

57. *Verbesina hypsela* Robinson, Proc. Bost. Soc. Nat. Hist. **31**: 269. 1904.

Chiapas.

Herbaceous (?), tall; stem glabrous, purplish, winged by the decurrent leaf bases; leaves alternate, 10 to 30 cm. long, 7 to 18 cm. wide, deeply pinnatifid (the lobes 13 to 15), above very smooth, beneath thinly appressed-pubescent; heads small, very numerous in a large convex panicle; rays white, 8 mm. long. (Description compiled.)

58. *Verbesina gigantoides* Robinson, Proc. Amer. Acad. **47**: 213. 1911.

Known only from the type locality, Yajalón, Chiapas.

Herbaceous (?), tall; stem purplish, glabrous, wingless; leaves alternate; petioles wingless, 5 to 15.5 cm. long; blades 15 to 30 cm. long, 10 to 25 cm. wide, pinnatifid (the lobes about 11), smooth above, softly pubescent beneath; heads small, numerous in a large convex panicle; rays white, 3.5 mm. long.

59. *Verbesina pauciflora* Hemsl. Biol. Centr. Amer. Bot. **2**: 189. 1881.

Verbesina cymosa A. Gray, Proc. Amer. Acad. **21**: 390. 1886.

Sinaloa and Chihuahua; type from Cerro de Pinal, Sinaloa.

Shrubby; stem wingless, hirsute-pilose, glabrescent; leaves opposite, short-petioled, lance-oblong, 12 to 20 cm. long, 1.8 to 3.5 cm. wide, acuminate, cuneate at base, scabrid above, cinereously subtomentose-hirsute beneath; heads very numerous, small, 9-flowered, yellow, discoid, in cymose panicles; involucre 3 mm. high, the phyllaries oblong, obtuse, hirsute.

60. *Verbesina oligantha* Robinson, Proc. Amer. Acad. **47**: 214. 1911.

Known only from the type locality, Jimalcota, Michoacán or Guerrero.

Shrubby, 2 to 3 meters high; stem wingless, scabrid-puberulous; leaves opposite; petioles 1 to 1.5 cm. long; blades ovate or elliptic-ovate, 12 to 16 cm. long, 4 to 7 cm. wide, acuminate, cuneate at base, serrate, green and harsh on both sides; heads numerous, in flat cymose panicles, 12 mm. high, 4 mm. thick, discoid, yellow, 7-flowered; involucre 3 mm. high, the phyllaries ovate or oblong, obtuse to acute.

DOUBTFUL SPECIES.

VERBESINA OAXACANA DC. Prodr. **5**: 614. 1836.

VERBESINA SARTORII Schultz Bip.; Klatt, Leopoldina **23**: 143. 1887, as synonym. This name is published by Klatt with reference to a Mexican plant collected by Liebmann, but is referred as a synonym to *V. leprosa* Klatt, a species restricted to Martinique.

VERBESINA TRIPLINERVIA Visiani, Nuov. Sagg. Accad. Sci. Padova **5**: 264. 1840. Insufficiently described.

76. *COREOPSIS* L. Sp. Pl. 907. 1753.

Herbs or shrubs; leaves chiefly opposite; heads (in ours) yellow, radiate, the rays pistillate or neutral; involucre double, the outer phyllaries herbaceous, 1-seriate, small; the inner about 2-seriate, equal, submembranous, usually brownish, vittate; achenes obcompressed, usually marginate or winged; pappus (in ours) of 2 smooth or antrorse-ciliate awns, or wanting.

Rays pistillate, fertile.

Leaves lanceolate to oval, unlobed or ternatisect.

Heads numerous, cymose-panicked; leaves lanceolate to oblong-ovate, unlobed or ternatisect.....1. *C. mutica*.

Heads solitary or few; leaves cuneately oblanceolate to oval, unlobed.

Leaves 2 to 5 cm. long, cuneately oblanceolate or obovate.

2. *C. cuneifolia*.

Leaves 1 to 2 cm. long, oval.....3. *C. parvifolia*.

Leaves or their lobes linear-filiform or very narrowly linear.

Leaves entire, or rarely with a pair of lobes, 2 to 6 cm. long.

4. *C. cyclocarpa*.

Leaves all, except sometimes the uppermost, pinnately 3 to 7-lobed.

Heads larger; involucre 6 to 8 mm. high; leaves mostly with 3 pairs of lobes.....5. *C. pinnatisecta*.

Heads smaller; involucre 4 to 5 mm. high; leaves mostly with 1 pair of lobes.....6. *C. insularis*.

Rays neutral.

Pappus none; achenes glabrous.....7. *C. cordylocarpa*.

Pappus awns 2, antrorse-ciliate; achenes ciliate.

Leaves rhombic, merely serrate or doubly serrate....8. *C. petrophiloides*.

Leaves once or twice pinnatisect.

Heads smaller; inner phyllaries about 5 mm. long; rays 4 to 8 mm. long.

9. *C. petrophila*.

Heads larger; inner phyllaries 6 to 9 mm. long; rays 1 to 2 cm. long.

Outer phyllaries narrowly linear; ultimate lobes of the leaves 1 to 2.5 mm. wide.....10. *C. rhyacophila*.

Outer phyllaries linear-oblong; ultimate lobes of the leaves 0.6 to 0.8 mm. wide.....11. *C. pringlei*.

1. *Coreopsis mutica* DC. Prodr. 5: 571. 1836.

Electra mexicana DC. Prodr. 5: 630. 1836.

Electra galeottii A. Gray, Pl. Wright. 1: 110. 1852.

Coreopsis galeottii Hemsl. Biol. Centr. Amer. Bot. 2: 195. 1881.

Coreopsis mexicana Hemsl. Biol. Centr. Amer. Bot. 2: 196. 1881.

Guanajuato to Chiapas; type from Tlapuajahua. Guatemala.

Shrubby, nearly or quite glabrous throughout, 2 meters high or less; leaf blades lanceolate to oblong-ovate, 4 to 13.5 cm. long, serrate, often ternatisect, coriaceous or papery, petiolate; heads 2 to 4.5 cm. wide; achenes glabrous, epappose, or the inner rarely with a pair of smooth slender awns.

1a. *Coreopsis mutica subvillosa* DC. Prodr. 5: 571. 1836.

Coreopsis mexicana hyperdasya Blake, Proc. Amer. Acad. 49: 338. 1913.

Hidalgo and Oaxaca; type from Mexico, without definite locality.

Stem, inflorescence, and lower leaf surface densely tomentose.

1b. *Coreopsis mutica holotricha* Blake, Contr. Gray Herb. n. ser. 52: 55. 1917.

Coreopsis mexicana hyperdasya holotricha Blake, Proc. Amer. Acad. 49: 338. 1913.

Known only from the type locality, near San Luis Tultitlanapa, Puebla.

Leaves small, densely and rather harshly cinereous-puberulous on both sides.

2. *Coreopsis cuneifolia* Greenm. Proc. Amer. Acad. 40: 43. 1904.

Durango and Jalisco; type from State of Durango.

Fruticose or suffruticose, about 60 cm. high, erect-branched, somewhat pubescent, glabrate; leaf blades toothed above the middle, subsessile; heads few, long-peduncled, 2 cm. wide; achenes epappose.

3. **Coreopsis parvifolia** Blake, Proc. Amer. Acad. 49: 338. 1913.

Known only from the type locality, Esperanza, Puebla.

Shrub, trichotomously branched, somewhat pubescent, glabrate; leaf blades oval, serrate above the base, subsessile; heads solitary, 3 cm. wide, on peduncles 3 to 6.5 cm. long; achenes epappose.

4. **Coreopsis cyclocarpa** Blake, Proc. Amer. Acad. 49: 339. 1913.

Leptosyne mexicana A. Gray in S. Wats. Proc. Amer. Acad. 22: 429. 1887.

Not *Coreopsis mexicana* Hemsl. 1881.

Jalisco; type from Río Blanco.

Herbaceous or suffruticulose, many-stemmed, about 60 cm. high, nearly glabrous, leafy; leaves 2 mm. wide or less; heads few, long-peduncled, 1.5 to 2.5 cm. wide; disk corollas without hairy annulus; outer achenes suborbicular; pappus none.

5. **Coreopsis pinnatisecta** Blake, Proc. Amer. Acad. 49: 339. 1913.

Leptosyne pringlei Robins. & Greenm. Amer. Journ. Sci. III. 50: 155. 1895.

Not *Coreopsis pringlei* Robinson. 1907.

Puebla and Oaxaca; type from Sierra de San Felipe, Oaxaca.

Herbaceous or suffruticulose, 40 to 70 cm. high, essentially glabrous; leaves 2 to 4 cm. long, pinnately or sometimes bipinnately lobed, the lobes 1 mm. wide or less; heads few, long-peduncled, 2.5 cm. wide; disk corollas with hairy annulus; pappus none.

6. **Coreopsis insularis** (T. S. Brandeg.) Blake, Proc. Amer. Acad. 49: 340. 1913.

Leptosyne insularis T. S. Brandeg. Erythea 7: 5. 1899.

Known only from the type locality, Socorro Island.

Decumbent, suffruticose or suffruticulose, nearly glabrous; leaves 1 to 2.5 cm. long, the lobes 1 mm. wide or less; disk corollas without annulus; pappus none.

7. **Coreopsis cordylocarpa** A. Gray in S. Wats. Proc. Amer. Acad. 22: 428. 1887.

Jalisco; type from Río Blanco.

Suffrutescent, about 2 meters high, leafy; leaves petioled, the blades 4.5 to 12 cm. long, pinnatisect, the lobes 2 or 3 pairs, linear-lanceolate, serrate or the lower sometimes lobed at base, 2 to 9 mm. wide, somewhat pubescent; heads few or numerous, long-peduncled, 2.5 to 3.5 cm. wide; achenes linear-clavate, scarcely obcompressed, up to 12 mm. long.

8. **Coreopsis petrophiloides** Robins. & Greenm. Proc. Amer. Acad. 29: 388. 1894.

Colima to Michoacán; type from the Nevada de Colima.

Shrubby, 1 meter high, sparsely pubescent above and often on the leaves; leaves petioled, the blades 4 to 9 cm. long, 1 to 3.5 cm. wide, acute at each end or acuminate, the upper reduced; heads few, about 3.5 cm. wide.

9. **Coreopsis petrophila** A. Gray in S. Wats. Proc. Amer. Acad. 22: 428. 1887.

Durango and Jalisco; type from Río Blanco, Jalisco.

Suffruticose, branched, very leafy, nearly or quite glabrous; leaves slender-petioled, the blades deltoid in outline, 3 to 4 cm. long and wide, bipinnatisect, the primary lobes 3 or 4 pairs, the ultimate divisions 1 to 2 mm. wide; heads several or many, panicled, 1.5 to 2 cm. wide.

The specimen from Durango has broader leaf lobes than normal, and is referred to this species with some hesitation.

10. **Coreopsis rhyacophila** Greenm. Proc. Amer. Acad. 35: 313. 1900.

Morelos; type from Cuernavaca.

Suffrutescent, 1 meter high or less, nearly glabrous; leaves slender-petioled, often with fascicles in their axils, the blades deltoid, 3 to 8 cm. long and wide, bipinnatisect, the primary lobes 3 to 5 pairs; heads 2.5 to 4 cm. wide.

11. *Coreopsis pringlei* Robinson, Proc. Amer. Acad. **43**: 41. 1907.

Known only from the type locality, San Juan del Río, Querétaro.

Shrub, essentially glabrous; leaves petioled, the blades 2 to 4 cm. long, 1 to 3 cm. wide, bipinnatisect, the segments narrowly linear; heads 1 to 5, 3 cm. wide.

77. COREOCARPUS Benth. Bot. Voy. Sulph. 28. *pl.* 16. 1844.

REFERENCE: Blake, Proc. Amer. Acad. **49**: 342-345. 1913.

Shrubs or herbs; leaves opposite, once to thrice pinnatisect; heads small, radiate, yellow (or the rays sometimes white or purple-tinged), cymose-panicled; involucre 2-seriate, subequal, the phyllaries 5 to 8, all submembranous, ovate to ovate-oblong, narrowly pale-margined, lineate, sometimes with a few small herbaceous bractlets at base; rays fertile; achenes obcompressed, with entire or pectinate crustaceous wings; pappus none or of 2 retrorsely hispidulous awns. Leaves fleshy; wings of achene entire or merely crenulate.....**1. *C. dissectus*.** Leaves not fleshy; wings of achene pectinately cut.....**2. *C. arizonicus*.**

1. *Coreocarpus dissectus* (Benth.) Blake, Proc. Amer. Acad. **49**: 344. 1913.

Acoma dissecta Benth. Bot. Voy. Sulph. 29. *pl.* 17. 1844.

Leptosyne dissecta A. Gray, Syn. Fl. **1**²: 301. 1884.

Leptosyne parthenioides dissecta S. Wats. Proc. Amer. Acad. **24**: 56. 1889.

Coreocarpus dissectus longilobus Blake, Proc. Amer. Acad. **49**: 345. 1913.

Southern half of Baja California; type from Magdalena Bay.¹

Shrubby, about 40 cm. high, trichotomously branched, essentially glabrous; leaves crowded, petioled, the blades 1.5 to 7.5 cm. long, once to thrice pinnatisect, the primary lobes 2 or 3 pairs, the ultimate divisions linear-filiform to linear-lanceolate, 2.5 mm. wide or less; heads yellow, 1 to 1.5 cm. wide, the pedunculate panicles nearly naked; pappus none.

2. *Coreocarpus arizonicus* (A. Gray) Blake, Proc. Amer. Acad. **49**: 344. 1913.

Leptosyne arizonica A. Gray, Proc. Amer. Acad. **17**: 218. 1882.

Coreopsis arizonica O. Hoffm. in Engl. & Prantl, Pflanzenfam. **4**⁵: 243. *f.* 118, S. 1890.

Sonora and Chihuahua. Arizona; type from Fort Lowell.

Suffruticulose, 30 to 60 cm. high, essentially glabrous, branched at base; leaves petioled, the blades 5 to 8 cm. long, pinnatisect into 3 to 5 linear lobes 1 to 3 mm. wide, the lower pair sometimes again pinnatisect; heads yellow, or the rays white; achenes sometimes with a pappus of retrorsely spinulose awns.

2a. *Coreocarpus arizonicus pubescens* (Robins. & Fern.) Blake, Proc. Amer. Acad. **49**: 344. 1913.

Leptosyne arizonica pubescens Robins. & Fern. Proc. Amer. Acad. **30**: 118. 1894.

Sonora; type from Granados.

Whole plant rather densely spreading-pilosulous.

2b. *Coreocarpus arizonicus filiformis* (Greenm.) Blake, Proc. Amer. Acad. **49**: 344. 1913.

Leptosyne arizonica filiformis Greenm. Proc. Amer. Acad. **40**: 44. 1904.

Known only from the type locality, Sierra de Choix, Sinaloa.

Leaf lobes linear-filiform, less than 1 mm. wide, the lower ones 4 to 6 cm. long.

¹ See Blake, Contr. Gray Herb. n. ser. **52**: 56. 1917.

78. HIDALGOA Llave in Llave & Lex. Nov. Veg. Descr. 1: 15. 1824.**1. Hidalgo ternata** Llave in Llave & Lex. Nov. Veg. Descr. 1: 15. 1824.*Hidalgoa lessingii* DC. Prodr. 5: 511. 1836.*Melampodium ? hidalgoa* DC. Prodr. 5: 521. 1836.

Veracruz and Oaxaca; type from Río Blanco, near San José del Corral. Guatemala and Ecuador.

Suffrutescent (?), somewhat sordid-pubescent or essentially glabrous, high-climbing, the basally coiled and often thickened petioles functioning as tendrils; leaves opposite, the petioles slender, about 4 cm. long, the blades about 6 cm. long, ternatisect, the lobes ovate, acute, crenate-serrate, stipitate or subsessile, thin; heads solitary or few, axillary and terminal, long-peduncled, 2.2 to 4.2 cm. wide; involucre double, as in *Coreopsis*; rays 5, orange, yellow, or apparently purplish red, fertile; disk yellow (?), infertile, the styles undivided, the corollas irregular, one tooth being deeper cut than the others; ray achenes oval, obcompressed, thick, drupaceous, glabrous, about 7 mm. long, crowned with a pair of short, thick teeth.

79. THELESPERMA Less. Linnaea 6: 511. 1831.**1. Thelesperma longipes** A. Gray, Pl. Wright. 1: 109. 1852.

Coahuila, Nuevo Leon, and San Luis Potosí. Texas to Arizona; type from the San Pedro River, Texas.

Suffrutescent, 15 to 40 cm. high, much branched at base, nearly glabrous, very leafy; leaves opposite, 2.5 to 7 cm. long, pinnately parted into 3 or 5 filiform or linear-filiform lobes as wide as the rachis, or the upper entire; heads discoid, yellow, 7 to 10 mm. wide, solitary at apex of slender naked peduncles 9 to 24 cm. long; involucre double, the outer of small lance-ovate herbaceous phyllaries, the inner of submembranous dark phyllaries, these connate about to middle, with scarious yellow border; achenes thickened, curved, about 2.5 mm. long, muricate; pappus an obscure border, sometimes produced into 2 very short teeth. "Hierba de San Nicolás" (Nuevo León).

80. BIDENS L. Sp. Pl. 831. 1753.

Herbs, rarely suffrutescent; leaves mostly opposite; heads few to numerous, in ours yellow and radiate; involucre double, as in *Coreopsis*; achenes (in ours) linear, flattened or subquadrangular; pappus usually of 2 to 4 commonly retrorse-hispid awns.

Leaves dissected into linear-filiform segments..... **1. B. nudata.**

Leaves pinnately parted into 3 or 5 ovate to lanceolate divisions, rarely undivided.

2. B. squarrosa.

1. Bidens nudata T. S. Brandeg. Zoe 1: 309. 1890.

Cape Region of Baja California (Sierra de San Francisquito).

Suffrutescent, about 60 cm. high, essentially naked above, trichotomously branched, glabrous; leaves petiolate, 5 to 10 cm. long, twice or thrice pinnatisect into linear-filiform segments less than 1 mm. wide, as broad as the rachis; heads about 3, long-peduncled, yellow, radiate, about 1.5 cm. wide; rays pistillate; achenes linear, subquadrangular, about 6 mm. long; pappus of 2 or 3 retrorsely hispid awns about 3 mm. long.

2. Bidens squarrosa H. B. K. Nov. Gen. & Sp. 4: 238. 1820.*Bidens tereticaulis* DC. Prodr. 5: 598. 1836.*Bidens antiguensis* Coulter, Bot. Gaz. 16: 100. 1891.*Bidens tereticaulis sordida* Greenm. Proc. Amer. Acad. 39: 115. 1903.*Bidens tereticaulis indivisa* Robinson, Proc. Bost. Soc. Nat. Hist. 31: 270. 1904.*Bidens coreopsidis procumbens* Donn. Smith, Bot. Gaz. 42: 299. 1906.

Tamaulipas to Chiapas. Guatemala to South America; type collected between Caracas and Mount Buenavista, Venezuela.

Suffrutescent or herbaceous, scandent; stem glabrous or pubescent; leaves petioled, the divisions lanceolate to ovate, 2.5 to 9 cm. long, acute to attenuate, closely serrate; heads usually numerous, cymose-panicled, slender-pedicled, 4.5 cm. wide or less; achenes linear, ciliate, the 2 awns spreading or recurved, retrorse-hispid or smooth. "Flor de colmena" (El Salvador).

81. COSMOS Cav. Icon. Pl. 1: 9. pl. 14. 1791.

Herbs, rarely suffrutescent; leaves opposite, entire to dissected; heads radiate, purple, pink, white, or yellow; involucre double, as in *Coreopsis*; rays neutral; achenes obcompressed or angulate, more or less distinctly rostrate; pappus of 2 to 9 retrorsely hispid awns.

An herbaceous species of this genus is much cultivated as an ornamental plant under the name "cosmos."

Rays purple.

Leaves narrowly linear and entire to bipinnatisect with linear divisions, these more than 1 mm. wide.....1. *C. crithmifolius*.

Leaves pinnatisect, the lobes linear-filiform, 0.7 mm. wide or less.

2. *C. seemannii*.

Rays yellow.....3. *C. landii*.

1. *Cosmos crithmifolius* H. B. K. Nov. Gen. & Sp. 4: 242. 1820.

Bidens valladolidensis Schultz Bip. in Seem. Bot. Voy. Herald 308. 1856.

Sinaloa to Oaxaca; type from Valladolid (Morelia), Michoacán.

Suffrutescent, 50 to 90 cm. high, slender, glabrous; leaves 3.5 to 12 cm. long, narrowly linear (1.5 to 4 mm. wide) and entire, or pinnatisect to bipinnatisect, rough-margined; heads few or solitary, long-peduncled, 2 to 4.5 cm. wide; disk yellow; achenes linear-fusiform, angled; pappus of usually 4 awns. "Gallitos" (Sinaloa).

2. *Cosmos seemannii* (Schultz Bip.) A. Gray, Proc. Amer. Acad. 19: 16. 1883.

Bidens seemannii Schultz Bip. in Seem. Bot. Voy. Herald 307. 1856.

Tepic and Michoacán; type from the Sierra Madre.

Suffrutescent, about 60 cm. high, minutely hirtellous, leafy; leaves about 5 cm. long, twice or thrice pinnatisect with very narrow divisions; heads 1 to 7, long-peduncled, 2.5 to 4.5 cm. wide; disk corollas purplish on the teeth; awns 6 to 9.

3. *Cosmos landii* Sherff, Bot. Gaz. 64: 29. 1917.

Bidens palmeri A. Gray in S. Wats. Proc. Amer. Acad. 22: 429. 1887. Not

Cosmos palmeri Robinson, 1909.

Jalisco; type from Río Blanco.

Suffrutescent, about 1 meter high, glabrous; leaves 4 to 6 cm. long, pinnatisect or bipinnatisect, the segments linear, 1 to 2 mm. wide, rough-margined; heads several, long-peduncled, 2.3 to 3.8 cm. wide; flowers all yellow; achenes rostrate; awns 2 to 4.

82. CALEA L. Sp. Pl. ed. 2. 1179. 1763.

REFERENCE: Robinson & Greenman, Revision of the Mexican and Central American species of the genus *Calea*, Proc. Amer. Acad. 32: 20-30. 1896.

Shrubs or sometimes herbs; leaves opposite; heads radiate or discoid, yellow or white, usually cymose; involucre several-seriate, graduate, the phyllaries dry or the outer sometimes herbaceous; rays if present fertile; achenes subterete or 4 or 5-angled; pappus persistent, of 4 to 20 usually equal, paleaceous squamellae or awns, rarely entirely wanting.

Pappus awns or squamellae 4 or 5.

Leaves densely tomentose or tomentulose beneath; heads 1 to 5, rather large (about 1.8 cm. wide).

Leaves ovate, subcordate, densely canescent-tomentose beneath; heads solitary-----14. *C. grayii*.

Leaves ovate-oblong, not subcordate, very finely tomentulose beneath; heads about 5-----15. *C. discolor*.

Leaves green beneath; heads numerous, or if few, then small.

Leaves small, the blades at most 2.5 cm. long, 7 mm. wide; heads few, small, in a naked terminal cymose panicle.-----16. *C. brandegei*.

Leaves larger, 4 cm. long or more; heads numerous.

Leaves with conspicuous stipule-like auriculations at base.

17. *C. manicata*.

Leaves without stipule-like auriculations at base.

Leaves oblong, 7.5 cm. wide, pilose on the nerves beneath.

18. *C. orizabaensis*.

Leaves lanceolate or oblanceolate, 1.5 to 3.5 cm. wide, glabrous.

20. *C. pachyphylla*.

Pappus awns or squamellae 7 to 20.

Pappus awns as long as or longer than the achene.

Rays white or whitish, conspicuous.

Phyllaries ciliate, otherwise essentially glabrous-----8. *C. integrifolia*.

Phyllaries rather densely pubescent dorsally.

Leaves thickish, scabrous, green in drying-----9. *C. scabrifolia*.

Leaves thin, nearly smooth, blackening in drying.

10. *C. submembranacea*.

Rays yellow or wanting.

Heads 2 to 13, rather large; pedicels 3 to 10 cm. long.

11. *C. longipedicellata*.

Heads numerous, rather small, umbellate-clustered, usually short-pedicelled or sessile.

Heads distinctly radiate-----12. *C. urticifolia*.

Heads discoid-----13. *C. trichotoma*.

Pappus awns or squamellae shorter than the achene.

Leaves densely cinereous- or griseous-tomentose or -tomentulose beneath.

Outer phyllaries without distinct herbaceous tips-----4. *C. pringlei*.

Outer phyllaries with conspicuous herbaceous tips.

Leaves broadly ovate, about two-thirds as wide as long; pappus squamellae acutish-----2. *C. albida*.

Leaves suborbicular, about as wide as long; pappus squamellae obtuse.

3. *C. hypoleuca*.

Leaves green and not densely pubescent beneath.

Pedicels mostly considerably longer than the heads.

Heads discoid, 8 to 14-flowered-----1. *C. salmeaefolia*.

Heads radiate, with more numerous flowers.

Leaves ovate, half as wide as long-----19. *C. rupestris*.

Leaves cuneate-obovate or oblanceolate, less than half as wide as long-----20. *C. pachyphylla*.

Pedicels mostly much shorter than the heads or obsolete.

Leaves glabrous and not gland-dotted beneath-----5. *C. nelsonii*.

Leaves pubescent or gland-dotted beneath.

Heads subcylindric, 4 or 5-flowered-----6. *C. leptcephala*.

Heads turbinate or subcampanulate, 5 to 12-flowered.

7. *C. zacatechichi*.

1. **Calea salmeaefolia** (DC.) Hemsl. Biol. Centr. Amer. Bot. **2**: 206. 1881, as *C. salmiaefolia*.

Calydermos salmeaefolius DC. Prodr. **5**: 670. 1836.

Tamaulipas.

Shrubby, about 1 meter high; branches slender, retrorse-puberulous in lines; leaves short-petioled, the blades ovate, about 3 cm. long, acuminate or acute, few-toothed, smoothish and lucid above, gland-dotted and sparsely pubescent beneath; heads umbellate, about 6 mm. high; pedicels 9 to 18 mm. long; squamellae 0.5 mm. long.

2. **Calea albida** A. Gray, Proc. Amer. Acad. **15**: 38. 1879.

San Luis Potosí; type from Morales.

Shrub; branches densely sordid-pilose; leaf blades ovate, 2.5 to 3.7 cm. long, 1.3 to 2.3 cm. wide, acute, coarsely toothed, rough above, gland-dotted and loosely griseous-pilose beneath; heads cymose-umbellate, about 8 mm. high, about 20-flowered; flowers whitish; achenes about 3.5 mm. long, the pappus about 1.5 mm. long.

3. **Calea hypoleuca** Robins. & Greenm. Proc. Amer. Acad. **32**: 24. 1896.

Oaxaca; type from Sierra de San Felipe.

Similar to *C. albida*; leaves larger, 3 to 5 cm. long and wide, densely pilose-tomentose beneath, subsessile or short-petioled. "Cuanaxana" (*Reko*).

4. **Calea pringlei** Robinson, Proc. Amer. Acad. **36**: 488. 1901.

Guerrero and Morelos; type from Iguala, Guerrero.

Frutescent, sordidly pilose-tomentose, glabrescent; leaves subsessile, suborbicular-ovate or broadly deltoid-ovate, the larger 3 to 4.5 cm. long and wide, rugose above, cinereously pilose-tomentose beneath; heads 7 to 10-flowered, in dense umbelliform cymose panicles.

- 4a. **Calea pringlei rubida** Greenm. Field Mus. Bot. **2**: 272. 1907.

Known only from the type locality, near Chavarillo, Veracruz.

Leaves short-petioled, ovate, 1.5 to 3 cm. long, two-thirds as wide; phyllaries reddish-margined. (Description compiled.)

5. **Calea nelsonii** Robins. & Greenm. Proc. Amer. Acad. **32**: 25. 1896.

Known only from the type locality, ridge back of Tonalá, Chiapas.

Frutescent, glabrous; leaves short-petioled, the blades rhombic-ovate, 4.5 to 7.5 cm. long, 1.8 to 6 cm. wide, coarsely toothed, glabrous and eglandular on both sides; heads numerous, in umbelliform cymes, about 10-flowered; ray flowers 2 or 3, obscurely ligulate.

6. **Calea leptcephala** Blake, Contr. U. S. Nat. Herb. **22**: 646. 1924.

Known only from the type locality, Tonameca, Oaxaca.

Shrub; stem puberulous in lines, glabrate; leaves petioled, the blades ovate, 5.5 to 8.5 cm. long, 3.5 to 5 cm. wide, acuminate, coarsely toothed, beneath gland-dotted and on the veins sparsely pilosulous; heads in small clusters at tips of branchlets, the disk 6.5 mm. high, 2 mm. thick; phyllaries with involute-margined spreading apex; ray 1, small.

7. **Calea zacatechichi** Schlecht. Linnaea **9**: 589. 1834.

San Luis Potosí and Jalisco to Veracruz and Puebla; type from Hacienda de la Laguna and Jalapa, Veracruz. Guatemala.

Much-branched shrub, puberulous or pubescent; leaves short-petioled, the blades ovate or broadly triangular-ovate, 2 to 6.5 cm. long, coarsely toothed, veiny, gland-dotted and more or less pubescent beneath; heads small, about 12-flowered, in dense umbellate-cymose panicles; phyllaries without spreading tips. "Tzicin," "xicin" (Yucatán, Maya); "zacatechichi," "sacatechichi," "sacachichic," "zacachichi," "zacatechi" (from the Nahuatl, *zaca-chichic*,

bitter-grass); "juralillo;" "zacate amargo," "simonillo," "falso simonillo," "bejuco chismuyo" (El Salvador).

The plant is bitter, and has been employed in Mexico as a remedy for affections of the stomach, cholera, and malaria.

- 7a. *Calea zacatechichi rugosa*** (DC.) Robins. & Greenm. Proc. Amer. Acad. **32**: 26. 1896.

Calydermos rugosus DC. Prodr. **5**: 670. 1836.

Calea rugosa Hemsl. Biol. Centr. Amer. Bot. **2**: 206. 1881.

Morelos and Veracruz (Orizaba); type from Cuernavaca, Morelos.

Similar; heads smaller, about 5-flowered.

- 7b. *Calea zacatechichi calyculata*** Robinson, Proc. Amer. Acad. **36**: 488. 1901.

Sierra Madre near Monterrey, Nuevo León.

Similar to the typical form; involucre subtended by 2 or 3 herbaceous-tipped bracts.

- 8. *Calea integrifolia*** (DC.) Hemsl. Biol. Centr. Amer. Bot. **2**: 205. 1881.

Allocarpus integrifolius DC. Prodr. **5**: 676. 1836.

Calea integrifolia dentata Coulter, Bot. Gaz. **20**: 51. 1895.

Veracruz and Michoacán (or Guerrero) to Chiapas; type from Mexico, without definite locality. Guatemala, El Salvador, Nicaragua.

Shrub up to 2.5 meters high, pubescent or nearly glabrous; leaves short-petioled, the blades ovate or lance-ovate, 5 to 12 cm. long, 1.5 to 4 cm. wide, acute to long-acuminate, serrate or serrulate, usually rough above, from essentially glabrous to rather densely pubescent beneath; heads 8 to 10 mm. wide, very numerous in close cymose panicles, 15 to 20-flowered; disk yellow, the 5 rays white; ray achenes epappose; disk achenes about 1 mm. long, their pappus 3 mm. long. "Simincontra" (El Salvador, Pittier).

- 9. *Calea scabrifolia*** (Hook. & Arn.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 206. 1881.

Allocarpus scabrifolius Hook. & Arn. Bot. Beechey Voy. 300. 1840.

Ferdinanda oppositifolia Schultz Bip. in Seem. Bot. Voy. Herald 303. 1856.

Zaluzania oppositifolia Schultz Bip. Flora **44**: 562. 1861.

Perymenium album S. Wats. Proc. Amer. Acad. **25**: 154. 1890.

Sinaloa to Jalisco and Durango; type from Jalisco.

Shrub, densely pubescent in the inflorescence, the branches pubescent or essentially glabrous; leaves short-petioled, the blades oblong-ovate, ovate, or lance-ovate, 4.5 to 10 cm. long, acuminate, very rough above, sparsely pubescent or essentially glabrous beneath; heads numerous, paniced, 1.5 to 2.5 cm. wide; rays about 18 to 25, white, the disk yellow; ray achenes epappose; disk achenes about 1.5 mm. long, their pappus 2.5 mm. long, or sometimes wanting. "Hierba del becerro" (Ramírez).

- 10. *Calea submembranacea*** Fernald, Bot. Gaz. **20**: 535. 1895.

Known only from the type locality, Zopilote, Tepic.

Similar to *C. scabrifolia*; stem sparingly villous; leaves submembranaceous, smoothish, nigrescent in drying. (Description compiled.)

- 11. *Calea longipedicellata*** Robins. & Greenm. Proc. Amer. Acad. **32**: 28. 1896.

Chiapas; type from Choapam. Guatemala.

Shrubby or subherbaceous, 1 to 2 meters high, glabrous throughout except for the puberulous tips of the pedicels; leaves short-petioled, the blades elliptic, 3.7 to 5 cm. long, coriaceous, denticulate; heads about 1 cm. long, discoid, orange-yellow; achenes 2 mm. long, the pappus 6 mm. long.

12. *Calea urticifolia* (Mill.) DC. Prodr. 5: 674. 1836, as *C. urticaefolia*.

Solidago urticifolia Mill. Gard. Dict. ed. 8. *Solidago* no. 30. 1768.

Caleacte urticifolia R. Br. Trans. Linn. Soc. 12: 109. 1817.

Calea axillaris urticaefolia Robins. & Greenm. Proc. Amer. Acad. 32: 27. 1896.

Tepic and Veracruz to Chiapas; type from Veracruz. Guatemala to Panama.

Shrub 3 meters high or less, more or less pubescent; leaves petioled, the blades ovate, 5 to 12 cm. long, 2 to 6 cm. wide, acute, serrate, veiny, rough above and often beneath; heads about 1 cm. wide, numerous in terminal and axillary umbelliform panicles; outer phyllaries usually herbaceous-tipped; achenes about 2.5 mm. long; pappus about 3.5 mm. long. "Quinina" (Chiapas); "tacote" (Tepic); "hierba de la paloma" (*Urbina*); "pashcuane" (Otomí); "hierba de la rabia" (Chiapas, Oaxaca); "chichiquizo," "hoja amarga" (Oaxaca, Chiapas); "jalacate" (Costa Rica).

12a. *Calea urticifolia axillaris* (DC.) Blake, Contr. Gray Herb. n. ser. 52: 57. 1917.

Mocinna serrata Lag. Gen. & Sp. Nov. 31. 1816.

Galinsogea serrata Spreng. Syst. Veg. 3: 579. 1826.

Calea axillaris DC. Prodr. 5: 673. 1836.

Durango, San Luis Potosí, and Veracruz; type locality not definitely stated.

Similar; leaf blades elliptic-lanceolate or lance-ovate, acuminate, 3.5 to 8 cm. long, 1 to 2.5 cm. wide. "Xalacatl;" "chilchaca" (San Luis Potosí); "ponchishui" (*Urbina*).

13. *Calea trichotoma* Donn. Smith, Bot. Gaz. 13: 299. 1888.

Chiapas. Guatemala; type from Cobán.

Reclining or subscandent (?) shrub, 3 meters high or less; branches densely sordid-pubescent; leaves short-petioled, the blades ovate, 3 to 5.5 cm. long, obtuse or acute, griseously pilose-tomentose beneath; heads several or numerous, in close umbellate cymes or cymose panicles; outer phyllaries herbaceous at least above; achenes about 2.5 mm. long, the pappus about 5 mm. long.

14. *Calea grayii* Klatt, Leopoldina 20: 96. 1884.

Calea tomentosa A. Gray, Proc. Amer. Acad. 15: 38. 1879. Not *C. tomentosa* Gardn. 1848.

Known only from the type locality, between San Luis Potosí and Tampico.

Branches densely canescent-tomentose; leaves slender-petioled, the blades ovate, entire, rounded, veiny, glabrate above, densely canescent-tomentose beneath; peduncles densely tomentose; heads radiate; involucre tomentose; pappus of 5 lanceolate paleae, half as long as the achene. (Description compiled.)

15. *Calea discolor* A. Gray, Proc. Amer. Acad. 15: 38. 1879.

Known only from the type, collected in Mexico without definite locality.

Branches minutely incano-tomentose; leaves petioled, the blades ovate-oblong, obtusish, entire, glabrous above, finely whitish-tomentulose beneath; heads radiate, about 1.8 cm. wide; involucre glabrous; pappus of 4 or 5 small subulate paleae. (Description compiled.)

16. *Calea brandegei* Greenm. in T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 280. 1912.

Puebla; type from Cerro de Coatape.

Shrub; branches cinereous-tomentulose, glabrate, nearly naked above; leaves petioled, the blades elliptic or linear-lanceolate, 1.5 to 2.5 cm. long, 2 to 7 mm. wide, acutish, entire, glabrate; heads yellow, about 8 mm. wide; rays 8 to 10; achenes about 2 mm. long; pappus (of ray and disk) of 4 unequal, linear, bristle-like, lacerate squamellae or awns, 1 mm. long or less.

17. *Calea manicata* (Schlecht.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 206. 1881.

Tetrachyron manicatum Schlecht. Linnaea 19: 744. 1847.

Veracruz; type from temperate Mexico, without definite locality.

Shrub up to 4 meters high, nearly glabrous; branchlets angulate; leaves lanceolate, 7 to 12 cm. long, 1.5 to 3.5 cm. wide, acuminate, sessile or short-petioled, auriculate-clasping at base, serrate; heads yellow, turbinate, radiate, numerous in flattish terminal panicles; rays about 12; pappus of 4 unequal paleaceous awns, half as long as the achenes or less.

18. *Calea orizabaensis* Klatt, Leopoldina 23: 145. 1887.

Tetrachyron orizabaense Schultz Bip.; Klatt, Leopoldina 23: 145. 1887, as synonym.

Volcán de Orizaba, altitude 2,440 to 3,050 meters.

Branches villous, pentagonal; lower leaves petioled, the blades 12.5 cm. long, 7.5 cm. wide, sinuate-undulate, pilose on the nerves beneath; rays 4 or 5; pappus awns 4, linear-lanceolate, shorter than the achene. (Description compiled.)

19. *Calea rupestris* T. S. Brandeg. Zoe 5: 258. 1908.

Puebla; type from Boca del Monte.

Small shrub; branches glabrous, striate; leaves petioled, the blades ovate, about 5 cm. long, 2 to 3 cm. wide, acute, serrulate, coriaceous, pilose on the nerves beneath; heads radiate, numerous in a flattish terminal panicle; achenes about 3 mm. long; pappus of about 7 to 10 unequal awns and squamellae, 1.2 mm. long or less.

20. *Calea pachyphylla* (Klatt) Blake, Contr. U. S. Nat. Herb. 22: 647. 1924.

Aspilia pachyphylla Klatt, Leopoldina 23: 143. 1887.

Actinomeris pachyphylla Schultz Bip.; Klatt, Leopoldina 23: 143. 1887, as synonym.

Altamirania pachyphylla Greenm. Proc. Amer. Acad. 39: 106. 1903.

Aspiliopsis pachyphylla Greenm. Bot. Gaz. 37: 222. 1904.

Oaxaca; type from Santa Gertrudis.

Suffrutescent, nearly glabrous throughout; leaves short-petioled, the blades cuneate-obovate or oblanceolate, 5 to 12 cm. long, 1.5 to 3.5 cm. wide, acute, serrate, coriaceous, feather-veined; heads about 8 in a subternate terminal panicle, radiate; achenes 3 to 4 mm. long; pappus of 2 or 3 awns 1.5 mm. long, and on each side between them 1 or 2 lacerate squamellae about half as long.

DOUBTFUL SPECIES.

- CALEA CACOSMOIDES Less. Linnaea 5: 157. 1830.

Known only from the type locality, near Jalapa, Veracruz.

Leaves obtuse or acute at base, sharply serrate, subglabrous, lucid above; heads cylindric, radiate, about 12-flowered. (Description compiled.)

- CALEA LIEBMANNII Schultz Bip.; Klatt, Leopoldina 23: 145. 1887.

Known only from the type locality, Gualulu, Mexico.

Leaves petioled, the blades ovate-elliptic, 5 cm. long, 1.8 cm. wide, coriaceous, glabrous above, ferruginous and gland-dotted beneath; heads cylindric, 6-flowered, short-pedicel, umbellate-cymose; phyllaries somewhat reflexed at apex; pappus squamellae 10, short. (Description compiled.)

- CALEA SESSILIFLORA Less. Linnaea 5: 158. 1830.

Chrysosphaerium gnaphalioides Willd.; Less. Linnaea 5: 158. 1830, as synonym. Mexico, without definite locality.

Shrub; leaves at base very obtuse and subcordate; heads cylindric, discoid, 10-flowered. (Description compiled.)

83. BEBBIA Greene, Bull. Calif. Acad. 1: 179. 1885.**1. *Bebbia juncea*** (Benth.) Greene, Bull. Calif. Acad. 1: 180. 1885.*Carphephorus junceus* Benth. Bot. Voy. Sulph. 21. 1844.

Baja California and islands; Sonora; type from Magdalena Bay, Baja California. California to New Mexico.

Shrubby, 2.5 meters high or less, intricately branched, glabrous except on the involucre and the apex of the peduncles, strong-scented; leaves opposite below, alternate above, linear, about 3 cm. long or less, 2 mm. wide or less, entire or few-toothed, fleshy; heads solitary or few and cymose at tips of the long, nearly naked branches, discoid, yellow, 1 to 1.5 cm. wide; involucre strongly graduate, 5 to 8 mm. high, the outer phyllaries (2 or 3 series) oval, subherbaceous with scarious margins, obtuse or rounded, rarely acute, canescent-pubescent, the inner (about 2 series) thinner, subscarious; proper tube of the corollas densely stipitate-glandular; achenes somewhat compressed; pappus 1-seriate, of 20 plumose bristle-like awns more than twice as long as the achene.

1a. *Bebbia juncea aspera* Greene, Bull. Calif. Acad. 1: 180. 1885.*Bebbia aspera* A. Nels. Bot. Gaz. 37: 273. 1904.

Baja California and islands, Sinaloa, and Sonora. California, Nevada, and Arizona; type from "southeastern borders of California, and adjacent Arizona."

Similar; stem and leaves more or less densely hispidulous; phyllaries usually acute or acuminate.

1b. *Bebbia juncea atriplicifolia* (A. Gray) I. M. Johnston, Proc. Calif. Acad. IV. 2: 1197. 1924.*Carphephorus atriplicifolius* A. Gray, Proc. Amer. Acad. 5: 159. 1861.*Bebbia atriplicifolia* Greene, Bull. Calif. Acad. 1: 181. 1885.

Cape Region of Baja California; type from Cape San Lucas.

Stem hispidulous or sometimes glabrous; leaves petioled, the blades triangular-ovate, 2 to 5 cm. long, 0.6 to 4 cm. wide, hastately lobed or toothed; heads several or numerous, cymose-panicled; pedicels usually stipitate-glandular as well as hispidulous; involucre less pubescent, the phyllaries acute or acuminate.

84. TRIDAX L. Sp. Pl. 900. 1753.

REFERENCE: Robinson & Greenman, Revision of the genus *Tridax*, Proc. Amer. Acad. 32: 4-10. 1896.

Herbaceous, rarely suffruticulose; leaves chiefly opposite, entire to pinnatisect; heads long-peduncled, radiate or rarely discoid; involucre 2 to several-seriate, the phyllaries usually scarious-margined; rays white, rosy, or yellow, more or less distinctly bilabiate, fertile; disk usually yellow; achenes turbinate, usually villous; pappus of plumose squamellae or awns.

Plant green; leaves lanceolate to ovate, toothed-----1. *T. procumbens*.
Plant densely lanate-tomentose; leaves narrowly linear, entire.

2. *T. candidissima*.**1. *Tridax procumbens*** L. Sp. Pl. 900. 1753.*Balbisia elongata* Willd. Sp. Pl. 3: 2214. 1804.*Amellus pedunculatus* Ort.; Willd. Sp. Pl. 3: 2214. 1804, as synonym.*Balbisia divaricata* Cass. Ann. Sci. Nat. 23: 90. 1831.

Throughout Mexico; type from Veracruz. West Indies; Guatemala to South America; introduced in Florida, India, and Mauritius.

Herbaceous or suffruticulose (?), procumbent, hirsute; leaves petioled, the blades lanceolate to ovate, 1 to 8 cm. long, 0.5 to 3 cm. wide, repand-toothed to sharply serrate, cuneate-based; involucre 2 or 3 seriate, the phyllaries oblong, acutish; rays creamy-yellowish or "white," the disk yellow; pappus awns 4 mm. long, about twice as long as the achene. "Cura-gusano" (Guatemala); "hierba del toro" (El Salvador).

In eastern Guatemala the leaves are placed on the flesh to kill carnivorous insect larvae.

- 1a. *Tridax procumbens ovatifolia*** Robins. & Greenm. Proc. Amer. Acad. **32**: 7. 1896.

Known only from the type locality, Yalalag, Oaxaca.

Similar, more softly pubescent; leaves ovate, finely serrate, about 1.8 cm. long, 1 cm. wide; phyllaries mostly broadly obovate.

- 2. *Tridax candidissima*** A. Gray, Proc. Amer. Acad. **15**: 39. 1879.

San Luis Potosí; type from Angostura.

Low, suffrutescent, ascending; leaves 2.5 to 5 cm. long, about 1.5 mm. wide, entire; heads solitary, discoid, yellow; achenes turbinate, densely silky; pappus of 20 slender plumose awns, three times as long as the achene.

85. *HEMIZONIA* DC. Prodr. **5: 692. 1836.**

Herbs, rarely fruticose; leaves (in ours) opposite below, alternate above, entire or pinnatisect; heads (in ours) solitary or cymose-panicled, yellow, radiate; involucre 1-seriate, the phyllaries herbaceous above, scarious-margined and ampliate below and enfolding the gibbous subquadrangular rugose epappose ray achenes; receptacle bearing a single series of paleae between the rays and the disk flowers; disk (in ours) infertile, the achenes with a pappus of 6 to 12 awns or squamellae.

Leaves densely silky-strigose.....**1. *H. palmeri*.**
Leaves green.

Heads mostly solitary at tips of branchlets, forming a thyrse; leaves filiform.
2. *H. frutescens*.

Heads solitary at tips of branches, cymosely arranged; leaves linear or linear-lanceolate.....**3. *H. greeneana*.**

- 1. *Hemizonia palmeri*** Rose, Contr. U. S. Nat. Herb. **1**: 24. 1890.

Known only from the type locality, Guadalupe Island, Baja California.

Low, much branched, the woody stem becoming 1 cm. thick; leaves and young branches densely silky-strigose; leaves opposite below, crowded, oblanceolate or linear, 1 to 1.8 cm. long, 1.5 to 3 mm. wide, entire, acutish; heads about 1.2 cm. wide, densely panicled at ends of branches; rays 8; pappus of the disk achenes of 6 to 12 linear-lanceolate acuminate denticulate awns, longer than the achene.

- 2. *Hemizonia frutescens*** A. Gray, Proc. Amer. Acad. **11**: 79. 1876.

Known only from the type locality, Guadalupe Island, Baja California.

Fruticose, erect, about 60 cm. high, hirsute-pilose and glandular-viscid; flowering branches fastigate, very leafy; leaves filiform, about 2.5 cm. long, 1 mm. wide, entire or with a pair of short lateral lobes; heads about 6 mm. high; rays 8 or 9; pappus of the disk achenes of 5 linear or subulate fimbriate-denticulate paleae.

- 3. *Hemizonia greeneana*** Rose, Contr. U. S. Nat. Herb. **1**: 24. 1890.

Known only from the type locality, Guadalupe Island, Baja California.

Suffrutescent, 0.6 to 1 meter high, tufted, more or less pubescent and viscid; leaves of the sterile branches linear-lanceolate, 1.2 to 2 cm. long, pinnatisect with 6 to 8 lobes, or sometimes entire, those of the flowering branches linear, entire; rays 8; pappus of the disk achenes of 6 to 10 unequal paleaceous awns.

86. *JAUMEA* Pers. Syn. Pl. **2: 397. 1807.**

REFERENCE: Rydberg, N. Amer. Fl. **34**: 3. 1914.

- 1. *Jaumea peduncularis*** (Hook. & Arn.) Oliver & Hiern.; Oliver, Fl. Trop. Afr. **3**: 395. 1877.

Chaetymenia peduncularis Hook. & Arn. Bot. Beechey Voy. 298. pl. 62. 1837.

Jalisco and Tepic; type from Jalisco.

Shrubby, sparsely branched; stem glabrous except for hairy lines on the upper internodes; leaves opposite, linear-lanceolate, 8 to 12.5 cm. long, 7 to 17 mm. wide, acuminate, entire, ciliate toward base, triplinerved; heads solitary or ternate, yellow, radiate, 3 to 4 cm. wide, long-peduncled; involucre about 4-seriate, graduate, 1.5 cm. high, with ovate appressed phyllaries; achenes narrowly oblanceolate, about 8 mm. long; pappus of about 20 rigid barbate bristles, about 1 cm. long, slightly paleaceous-dilated at base.

87. VENEGASIA DC. Prodr. 6: 43. 1837.

REFERENCE: Rydberg, N. Amer. Fl. 34: 5. 1914.

1. Venegasia carpesioides deltoidea (Rydb.) Blake.

Venegasia deltoidea Rydb. N. Amer. Fl. 34: 5. 1914.

Known only from the type locality, Sauzal, Baja California.

Suffrutescent, 50 cm. high and more, somewhat puberulous; leaves alternate; petioles slender, about 2 cm. long; blades triangular-ovate, 5 to 8 cm. long, 2 to 3.8 cm. wide, acuminate, subtruncate to slightly cordate at base, dentate, thin; heads radiate, yellow, about 4 cm. wide, terminal and axillary, nodding in fruit, long-peduncled; involucre broad, about 3-seriate, about 1.2 cm. high, puberulous, the outer phyllaries connate below, oval or oblong, herbaceous, with spreading or reflexed tips, the inner membranous; receptacle hairy; achenes curved, about 3 mm. long, striate, glabrous, somewhat roughened, epappose.

88. CLAPPIA A. Gray in Torr. U. S. & Mex. Bound. Bot. 93. 1859.

REFERENCE: Rydberg, N. Amer. Fl. 34: 5. 1914.

1. Clappia suaedaefolia A. Gray in Torr. U. S. & Mex. Bound. Bot. 93. 1859.

Tamaulipas. Texas; type from Laredo.

Suffruticose or herbaceous, much branched from base, low, pale green, glabrous, very leafy; leaves alternate, linear or linear-filiform, 2 to 6 cm. long, 0.5 to 2.5 mm. wide, entire or trifid, fleshy, subterete or flattened; heads radiate, yellow, about 3 cm. wide, solitary at tips of upwardly thickened peduncles about 5 cm. long; involucre about 4-seriate, graduate, about 7 mm. high, the phyllaries oblong, rounded, glandular-vittate, thin-margined; receptacle densely paleaceous-setose; achenes ribbed, sparsely hispidulous, 3 mm. long; pappus of about 35 unequal, hispidulous, setiform paleae, connate at extreme base, about 5 mm. long.

89. PSILOSTROPHE DC. Prodr. 7: 261. 1838.

REFERENCE: Rydberg, N. Amer. Fl. 34: 6-9. 1914.

1. Psilostrophe cooperi (A. Gray) Greene, Pittonia 2: 176. 1891.

Riddellia cooperi A. Gray, Proc. Amer. Acad. 7: 358. 1868.

Northern Baja California. Nevada to California and Arizona; type from Fort Mohave, Arizona.

Shrub, forming clumps about 0.5 meter high; stem and branches densely pannose-tomentose; leaves alternate, linear or linear-oblanceolate, 2 to 5 cm. long, 1 to 4 mm. wide, entire, green in age; heads radiate, yellow, solitary or cymose-panicked, 1 to 2.5 cm. wide; involucre narrow, equal, woolly, of erect connivent phyllaries; rays about 5, broad, papery-persistent; achenes slender, nearly glabrous; pappus of several usually oblong, obtuse or acute, hyaline paleae.

The other species of this genus are herbaceous or sometimes indurate at base, but are never really frutescent.

90. PERITYLE Benth. Bot. Voy. Sulph. 23. *pl.* 15. 1844.¹REFERENCE: Rydberg, N. Amer. Fl. **34**: 12-19. 1914.

Herbs or undershrubs; leaves usually opposite at least below, petioled, entire to dissected; heads radiate or discoid, white or yellow; involucre sub-2-seriate, equal, the phyllaries carinate at least at maturity; rays fertile; disk corollas 4-toothed; achenes linear or oblong, strongly compressed, usually with distinct, white, callous, ciliate margins; pappus a crown of more or less connate squamellae, and usually 1 or 2 slender bristlelike awns, or rarely wanting.

Several of the species included in this treatment may be merely herbaceous.

Heads discoid.

Plant white-tomentose; heads numerous, naked-panicled.....1. *P. incana*.

Plant green; heads solitary or few.....6. *P. jaliscana*.

Heads radiate.

Leaves deeply cut or lobed.

Pappus awn 1, much shorter than the achene.....7. *P. lineariloba*.

Pappus awns 1 or 2, as long as the achene.

Pappus awns 2; involucre cinereous-puberulent.....8. *P. coronopifolia*.

Pappus awn 1; involucre hirsute or villous.

Leaf blades usually 5-lobed, very thin, nearly glabrous.....15. *P. lobata*.

Leaf blades 3-lobed, thickish, glandular-pubescent.....16. *P. trisecta*.

Leaves not deeply cut or lobed.

Rays white, 2 to 4 mm. long; pappus awns 2 (rarely 1 or none).

Achenes glabrous on the faces; leaf blades nearly or quite entire, 1 to 3 cm. long.....3. *P. rosei*.

Achenes pubescent on the faces; leaf blades usually coarsely toothed, if entire only 3 to 8 mm. long.

Leaf blades 3 to 8 mm. long, entire or 1 or 2-toothed on each side.

Petioles usually much longer than the blades; disk corollas merely glandular on the teeth.....4. *P. hofmeisteria*.

Petioles shorter than the blades; disk corollas hirsute-pilose on the teeth.....5. *P. trichodonta*.

Leaf blades 1 to 5 cm. long, coarsely dentate.....2. *P. spilanthis*.

Rays yellow, rarely white (?), 5 to 10 mm. long; pappus awn 1 or none.

Stems puberulent or glandular-puberulent.

Stem puberulent, obscurely if at all glandular; pappus awn as long as the achene or longer.....9. *P. leptoglossa*.

Stem glandular-puberulent; pappus awn about one-third as long as the achene.....10. *P. parryi*.

Stems viscid-villous.

Achenes strongly ciliate; pappus awn about twice as long as the achene.....11. *P. cordifolia*.

Achenes obscurely ciliate; pappus awn not twice as long as the achene, or wanting.

Leaves shallowly lobed, the lobes acutely toothed; squamellae well developed.....12. *P. palmeri*.

Leaves dentate or doubly dentate, not lobed; squamellae minute or wanting.

Leaf blades 1 to 2.5 cm. long; pappus present.....13. *P. lloydii*.

Leaf blades 4 to 7 cm. long; pappus wanting.....14. *P. grandifolia*.

¹ The related genus *Amauria* Benth. is described by Rydberg as consisting of suffruticose perennials, but the two known species are winter annuals.

1. **Perityle incana** A. Gray, Proc. Amer. Acad. 11: 78. 1876.

Nesothamnus incanus Rydb. N. Amer. Fl. 34: 12. 1914.

Known only from the type locality, Guadalupe Island, Baja California.

Shrub 1 meter high, densely and closely white-tomentose throughout; leaf blades 2.5 to 7 cm. long and wide, pinnately cut, the divisions bluntly lobed and toothed; heads about 6 mm. wide, very numerous in a naked pedunculate panicle; achenes rather densely pubescent and ciliate; pappus of squamellae, without awns.

2. **Perityle spilanthoides** (Schultz Bip.) Rydb. N. Amer. Fl. 34: 17. 1914.

Galinsogeopsis spilanthoides Schultz Bip. in Seem. Bot. Voy. Herald 307. 1856.

Pericome spilanthoides Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 215. 1881.

Perityle microcephala A. Gray, Proc. Amer. Acad. 21: 391. 1886.

Perityle saxosa T. S. Brandeg. Zoe 5: 225. 1905.

Sinaloa, Chihuahua, and Durango; type from the Sierra Madre of northwestern Mexico. Arizona.

Suffruticulose, lax or decumbent, much branched, up to 40 cm. long, griseous-puberulous; leaf blades 1 to 5 cm. long and wide; heads cymose-panicled; pappus a crown of squamellae and 1 or 2 awns, these shorter than the achene.

3. **Perityle rosei** Greenm. Proc. Amer. Acad. 40: 45. 1905.

Known only from the type locality, Sierra Madre west of Bolaños, Jalisco.

Suffruticulose, 10 to 20 cm. high, pilosulous; leaf blades deltoid-ovate, 1 to 3 cm. long, 0.5 to 2 cm. wide; pappus a crown of squamellae, and 2 awns about as long as the achene.

4. **Perityle hofmeisteria** Rydb. N. Amer. Fl. 34: 18. 1914.

Known only from the type locality, vicinity of City of Durango, Durango.

Suffruticulose, diffusely branched, about 15 cm. high, finely puberulent; petioles 5 to 14 mm. long; leaf blades ovate or rhombic-ovate, 3 to 8 mm. long; heads solitary, on peduncles 1 to 3 cm. long; involucre puberulous but green; pappus a crown of squamellae and 2 awns about as long as the achene.

5. **Perityle trichodonta** Blake, Proc. Biol. Soc. Washington 37: 60. 1924.

Known only from the type locality, Sierra Madre west of Bolaños, Jalisco.

Suffruticulose, 10 cm. high, densely griseous-puberulous; petioles about 2 mm. long; leaf blades ovate or rhombic-ovate, 3 to 5 mm. long; peduncles 1 cm. long or less; involucre griseous-pilosulous; pappus as in the last species.

6. **Perityle jaliscana** A. Gray in S. Wats. Proc. Amer. Acad. 22: 431. 1887.

Jalisco; type from Río Blanco.

Suffruticulose, loose or procumbent, up to 25 cm. long, puberulent; leaf blades deltoid-ovate, 1 to 1.8 cm. long, coarsely toothed, about equaling the petioles; heads axillary and terminal, discoid; achenes sometimes 1-carinate on the faces; pappus awns 1 mm. long or less; squamellae very short.

7. **Perityle lineariloba** Rydb. N. Amer. Fl. 34: 18. 1914.

Known only from the type locality, San Ramón, Durango.

Suffruticulose (?), decumbent, about 30 cm. long, puberulous; leaf blades triangular in outline, 2 to 4 cm. long, pinnately 3 to 5-parted with entire or lacinate-lobed divisions, very thin; peduncles 5 to 10 cm. long; rays white, about 4 mm. long.

8. **Perityle coronopifolia** A. Gray, Pl. Wright. 2: 82. 1853.

Laphamia coronopifolia Hemsl. Biol. Centr. Amer. Bot. 2: 210. 1881.

?*Laphamia scopulorum* Jones, Contr. West. Bot. 12: 48. 1908.

Chihuahua and Sonora. Arizona and New Mexico; type from Copper Mines, New Mexico.

Suffruticulose, many-stemmed, diffusely branched or erect, up to 25 cm. long, puberulous; leaf blades triangular, 3 to 12 mm. long, ternately pinnatisect, the primary divisions usually lobed or toothed; rays white, 3 to 6 mm. long.

9. **Perityle leptoglossa** Harv. & Gray, Mem. Amer. Acad. n. ser. 4: 77. 1849.

Leptopharynx leptoglossa Rydb. N. Amer. Fl. 34: 22. 1914.

Sonora; type wrongly ascribed to California.

Suffrutescent, branched, griseous-puberulous on the younger parts; leaf blades suborbicular, about 2 cm. wide, cordate at base, shallowly and obtusely lobed, the lobes crenate-toothed or crenate; heads about 1.5 to 2.3 cm. wide; rays apparently white; achenes ciliolate.

10. **Perityle parryi** A. Gray, Pl. Wright. 2: 106. 1853.

Laphamia parryi Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. 2: 210. 1881.

Leptopharynx parryi Rydb. N. Amer. Fl. 34: 22. 1914.

Chihuahua. Texas; type from the Rio Grande.

Similar to the last species; stem subglandular-puberulous; leaf blades crenate or slightly crenate-lobed; rays yellow; achenes ciliate.

11. **Perityle cordifolia** (Rydb.) Blake.

Leptopharynx cordifolia Rydb. N. Amer. Fl. 34: 22. 1914.

Sonora and Sinaloa; type from Topolobampo, Sinaloa.

Suffrutescent (?), low; leaf blades cordate-ovate, 1.5 to 3.2 cm. long, doubly crenate-dentate; heads about 2.5 cm. wide; rays probably yellow.

12. **Perityle palmeri** S. Wats. Proc. Amer. Acad. 24: 57. 1889.

Leptopharynx palmeri Rydb. N. Amer. Fl. 34: 23. 1914.

Known only from the vicinity of the type locality, Guaymas, Sonora.

Suffruticulose (?), about 25 cm. high; leaf blades cordate-ovate, 3 to 5 cm. long, thin, about equaling the petioles; heads about 2 cm. wide; rays yellow; pappus awn nearly twice as long as the achene.

13. **Perityle lloydii** Robins. & Fern. Proc. Amer. Acad. 30: 118. 1894.

Leptopharynx lloydii Rydb. N. Amer. Fl. 34: 22. 1914.

Known only from the type locality, Badehuache, Sonora.

Suffruticulose, 10 to 30 cm. high; leaf blades deltoid-ovate, doubly dentate, villous; heads about 1.5 cm. wide; rays pale yellow; pappus a minute crown of squamellae and 1 awn about equaling the achene.

14. **Perityle grandifolia** T. S. Brandeg. Zoe 5: 224. 1905.

Leptopharynx grandifolia Rydb. N. Amer. Fl. 34: 23. 1914.

Known only from the type locality, Cerro Colorado, Sinaloa.

Suffrutescent, 10 to 20 cm. high; leaf blades ovate, about equaling the petioles, crenate-serrate, cordate at base, thin; rays "yellow."

15. **Perityle lobata** (Rydb.) I. M. Johnston, Proc. Calif. Acad. IV. 12: 1205. 1924.

Leptopharynx lobata Rydb. N. Amer. Fl. 34: 23. 1914.

Baja California; type from Coronado.

Suffrutescent (?), about 10 cm. high; leaf blades orbicular-reniform in outline, 1.5 to 2.5 cm. wide, about equaling the petioles, the lobes oblong-obovate, doubly sinuate, dentate; rays yellow; pappus awn nearly twice as long as the achene.

16. **Perityle trisecta** Rydb.; Macbride, Contr. Gray Herb. n. ser. 56: 39. 1918.

Leptopharynx trisecta Rydb. N. Amer. Fl. 34: 23. 1914.

Chihuahua; type from City of Chihuahua.

Suffruticulose, much branched, up to 30 cm. high; leaf blades 1 to 3 cm. long, usually shorter than the petioles, deeply 3-lobed, the lobes toothed or crenate; rays pale yellow; pappus awn longer than the achene.

91. LAPHAMIA A. Gray, Pl. Wright. 1: 99. 1852.

REFERENCE: Rydberg, N. Amer. Fl. 34: 24-27. 1914.

1. Laphamia dissecta Torr.; A. Gray, Pl. Wright. 2: 81. 1853.*Laphamia lemmoni pedata* A. Gray, Proc. Amer. Acad. 16: 101. 1880.*Perityle dissecta* A. Gray, Syn. Fl. 1²: 320. 1884.*Leptopharynx dissecta* Rydb. N. Amer. Fl. 34: 24. 1914.

Niggerhead Mountains, along Arizona-Sonora boundary line. Texas and Arizona; type from Presidio del Norte, Texas.

Suffrutescent from a thick woody caudex, many-stemmed, about 15 cm. high, densely spreading-villous and glandular-puberulent, very leafy; leaf blades suborbicular-ovate in outline, 5 to 10 mm. long, about equaling the petioles, pedately trisect with lobed and toothed divisions; heads discoid, solitary, whitish, about 7 mm. wide; achenes linear-oblong, densely hispidulous, not distinctly ciliate, marginate all around (including apex); pappus awn 1, shorter than achene, or wanting; squamellae none.

Several other species of *Laphamia* occur near the Mexican boundary, and will doubtless be found in Mexico.

92. FLAVERIA [Juss.] J. F. Gmel. Syst. Nat. 2: 1269. 1791.REFERENCES: J. R. Johnston, A revision of the genus *Flaveria*, Proc. Amer. Acad. 39: 279-292. 1903; Rydb. N. Amer. Fl. 34: 142-146. 1915.

Herbaceous or suffrutescent, usually glabrous; leaves opposite, sessile, narrow; heads yellow, small, in close cymose panicles or glomerules; involucre 1-seriate, of 1 to 8 phyllaries, sometimes with a few bractlets at base; ray 1 or wanting; achenes oblong, 10-ribbed; pappus (in ours) none.

Phyllaries 3 or 4; ligule 5 mm. long.....1. **F. vaginata.**Phyllaries 5; ligule 2 mm. long.....2. **F. linearis.****1. Flaveria vaginata** Robins. & Greenm. Proc. Amer. Acad. 32: 48. 1896.

Known only from the type locality, between Coixlahuaca and Tamazulapan, Oaxaca.

Suffrutescent (?), many-stemmed from a thick woody root, about 20 cm. high, prostrate to ascending; internodes very short, pubescent in lines; leaves linear-lanceolate, 2 to 3 cm. long, attenuate, entire; heads 6 to 8-flowered, closely aggregated; ray achene 2.2 mm., disk achenes 1.8 mm. long.

2. Flaveria linearis Lag. Gen. & Sp. Nov. 33. 1816.*Flaveria maritima* H. B. K. Nov. Gen. & Sp. 4: 285. 1820.*Selloa nudata* Nutt. Amer. Journ. Sci. I. 5: 300. 1822.*Flaveria tenuifolia* Nutt. Journ. Acad. Phila. 7: 81. 1834.*Gymnosperma nudatum* DC. Prodr. 5: 312. 1836.

Yucatán. Florida, Bahamas, and Cuba; type from Havana, Cuba.

Suffrutescent, glabrous, up to 80 cm. high, prostrate to erect; lower internodes short, the leaf bases persistent; leaves linear, 2 to 10 cm. long, 1 to 4 mm. wide, fleshy, entire; heads 2 to 7-flowered, crowded in small, ternately divided, cymose panicles, short-pedicel or sessile, about 5 mm. high; achenes equal, about 1.6 mm. long.

93. EUTETRAS A. Gray, Proc. Amer. Acad. 15: 39. 1879.

REFERENCE: Rydberg, N. Amer. Fl. 34: 30. 1914.

1. Eutetras palmeri A. Gray, Proc. Amer. Acad. 15: 40. 1879.*Eutetras pringlei* Greenm. Proc. Amer. Acad. 41: 266. 1905.

Zacatecas to San Luis Potosí and Hidalgo; type from Angostura, San Luis Potosí.

Undershrub 10 to 25 cm. high, cinereous-puberulous, especially on the branches, and more or less glandular; leaves chiefly opposite, on slender petioles 0.5 to 3 cm. long, the blades deltoid-ovate, 1 to 4.5 cm. long, about as wide, acute, dentate-serrate or sinuate-dentate; heads 1 to 3, radiate, 1.2 to 2 cm. wide, white or rosy-tinged, on peduncles 2 to 5 cm. long; involucre 2-seriate, equal, 5 to 8 mm. high; achenes 4-angled, about 3 mm. long; pappus of 4 slender awns 2.5 to 5 mm. long, and 4 oblong squamellae 0.5 to 1 mm. long.

94. PALAFOXIA Lag. Gen. & Sp. Nov. 26. 1816.

REFERENCE: Rydberg, N. Amer. Fl. **34**: 62-63. 1914.

1. Palafoxia leucophylla A. Gray, Proc. Amer. Acad. **8**: 291. 1873.

Palafoxia arenaria T. S. Brandeg. Proc. Calif. Acad. II. **2**: 178. 1889.

Palafoxia linearis leucophylla I. M. Johnston, Proc. Calif. Acad. IV. **12**: 1202. 1924.

Baja California; type from Carmen Island.

Suffrutescent, decumbent, up to 1 meter long, hispid and glandular; leaves alternate, linear or elliptic-linear, 1.5 to 3.5 cm. long, 2 to 6 mm. wide, short-petioled, obtuse, entire, canescent-strigose; heads few, discoid, turbinate, about 1.8 cm. high, flesh-colored; phyllaries 1-seriate, herbaceous; achenes linear-oblong, 4-angled, about 8 mm. long; pappus of 4 to 6 linear-oblong truncate scarious paleae with strong midrib, 5 mm. long.

95. ERIOPHYLLUM Lag. Gen. & Sp. Nov. 28. 1816.

REFERENCE: Rydberg, N. Amer. Fl. **34**: 82-96. 1915.

1. Eriophyllum confertiflorum (DC.) A. Gray, Proc. Amer. Acad. **19**: 25. 1883.

Bahia confertiflora DC. Prodr. **5**: 657. 1836.

Bahia tenuifolia DC. Prodr. **5**: 657. 1836.

Bahia trifida Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 374. 1841.

Eriophyllum confertiflorum trifidum A. Gray, Proc. Amer. Acad. **19**: 25. 1883.

Eriophyllum confertiflorum laxiflorum A. Gray, Proc. Amer. Acad. **19**: 25. 1883.

Eriophyllum tenuifolium Rydb. N. Amer. Fl. **34**: 96. 1915.

Eriophyllum crucigerum Rydb. N. Amer. Fl. **34**: 96. 1915.

Baja California and islands; Sonora. California and Arizona; type from California.

Frutescent or suffrutescent, up to 60 cm. high, densely white-tomentose on stem, branches, and involucre; leaves opposite below, alternate above, 0.6 to 3 cm. long, the blade usually deltoid-ovate in outline, pinnately 3 to several-lobed, usually green above, tomentose beneath, the segments usually linear and entire, revolute; heads small, yellow, in small umbelliform cymes or cymose panicles, subsessile or pedicellate (pedicels sometimes 2 cm. long); phyllaries about 5, firm, about 4 mm. long; rays about 5; achenes pubescent and glandular to nearly glabrous, narrowly oblong or obovoid, about 2 mm. long; pappus about 0.8 mm. long, of several obtuse or acutish, unequal, paleaceous squamellae.

96. CHAENACTIS DC. Prodr. **5**: 659. 1836.

REFERENCE: Rydberg, N. Amer. Fl. **34**: 64-74. 1914.

1. Chaenactis parishii A. Gray, Proc. Amer. Acad. **20**: 299. 1885.

Northern Baja California. Southern California; type from southern border of California.

Suffrutescent, decumbent and much branched at base, up to 50 cm. high, white-tomentose, sometimes glabrescent above, stipitate-glandular above beneath the tomentum, leafy below; leaves alternate, 2 to 5 cm. long, the blades oblong-ovate, pinnatilobate, the lobes 3 to 6 pairs, linear, usually entire; heads solitary

or few, long-peduncled, discoid, ochroleucous or tinged with purplish, about 1.8 cm. high; phyllaries very unequal, linear; achenes nearly linear, densely pubescent, about 7 mm. long; pappus of about 13 linear acutish hyaline paleae about 5.5 mm. long.

97. BAHIA Lag. Gen. & Sp. Nov. 30. 1816.

REFERENCE: Rydberg, N. Amer. Fl. **34**: 34–37. 1914.

Herbaceous or suffrutescent, usually cinereous or canescent-pubescent; leaves opposite, at least below, usually dissected; heads yellow, radiate, solitary at tips of branches or cymose-panicked; involucre 2 or 3-seriate, subequal, the inner phyllaries often with scarious colored tips or margins; achenes very slenderly clavate, substipitate, 4-angled, hirsute below, hirsutulous above; pappus of about 8 hyaline paleae, in ours rounded and with obscure or evident costa.

Leaves distinctly canescent-tomentose or canescent-pubescent beneath.

Lobes of the leaves very narrow, often again lobed, usually more than 3.

1. B. absinthifolia.

Lobes of the leaves linear-lanceolate to cuneate, usually 3 and entire.

1a. B. absinthifolia dealbata.

Leaves green or slightly cinereous beneath.

Pappus paleae suborbicular, nearly as wide as long-----**2. B. pringlei.**

Pappus paleae obovate, much longer than wide-----**3. B. xylopoda.**

1. Bahia absinthifolia Benth. Pl. Hartw. 18. 1839.

Coahuila and Durango to Aguascalientes and San Luis Potosí; type from Aguascalientes. Arizona and Texas.

Suffruticulose, up to 35 cm. high, cinereous-strigillose, whiter on the lower side of the leaves; leaves petioled, 2 to 5 cm. long, pinnatisect, the segments 2.5 mm. wide or less; heads several, pedunculate, about 1.8 cm. wide; involucre about 6 mm. high; achenes 4 mm. long; squamellae obovate, 1.5 mm. long.

1a. Bahia absinthifolia dealbata A. Gray, Pl. Wright. 1: 121. 1852.

Bahia dealbata A. Gray, Mem. Amer. Acad. n. ser. 4: 99. 1849.

Picradeniopsis dealbata Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 192. 1913.

Chihuahua, Coahuila, and Durango; type from valley between Mapimí and Guajuquilla, Chihuahua. Texas to Arizona.

Similar, but with less divided leaves with broader segments, these sometimes pannose-tomentose.

2. Bahia pringlei Greenm. Proc. Amer. Acad. **32**: 309. 1897.

Hidalgo; type from Tula.

Suffruticulose, procumbent at base, with slender rootstocks; stem cinerous-strigillose; leaves 2 to 3.5 cm. long, twice or thrice ternately pinnatisect, with narrowly linear divisions; heads about 2 cm. wide.

3. Bahia xylopoda Greenm. Proc. Amer. Acad. **34**: 577. 1899.

Bahia ehrenbergii Schultz Bip.; Rydb. N. Amer. Fl. **34**: 35. 1914.

Hidalgo; type from Pachuca.

Very similar to *B. pringlei* except for the difference in pappus.

98. LOXOTHYSANUS Robinson, Proc. Amer. Acad. **43**: 43. 1907.

Low shrubs; leaves opposite, broad, crenate or repand, slender-petioled; heads white, discoid; involucre 2-seriate, equal, the phyllaries subherbaceous, somewhat thin-margined and often with somewhat yellowish tips; achenes as in *Bahia*; pappus oblique, of about 8 paleae, the innermost longest, sometimes aristiform, the others blunt, the outermost shortest.

The following treatment includes all the known species.

Plants erect or ascending; pappus 1 to 1.8 mm. long.

Heads several or numerous, cymose or cymose-panicled on a common peduncle.

1. *L. sinuatus*.

Heads few or solitary, on long peduncles.....2. *L. pedunculatus*.

Plants procumbent; pappus usually less than 1 mm. long.....3. *L. filipes*.

1. *Loxothysanus sinuatus* (Less.) Robinson, Proc. Amer. Acad. 43: 43. 1907.

Bahia sinuata Less. Linnaea 5: 160. 1830.

Bahia ? nepetaefolia A. Gray, Proc. Amer. Acad. 5: 184. 1861.

Tamaulipas, Puebla, and Veracruz; type from Hacienda de la Laguna, Veracruz.

Low puberulous shrub; petioles 1 to 4.5 cm. long; leaf blades broadly ovate or deltoid-ovate, 2.5 to 8 cm. long and wide, obtuse, coarsely repand or weakly 3-lobed, green above, griseous-puberulous or tomentulose beneath; heads about 7 mm. high, the pedicels 1.5 cm. long or less; longest palea of pappus 1.5 to 1.8 mm. long.

2. *Loxothysanus pedunculatus* Rydb. N. Amer. Fl. 34: 33. 1914.

San Luis Potosí; type from Tamasopo Canyon.

Similar to no. 1; heads less definitely cymose, the peduncles 2.5 to 7 cm. long; pappus 1 to 1.2 mm. long.

3. *Loxothysanus filipes* Robinson, Proc. Amer. Acad. 43: 44. 1907.

Veracruz; type from Zacuapan.

Small and procumbent; leaf blades suborbicular, 1 to 2 cm. long, repand-crenate; heads few; pappus 0.7 to 1.2 mm. long.

99. *DYSSODIA* Cav. Descr. Pl. 202. 1802.

REFERENCE: Rydb. N. Amer. Fl. 34: 160-179. 1915.

Herbs or shrubs, with oil glands; leaves opposite or alternate, entire to dissected; heads radiate or rarely discoid, yellow, rarely orange; involucre of usually connate and equal, glandular-punctate phyllaries, often with a calyculus at base; achenes slender; pappus of 5 to 20 paleae, these often aristate-dissected or awned.

Leaves lanceolate to spatulate, serrate or entire, not lobed.

Rays deep orange or brick-red.....1. *D. oaxacana*.

Rays yellow.

Leaves lanceolate or lance-ovate, 1.2 to 2 cm. wide.....2. *D. serratifolia*.

Leaves narrowly lanceolate, 2 to 8 mm. wide.....3. *D. integrifolia*.

Leaves usually pinnatisect, if rarely entire then acerose-filiform.

Involucre conspicuously calyculate by a series of outer phyllaries of different form or texture from the inner.

Primary divisions of at least the lower leaves lanceolate to ovate.

Leaves opposite essentially throughout.

Lateral lobes of the leaves distinctly stipitate, suborbicular, laciniate.

4. *D. speciosa*.

Lateral lobes of the leaves subsessile, ovate, serrate...5. *D. aurantia*.

Leaves chiefly alternate.....6. *D. porophylloides*.

Primary divisions of the leaves linear or essentially so.

Pappus paleae dissected nearly to base into numerous bristles.

Outer phyllaries linear-lanceolate, acuminate; peduncles usually thickened under the heads; principal phyllaries essentially glabrous on back.....7. *D. tagetiflora*.

Outer phyllaries linear-spatulate or oblong, obtuse or acute; peduncles scarcely or not thickened under the heads; principal phyllaries more or less densely hirsute on back.....8. *D. pinnata*.

Pappus paleae 1-aristate from a bifid apex or awnless...10. *D. treculii*.

Involucre ecalyculate or with very short and minute outermost phyllaries.

Leaves acerose, entire; pappus paleae all dissected into 3 to 5 bristles.

9. *D. acerosa*.

Leaves pinnatisect; pappus paleae with 1 to 3 awns or awnless.

Plants canescent-tomentose.

Pappus paleae distinct.....16. *D. setifolia*.

Pappus paleae united into a cup.....17. *D. greggii*.

Plants glabrous to densely puberulous or cinereous-pilosulous.

Involucre densely puberulent or pruinose.

Principal phyllaries united essentially up to the short free tips, the margins of the outer principal ones not free.

Heads larger; involucre 6 mm. high, 5 to 7 mm. wide.

10. *D. treculii*.

Heads smaller; involucre 3.5 to 4.5 mm. high, 2 to 5 mm. wide.

11. *D. hartwegii*.

Principal phyllaries less completely united, the outer ones with margins free for half their length or more...12. *D. pentachaeta*.

Involucre glabrous except for the ciliate margins of the phyllaries.

Principal phyllaries united essentially to the short free tips, the margins of the outer ones not free; accessory phyllaries (forming the calyculus) conspicuous.....10. *D. treculii*.

Principal phyllaries less completely united, the outer with margins free for half their length or more.

Pappus paleae all split into 3 to 5 awns.....15. *D. aurantiaca*.

Pappus paleae 1-awned or awnless.

Outer pappus paleae obtuse or acute, not aristate.

13. *D. berlandieri*.

Pappus paleae all aristate.....14. *D. thurberi*.

1. *Dyssodia oaxacana* Greenm. Field Mus. Bot. 2: 273. 1907.

Gymnolaena oaxacana Rydb. N. Amer. Fl. 34: 160. 1915.

Oaxaca; type from Almoloyas.

Shrub 1.3 to 2 meters high, slightly pubescent; leaves opposite, the blades elliptic-ovate, 1 to 4 cm. long, 4 to 11 mm. wide, acute, serrate, narrowed to a short petioliform base; heads solitary or few, about 1.8 cm. high; involucre about 1.4 cm. high, the phyllaries united nearly to apex; pappus paleae dissected into numerous bristles.

2. *Dyssodia serratifolia* DC. Prodr. 5: 641. 1836.

Hymenatherum serratifolium Hemsl. Biol. Centr. Amer. Bot. 2: 221. 1881.

Dyssodia sessilifolia A. Gray, Proc. Amer. Acad. 19: 37. 1883.

Gymnolaena serratifolia Rydb. N. Amer. Fl. 34: 161. 1915.

Oaxaca; type from Atitla.

Shrubby, essentially glabrous; leaves chiefly opposite, the blades 5 to 8 cm. long, acute, serrate, densely glandular-punctate; heads cymose, about 1.3 cm. wide; involucre 1 cm. high.

3. *Dyssodia integrifolia* A. Gray, Proc. Amer. Acad. 19: 37. 1883.

Gymnolaena integrifolia Rydb. N. Amer. Fl. 34: 161. 1915.

Puebla to Chiapas; type from Chiapas.

Similar to *D. serratifolia*; leaf blades 2.2 to 5 cm. long, acuminate, serrulate; heads mostly solitary; involucre 1.3 to 1.7 cm. high.

4. *Dyssodia speciosa* A. Gray, Proc. Amer. Acad. 5: 163. 1861.

Lebetina speciosa A. Nels. Bot. Gaz. 47: 435. 1909.

Clomenocoma speciosa Rydb. N. Amer. Fl. 34: 165. 1915.

Southern Baja California; type from Cape San Lucas.

Glabrous, weak shrub; leaves petioled, 2 to 4 cm. long, divided into 3 or 5 segments; heads solitary, long-peduncled, about 4.5 cm. wide; involucre broad, about 1.5 cm. high, with a calyculus of numerous filiform-subulate phyllaries half as long; pappus paleae dissected into numerous bristles.

5. **Dyssodia aurantia** (L.) Robinson, Proc. Amer. Acad. 49: 507. 1913.

Aster aurantius L. Sp. Pl. 877. 1753.

Dyssodia appendiculata Lag. Gen. & Sp. Nov. 29. 1816.

Clomenocoma aurantia Cass. Dict. Sci. Nat. 9: 416. 1817.

Clappia aurantiaca Benth. in Hook. Icon. Pl. 12: 3. pl. 1104. 1872.

Guerrero, Veracruz, and Oaxaca; type from Veracruz.

Shrub, essentially glabrous; leaves petioled, 2 to 5.5 cm. long, pinnatisect into 3 or 5 segments, the lateral sessile or short-stipitate, the terminal slender-stiped; involucre about 1.2 cm. high.

6. **Dyssodia porophylloides** A. Gray, Mem. Amer. Acad. n. ser. 5: 322. 1854.

Lebetina porophylloides A. Nels. Bot. Gaz. 47: 435. 1909.

Clomenocoma porophylloides Rydb. N. Amer. Fl. 34: 166. 1915.

Northern Baja California; Sonora. Arizona and southern California; type from San Felipe, California.

Suffrutescent, 0.3 to 1 meter high, glabrous; leaves short-petioled, 3 cm. long or less, deeply cut into 3 or 5 linear to lanceolate or cuneate lobes, these entire or toothed; heads solitary, long-peduncled; involucre about 12 mm. high.

7. **Dyssodia tagetiflora** Lag. Gen. & Sp. Nov. 29. 1816.

Boebera fastigiata H. B. K. Nov. Gen. & Sp. 4: 198. 1820.

Boebera tagetiflora Spreng. Syst. Veg. 3: 545. 1826.

Jalisco to Veracruz and Oaxaca; type from Mexico, without definite locality.

Suffrutescent or herbaceous, up to 90 cm. high, sparsely pubescent; leaves 2 to 4 cm. long, pinnatisect, the segments 3 to 13, linear or linear-oblongate, serrate, the lower ones smaller; heads terminating the branches, about 1.8 cm. wide, yellow, long-peduncled; involucre about 8 mm. high; pappus paleae dissected into numerous unequal bristles, the central one longest.

8. **Dyssodia pinnata** (Cav.) Robinson, Proc. Amer. Acad. 49: 508. 1913.

Aster pinnatus Cav. Icon. Pl. 3: 6. pl. 212. 1795.

Dyssodia pubescens Lag. Gen. & Sp. Nov. 29. 1816.

Dyssodia subintegerrima Lag. Gen. & Sp. Nov. 29. 1816.

Boebera pubescens Spreng. Syst. Veg. 3: 544. 1826.

Boebera subintegerrima Spreng. Syst. Veg. 3: 545. 1826.

Rosilla lutea Less. Syn. Gen. Comp. 245. 1832.

Boebera incana Lindl. Bot. Reg. 19: pl. 1602. 1833.

Dyssodia incana DC. Prodr. 5: 640. 1836.

Clomenocoma pinnata DC. Prodr. 5: 641. 1836.

Dyssodia integerrima Hemsl. Biol. Centr. Amer. Bot. 2: 219. 1881, as synonym.

Boebera pinnata Rydb. N. Amer. Fl. 34: 168. 1915.

Coahuila to Tamaulipas, south to Puebla and Veracruz.

Suffrutescent or herbaceous, 35 cm. high or less, pubescent; leaves 2 to 4 cm. long, pinnatisect, the segments usually 5 or 7, linear or narrowly linear-oblongate, entire or few-toothed; heads terminating branches, 2 to 2.8 cm. wide, yellow; involucre about 8 mm. high; pappus as in *D. tagetiflora*.

9. **Dyssodia acerosa** DC. Prodr. 5: 641. 1836.

Aciphyllaea acerosa A. Gray, Mem. Amer. Acad. n. ser. 4: 91. 1849.

Hymenatherum acerosum A. Gray, Pl. Wright. 1: 115. 1852.

Dyssodia fusca A. Nels. Bot. Gaz. 47: 436. 1909.

Sonora to Coahuila, south to Zacatecas, Hidalgo, and San Luis Potosí; type from San Luis Potosí. Texas to Arizona and Nevada.

Suffruticose, much branched, 20 cm. high or less, the branches finely hirtellous; leaves opposite at least below, acerose-filiform, 1 to 2 cm. long, 0.5 mm. wide or less, often with fascicles in their axils; heads solitary, subsessile, yellow, about 1.3 cm. wide; involucre about 6 mm. high, dotted with numerous glands; pappus paleae dissected into 3 to 7 bristles. "Hierba de San Nicolás" (Zacatecas); "contrayerba."

10. *Dyssodia treculii* (A. Gray) Robinson, Proc. Amer. Acad. **49**: 508. 1913.

Hymenatherum treculii A. Gray, Proc. Amer. Acad. **19**: 42. 1883.

Thymophylla treculii Small, Fl. Southeast. U. S. 1295. 1903.

Coahuila. Texas; type from southeastern Texas.

Suffruticulose (?), branched, about 20 cm. high, glabrous or finely pruinose; leaves opposite below, 1 to 2 cm. long, pinnatisect, the lobes 3 to 6 pairs, linear-filiform, setose-tipped; heads campanulate, 1.3 to 1.7 cm. wide; calyculus evident, of lanceolate acuminate phyllaries; pappus of 5 short outer paleae and 5 bifid, aristate-tipped, much longer inner paleae.

11. *Dyssodia hartwegi* (A. Gray) Robinson, Proc. Amer. Acad. **49**: 507. 1913.

Hymenatherum hartwegi A. Gray, Pl. Wright. **1**: 117. 1852.

Tagetes aristata Klatt, Leopoldina **25**: 109. 1889.

Thymophylla hartwegi Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 191. 1913.

Thymophylla pringlei Rydb. N. Amer. Fl. **34**: 177. 1915.

Chihuahua to Aguascalientes and San Luis Potosí; type from Aguascalientes. Arizona and New Mexico.

Similar to *D. treculii*; plant distinctly suffruticulose; heads smaller, 0.8 to 1.2 cm. wide.

12. *Dyssodia pentachaeta* (DC.) Robinson, Proc. Amer. Acad. **49**: 507 1913.

Hymenatherum pentachaetum DC. Prodr. **5**: 642. 1836.

Thymophylla puberula Rydb. N. Amer. Fl. **34**: 177. 1915.

Thymophylla canescens Rydb. N. Amer. Fl. **34**: 178. 1915.

Coahuila and Nuevo León, south to Hidalgo and San Luis Potosí; type from Monterrey, Nuevo León. Texas to Arizona.

Suffruticulose, 8 to 25 cm. high, the numerous branches usually procumbent at base, puberulous to cinereous-pilosulous; leaves crowded, chiefly opposite, 5 to 25 mm. long, pinnatisect with linear-filiform, setose-tipped divisions; heads campanulate-subglobose, long-peduncled, 1.5 to 2.2 cm. wide; involucre 5 to 6 mm. high, densely puberulent or pilosulous. "Parraleña," "limoncillo" (Coahuila).

The cinereous form, *T. canescens*, is not specifically distinguishable.

13. *Dyssopia berlandieri* (DC.) Blake.

Hymenatherum berlandieri DC. Prodr. **5**: 642. 1836.

Thymophylla gracilis Rydb. N. Amer. Fl. **34**: 176. 1915.

Thymophylla berlandieri Rydb. N. Amer. Fl. **34**: 177. 1915.

Thymophylla villosula Rydb. N. Amer. Fl. **34**: 177. 1915.

Coahuila, Tamaulipas, and Nuevo León; type collected between Santander and Victoria, Tamaulipas. Texas.

Very similar to *D. pentachaeta* except for the involucre, which is glabrous except for the conspicuously ciliate margins of the phyllaries. This species also has a cinereous-pubescent form (*T. villosula*), which can not be separated specifically. "Manzanilla amarilla."

14. *Dyssodia thurberi* (A. Gray) A. Nels. Bot. Gaz. **47**: 436. 1909.

Hymenatherum thurberi A. Gray, Proc. Amer. Acad. **19**: 41. 1883.

Dyssodia cupulata A. Nels. Bot. Gaz. **47**: 435. 1909.

Thymophylla thurberi Woot. & Standl. Contr. U. S. Nat. Herb. **16**: 191. 1913.

Coahuila and Durango; type from Chihuahua. Texas to New Mexico and Nevada.

Similar to *D. pentachaeta*, and distinguished chiefly by the difference in pappus.

15. *Dyssodia aurantiaca* (T. S. Brandeg.) Robinson, Proc. Amer. Acad. 49: 507. 1913.

Hymenatherum aurantiacum T. S. Brandeg. Zoe 5: 258. 1908.

Thymophylla aurantiaca Rydb. N. Amer. Fl. 34: 175. 1915.

Puebla; type from Cerro de Santa Lucía.

Suffruticulose, ascending, 10 to 20 cm. high, glabrous; leaves chiefly alternate, 1.5 to 3 cm. long, pinnatisect with soft, linear-filiform, merely cuspidate divisions; heads 1.8 cm. wide; free portions of phyllaries ciliolate; pappus paleae all split into 3 to 5 awns.

16. *Dyssodia setifolia* (Lag.) Robinson, Proc. Amer. Acad. 49: 508. 1913.

Thymophylla setifolia Lag. Gen. & Sp. Nov. 25. 1816.

Hymenatherum setifolium A. Gray, Proc. Amer. Acad. 19: 42. 1883.

Hymenatherum setifolium radiatum T. S. Brandeg. Univ. Calif. Publ. Bot. 4: 279. 1912.

Coahuila and Nuevo León, south to Querétaro; type from Mexico, without definite locality.

Suffruticulose, much branched, 7 to 20 cm. high, canescent-tomentose; leaves pinnatisect, with 3 to 7 lobes, rather soft, about 1.5 cm. long; heads small, discoid or rarely radiate; phyllaries with rather long triangular-subulate tips; pappus of 5 to 10 free paleae, all short and blunt or the inner sometimes aristate. "Par-raleña."

17. *Dyssodia greggii* (A. Gray) Robinson, Proc. Amer. Acad. 49: 507. 1913.

Thymophylla greggii A. Gray, Mem. Amer. Acad. n. ser. 4: 92. 1849.

Thymophylla greggii radiata A. Gray, Pl. Wright. 1: 119. 1852.

Hymenatherum greggii A. Gray, Proc. Amer. Acad. 19: 42. 1883.

Coahuila; type from Buena Vista. Texas and New Mexico.

Similar to *D. setifolia*; leaves mostly trifid; heads usually radiate; pappus paleae completely connate.

100. POROPHYLLUM Adans. Fam. Pl. 2: 122. 1763.

REFERENCES: Robinson & Greenman, A provisional key to the species of *Porophyllum* ranging north of the Isthmus of Panama, Proc. Amer. Acad. 32: 31-33. 1896; Rydb. N. Amer. Fl. 34: 181-193. 1916.

Shrubs or herbs, often glaucous, glabrous; leaves opposite or alternate, entire, sinuate, or rarely toothed, glandular-punctate on margin or apex and sometimes on surface; heads discoid, yellow, whitish, or purple; involucre of few equal, nearly 1-seriate, firm phyllaries, usually glandular-punctate; achenes slender; pappus of numerous bristles.

Leaves oval to elliptic, rarely lance-ovate, on distinct slender petioles.

Heads more or less distinctly nodding, several or numerous and racemosely cymose or cymose-panicled at tips of branches; flowers greenish.

Leaves thick, veiny beneath.....1. *P. viridiflorum*.

Leaves thin, not veiny.....2. *P. nutans*.

Heads not nodding, cymose at tips of branches or solitary.

Corollas purple above.....3. *P. nelsonii*.

Corollas greenish or ochroleucous.

Heads solitary in the forks of the stem and at apex of branches, rarely paired.....4. *P. jorullense*.

Heads cymose.

Leaves lanceolate or lance-ovate, acute or acuminate; phyllaries acuminate.....5. *P. palmeri*.

Leaves oval to elliptic or oblong, usually obtuse or rounded.

Leaves oblong or elliptic-oblong-----6. *P. oblongum*.

Leaves oval or elliptic.

Phyllaries acuminate-----7. *P. ervendbergii*.

Phyllaries obtuse to acute-----8. *P. punctatum*.

Leaves linear-filiform to lanceolate or rarely oblanceolate or ovate-lanceolate, sessile or sometimes gradually narrowed at base into a short, usually margined petiole.

Leaves 3 or 5-dentate-----25. *P. tridentatum*.

Leaves entire.

Leaves ovate-lanceolate, semiamplexicaul, fleshy ----21. *P. amplexicaule*.

Leaves not amplexicaul.

Leaves oblanceolate or linear-lanceolate to linear, usually over 2 mm. wide, not terete.

Involucre green; heads short-peduncled, in close cymes.

Corollas whitish.

Lower leaves lanceolate-----9. *P. brachypodium*.

Leaves narrowly lance-linear-----10. *P. pausodinum*.

Corollas ochroleucous.

Heads 5 to 7-flowered; leaves narrowly linear--11. *P. confertum*.

Heads about 15-flowered; leaves linear-oblanceolate.

12. *P. ochroleucum*.

Involucre purple.

Plants diffuse; heads nodding-----13. *P. cedrense*.

Plants erect; heads very rarely nodding.

Corollas ochroleucous-----14. *P. obtusifolium*.

Corollas purplish.

Leaves linear-----15. *P. linaria*.

Leaves narrowly linear-lanceolate to oblanceolate.

16. *P. seemannii*.

Leaves linear-filiform or narrowly linear, rarely narrowly linear-elliptic, usually terete and less than 2 mm. wide, more or less fleshy.

Corollas purple-----17. *P. porphyreum*.

Corollas greenish yellow, ochroleucous, or whitish.

Phyllaries broadly oblong-oval or obovate.

Leaves filiform, 2 to 4 cm. long; involucre 1 to 1.2 cm. high.

23. *P. greggii*.

Leaves linear to elliptic, 2 cm. long or less; involucre 6 to 8 mm.

high-----24. *P. crassifolium*.

Phyllaries linear or linear-oblong.

Leaves very fleshy, about 2 mm. wide; plant very glaucous.

20. *P. maritimum*.

Leaves scarcely fleshy, 1 mm. wide or less; plants usually not glaucous.

Achenes long-tapering at apex, about 8 mm. long.

18. *P. gracile*.

Achenes not distinctly tapering at apex, 4 to 6 mm. long.

Tube of the corollas longer than the throat.

19. *P. pinifolium*.

Tube of the corollas much shorter than the throat.

22. *P. scoparium*.

1. *Porophyllum viridiflorum* (H. B. K.) DC. Prodr. 5: 648. 1836.

Kleinia viridiflora H. B. K. Nov. Gen. & Sp. 4: 157. 1820.

Porophyllum lindenii Schultz Bip. in Seem. Bot. Voy. Herald 308. 1856.

Tepic to Veracruz and Oaxaca; type from Valladolid (Morelia), Michoacán.

Shrub up to 1.5 meters high; leaves chiefly alternate, the blades oval, 1.5 to 4.5 cm. long, 1 to 3.5 cm. wide, pale green, marginate; heads 1.4 to 2 cm. long; phyllaries with a median row of glands.

2. *Porophyllum nutans* Robins. & Greenm. Proc. Amer. Acad. **32**: 31. 1896.

Porophyllum holwayanum Greenm. Proc. Amer. Acad. **40**: 48. 1904.

Jalisco to Oaxaca; type from Lake Chapala, Michoacán.

Shrubby, 1 to 2 meters high; leaf blades oval or oblong-elliptic, 2 to 5 cm. long, scarcely marginate, glandular along the margin; phyllaries with 2 rows of linear glands.

3. *Porophyllum nelsonii* Robins. & Greenm. Proc. Amer. Acad. **32**: 32. 1896.

Oaxaca; type collected between Panixtlahuaca and Jaquila.

Shrubby, 0.3 to 0.6 meter high; leaf blades elliptic or oblong, 1 to 1.8 cm. long, 4 to 6 mm. wide, obtuse, thickish, with few glands; heads numerous, solitary in forks of stem and at tips of branchlets, about 1.5 cm. high; involucre purplish above; phyllaries with 2 rows of linear glands.

4. *Porophyllum jorullense* (H. B. K.) Cass. Dict. Sci. Nat. **43**: 57. 1826.

Kleinia jorullensis H. B. K. Nov. Gen. & Sp. **4**: 156. pl. 356. 1820.

Sinaloa to Jalisco; type from Volcán de Jorullo.

Shrubby; leaf blades oval, 1 to 2.5 cm. long, obtuse or rounded; heads 1.3 to 1.5 cm. high, on peduncles 2 to 4.5 cm. long; phyllaries with 2 rows of linear glands.

5. *Porophyllum palmeri* Rose, Contr. U. S. Nat. Herb. **1**: 338. pl. 34. 1895.

Known only from the type locality, Colima.

Shrub; leaves opposite, the blades 1 to 4 cm. long; heads loosely cymose, about 15 mm. high; phyllaries with 2 rows of glands.

6. *Porophyllum oblongum* Rydb. N. Amer. Fl. **34**: 186. 1916.

Known only from the type locality, Culiacán, Sinaloa.

Shrub; leaf blades 2 to 4 cm. long, 0.5 to 1.5 cm. wide, obtuse or rounded, glandular on the repand-sinuate margin and usually on surface; heads cymose, about 1.6 cm. high; phyllaries with about 3 rows of glands.

7. *Porophyllum ervendbergii* A. Gray, Proc. Amer. Acad. **19**: 35. 1883.

Definitely known only from the type locality, Wartenberg, Veracruz.

Shrub; leaves opposite, the blades elliptic, 2 to 3 cm. long, obtuse, sinuate, glandular on margin and surface; involucre 11 to 12 mm. high, the phyllaries punctate in 2 rows. (Description compiled.)

8. *Porophyllum punctatum* (Mill.) Blake, Contr. Gray Herb. n. ser. **52**: 58. 1917.

Eupatorium punctatum Mill. Gard. Dict. ed. 8. *Eupatorium* no. 11. 1768.

Porophyllum nummularium DC. Prodr. **5**: 649. 1836.

Eupatorium milleri Steud. Nom. Bot. ed. 2. **1**: 608. 1840.

Porophyllum millspaughii Robinson in Millsp. Field Mus. Bot. **2**: 109. 1900.

Porophyllum divaricatum Rydb. N. Amer. Fl. **34**: 186. 1916.

Sinaloa to Veracruz, Yucatán, and Oaxaca; type from Veracruz. Guatemala.

Shrubby, up to 2.6 meters high; leaves opposite, the blades oblong or sometimes elliptic, 1 to 3.5 cm. long, obtuse or rounded, rarely acute, crenate, glandular on margin and usually also on surface; heads cymose, 1.3 to 1.8 cm. high; phyllaries with 2 rows of linear glands. "Hierba del venado," "pioja," "piojillo" (Sinaloa); "xpechuekil" (Yucatán, Maya).

9. *Porophyllum brachypodum* Robinson, Proc. Amer. Acad. **35**: 341. 1900.

Known only from the type locality, Guaymas, Sonora.

Shrubby; leaves alternate, short-petioled, the blades thick, those of the main leaves lanceolate, 3 to 4 cm. long, 4 to 8 mm. wide, the others mostly linear; heads densely cymose, about 1.5 cm. high; peduncles 5 to 8 mm. long.

- 10. *Porophyllum pausodinum*** Robins. & Greenm. Proc. Amer. Acad. **32**: 32. 1896.

Known only from the vicinity of the type locality, Guaymas, Sonora.

Shrubby; leaves opposite below, alternate above, short-petioled, the blades 2.5 to 5.5 cm. long, 2 to 5 mm. wide, acutish, with intramarginal glands; heads short-peduncled, 1.5 to 1.8 cm. high, in close cymes; phyllaries oblong, obtuse, with 2 to 4 rows of glands; achenes not tapering at apex. "Maravilla."

The plant is used as a remedy for headache.

- 11. *Porophyllum confertum*** Greene, Leaflets **2**: 155. 1911.

Known only from the type locality, Cerralvo Island, Gulf of California.

Suffrutescent, erect; leaves mostly alternate, subsessile, the blades linear, 4 to 6 cm. long, less than 2 mm. wide; heads 1.3 cm. high; achenes tapering at apex.

- 12. *Porophyllum ochroleucum*** Rydb. N. Amer. Fl. **34**: 189. 1916.

Porophyllum confertum ochroleucum I. M. Johnston, Proc. Calif. Acad. IV. **12**: 1209. 1924.

Known only from the type locality, Saucito, Baja California.

Shrubby, 0.5 meter high or more; leaves short-petioled, the blades narrowly oblanceolate, 3 to 5 cm. long, 2 to 4 mm. wide; heads densely cymose; phyllaries linear. (Description compiled.)

- 13. *Porophyllum cedrense*** Rose & Standl.; Rydb. N. Amer. Fl. **34**: 189. 1916.

Known only from the type locality, Cedros Island, Baja California.

Diffusely branched shrub, under 0.5 meter high; leaves alternate, sessile, the blades oblong, 1 to 2 cm. long, 2 to 5 mm. wide, obtuse; heads usually solitary, 1.5 cm. high; phyllaries oblong.

- 14. *Porophyllum obtusifolium*** DC. Prodr. **5**: 650. 1836.

Jalisco, Guanajuato, and Mexico; type from Villalpando.

Suffruticose, about 0.5 meter high; leaves short-petioled, the blades oblanceolate or oblanceolate-linear, 2 to 4 cm. long, 2 to 8 mm. wide, mostly obtuse; heads about 13 mm. high, cymose-panicled; involucre dark purplish; achenes not tapering at apex. "Hierba del venado" (Guanajuato).

- 15. *Porophyllum linaria*** (Cav.) DC. Prodr. **5**: 649. 1836.

Cacalia linaria Cav. Icon. Pl. **3**: 29. pl. 257. 1795.

Hunteria columbina Moc. & Sessé; DC. Prodr. **5**: 649. 1836, as synonym.

Porophyllum linarifolium St. Lag. Ann. Soc. Bot. Lyon **7**: 132. 1880.

Coahuila to State of Mexico; type from Mexico, without definite locality.

Similar to *P. obtusifolium*; leaves narrowly linear, 1 to 2 mm. wide; flowers purple.

- 16. *Porophyllum seemannii*** Schultz Bip. in Seem. Bot. Voy. Herald **308**. 1856.

Sinaloa and Chihuahua to Jalisco; type from the Sierra Madre of northwestern Mexico.

Shrub; leaves opposite below, alternate above, short-petioled, the blades 2 to 5 cm. long, 2 to 5 mm. wide; heads 12 mm. high. "Hierba del venado" (Sinaloa); "maravilla" (Sonora).

Used as a remedy for malaria.

- 17. *Porophyllum porfyreum*** Rose & Standl.; Rydb. N. Amer. Fl. **34**: 191. 1916.

Known only from the type locality, San José del Cabo, Baja California.

Shrubby, very slender; leaves linear-filiform, 3 to 7 cm. long, 1 mm. wide or less; heads mostly solitary, 1.2 to 1.7 cm. high; involucre glaucous, purplish above.

18. *Porophyllum gracile* Benth. Bot. Voy. Sulph. 29. 1844.*Porophyllum caesium* Greene, Leaflets 2: 155. 1911.

Baja California and islands; Sonora; type from Magdalena Bay, Baja California. Southern California.

Shrubby, much branched, sometimes glaucous; leaves linear or linear-filiform, 1 to 5.5 cm. long, 1.5 mm. wide or less; heads loosely cymose-panicled, 1.3 to 1.5 mm. high; phyllaries 2 mm. wide or less. "Hierba del venado" (Baja California).

The bitter decoction of the leaves is administered for intestinal affections.

19. *Porophyllum pinifolium* Rydb. N. Amer. Fl. 34: 192. 1916.

Sonora and Cape region of Baja California; type from Alamos, Sonora.

Low much-branched shrub; leaves linear-filiform, 2 to 4 cm. long, about 0.5 mm. wide; heads solitary; involucre light green; corollas cream-colored, purple-streaked.

20. *Porophyllum maritimum* T. S. Brandeg. Zoe 5: 162. 1903.

Southern Baja California; type collected between Cape San Lucas and San José del Cabo.

Low, shrubby, strongly glaucous; leaves thick, 2 to 3.8 cm. long, about 2 mm. wide; involucre strongly glaucous, 11 mm. high; achenes tapering above, about 8 mm. long.

21. *Porophyllum amplexicaule* Engelm.; A. Gray, Pl. Wright. 1: 120. 1852.

Coahuila; type from Mesillas.

Suffruticose, glaucous; leaves ovate-lanceolate, 2 to 3 cm. long, about 8 mm. wide at base, semiamplexicaul, fleshy; heads solitary; flowers yellow. (Description compiled.)

22. *Porophyllum scoparium* A. Gray, Pl. Wright. 1: 119. 1852.*Porophyllum fruticosum* Rydb. N. Amer. Fl. 34: 193. 1916.

Chihuahua and Coahuila. Texas and New Mexico; type from San Pedro River, Texas.

Shrubby, up to 60 cm. high, much branched, somewhat glaucous; leaves filiform or linear-filiform, 1 to 5.3 cm. long, 1 mm. wide or less; heads solitary at tips of branchlets, about 1.3 cm. high; phyllaries 2 mm. wide or less. "Hierba del venado" (Coahuila); "jarilla;" "romerillo" (Coahuila).

The plant is employed locally as a remedy for fevers, rheumatism, and affections of the stomach and intestines.

23. *Porophyllum greggii* A. Gray, Pl. Wright. 1: 120. 1852.

Coahuila; type from Parras. Texas.

Suffruticose, 20 to 30 cm. high; heads solitary at tips of branches; phyllaries elliptic or obovate-oblong; achenes 5 mm. long, not tapering above. (Description compiled.)

24. *Porophyllum crassifolium* S. Wats. Proc. Amer. Acad. 24: 57. 1889.*Porophyllum leptophyllum* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1210. 1924.*Porophyllum tridentatum crassifolium* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1211. 1924.

Baja California and islands; type from Mulejé.

Low, shrubby, much branched; leaves linear to elliptic, 5 to 20 mm. long, 0.8 to 3 mm. wide, sessile, cuspidate; heads solitary at tips of branches and branchlets, 9 to 13 mm. high; phyllaries round-tipped or obtuse, 2.5 to 4.5 mm. wide.

25. *Porophyllum tridentatum* Benth. Bot. Voy. Sulph. 30. 1844.

Baja California; type from Magdalena Bay.

Similar to *P. crassifolium*; leaves coarsely 3 or 5-toothed, the teeth usually cuspidate.

101. CHRYSACTINIA A. Gray, Mem. Amer. Acad. n. ser. 4: 93. 1849.

REFERENCES: Blake, Proc. Amer. Acad. 51: 524-525. 1916; Rydberg, N. Amer. Fl. 34: 180-181. 1915-16.

Low, nearly or quite glabrous shrubs; leaves opposite or alternate, entire or pinnatilobate, glandular-punctate; heads solitary, radiate, yellow or orange; involucre of 8 to 12 free linear phyllaries, each with a terminal oil gland; achenes slender; pappus of numerous bristles.

The following treatment includes all the known species.

Leaves entire.

Leaves subulate, 0.7 to 1.2 mm. wide; phyllaries 12-----1. *C. mexicana*.

Leaves filiform-subulate, 0.25 mm. wide; phyllaries 8-----2. *C. acerosa*.

Leaves pinnatilobate.

Leaf lobes 9 to 17, acute-----3. *C. pinnata*.

Leaf lobes 3 to 11, truncate-----4. *C. truncata*.

1. Chrysactinia mexicana A. Gray, Mem. Amer. Acad. n. ser. 4: 93. 1849.

Pectis taxifolia Greene, Leaflets 1: 148. 1905.

Chihuahua to Tamaulipas, south to Veracruz and State of Mexico; type from Saltillo, Coahuila. Texas and New Mexico.

Undershrub, much branched, up to 60 cm. high; leaves 4.5 to 15 mm. long, spinulose-tipped, bearing numerous glands; heads golden yellow, about 2 cm. wide; involucre 4 to 5 mm. high. "Calanca" (Veracruz); "yeyepaxtle" (Puebla); "San Nicolás," "hierba de San Nicolás" (Coahuila, Durango, San Luis Potosí); "damiana," "damianita" (Chihuahua, Durango, Texas, etc.); "mariola" (Valley of Mexico); "falsa damiana," "garañona," "romerillo" (Coahuila, Hidalgo); said to be known sometimes as "guayule."

The plant is bitter and has a strong but rather agreeable odor. It is much used in domestic medicine, aphrodisiac, antispasmodic, sudorific, and diuretic properties being ascribed to it. It is used especially in the treatment of fevers and rheumatism.

2. Chrysactinia acerosa Blake, Proc. Amer. Acad. 51: 525. 1916.

Known only from the type locality, Sierra de Guascama, Minas de San Rafael, San Luis Potosí.

About 30 cm. high; leaves with few small glands; involucre 3.5 mm. high.

3. Chrysactinia pinnata S. Wats. Proc. Amer. Acad. 25: 154. 1890.

Known only from the type locality, near Monterrey, Nuevo León.

Leaves opposite, oblong in outline, 2.5 to 5 cm. long, 1.2 to 1.9 cm. wide, the lobes obliquely deltoid, acute, entire; rays whitish inside, orange outside; disk orange.

4. Chrysactinia truncata S. Wats. Proc. Amer. Acad. 25: 154. 1890.

Coahuila and Nuevo León; type from Sierra de la Silla, Nuevo León.

Leaves ovate or ovate-oblong in outline, 1.5 to 3 cm. long, 8 to 12 mm. wide, the lobes usually toothed; heads 2 to 3 cm. wide; rays bright yellow. "Hierba del venado" (Coahuila).

102. PECTIS L. Syst. Nat. ed. 10. 1221. 1759.

REFERENCES: Fernald, A systematic study of the United States and Mexican species of *Pectis*, Proc. Amer. Acad. 33: 57-86. 1897; Rydberg, N. Amer. Fl. 34: 194-216. 1916.

Herbaceous or suffrutescent; leaves opposite, glandular-punctate, usually entire, setose-ciliate; heads usually solitary, radiate, yellow; involucre of few equal phyllaries; achenes slender; pappus (in ours) of 4 to 40 bristles, or these sometimes reduced to squamellae, or (in the ray) wanting.

Involucre 4 to 6 mm. high, the phyllaries acute or acuminate; leaves mostly erect.....1. *P. diffusa*.

Involucre usually 5 to 8 mm. high, the phyllaries rounded or obtuse, rarely acutish; leaves wide-spreading.

Phyllaries broadly oval, 3 to 5 mm. wide, with strongly overlapping margins.
2. *P. latisquama*.

Phyllaries linear to oblong, 2.5 mm. wide or less.

Leaves obovate-oblong, 4 to 10 mm. wide.....3. *P. liebmannii*.

Leaves linear or lance-linear, 1 to 4 mm. wide.

Branches pubescent.....4. *P. saturejaoides*.

Branches glabrous.....5. *P. stenophylla*.

1. *Pectis diffusa* Hook. & Arn. Bot. Beechey Voy. 296. 1840.

Jalisco and Colima; type from Jalisco.

Suffruticulose, spreading or erectish, 25 cm. long or less; leaves linear, 2 to 4 cm. long, 1 to 3 mm. wide, setose-ciliate mostly below the middle; heads solitary in the upper axils, slender-peduncled, 1 to 1.5 cm. wide; involucre slender; pappus of 4 to 20 unequal bristles.

2. *Pectis latisquama* Schultz Bip.; Greenm. Proc. Amer. Acad. 39: 118. 1903.

Puebla and State of Mexico; type from Valley of Mexico.

Suffruticulose, depressed; branches puberulous; leaves linear-lanceolate, 1 to 2 cm. long; heads short-peduncled, 1.5 cm. wide; phyllaries very broad, blunt, ciliate at apex, purplish; rays yellow or purplish-tinged; pappus of ray and disk of numerous bristles.

3. *Pectis liebmannii* Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 226. 1881.

Jalisco; type from San Agustín.

Suffruticose, procumbent, 20 to 30 cm. long, canescent-tomentose or lanate; leaves 1.5 to 2.5 cm. long, with several long basal setae; peduncles very short; ray achenes epappose; disk achenes with a pappus of 20 to 30 unequal bristles. (Description compiled.)

4. *Pectis saturejaoides* (Mill.) Schultz Bip. in Seem. Bot. Voy. Herald 309. 1856, as *P. satureioides*.

Inula saturejaoides Mill. Gard. Dict. ed. 8. *Inula* no. 13. 1768.

Pectis canescens H. B. K. Nov. Gen. & Sp. 4: 263. 1820.

Lorentea auricularis DC. Prodr. 5: 102. 1836.

Pectis auricularis Schultz Bip. in Seem. Bot. Voy. Herald 309. 1856.

Pectis canescens villosior Coulter, Bot. Gaz. 20: 52. 1895.

Pectis repens T. S. Brandeg. Zoe 5: 241. 1906.

Sinaloa to San Luis Potosí, south to Chiapas; type from Veracruz. Guatemala to Nicaragua.

Suffruticulose, erectish or prostrate; leaves 1 to 2 cm. long; heads 1.5 to 2.2 cm. wide, the rays yellow or purplish-tinged; pappus very variable in the ray, of about 20 or fewer bristles (2 or 3 sometimes thickened and awnlike), or of squamellae, or wanting, in the disk of about 20 slender bristles.

5. *Pectis stenophylla* A. Gray, Proc. Amer. Acad. 21: 393. 1886.

Sonora and Chihuahua; type from Batopilas, Chihuahua.

Suffruticose below, diffusely branched; leaves 3 to 4 cm. long, 1 to 2 mm. wide, bristly toward base; peduncles filiform, 3 to 6 cm. long; pappus of ray achenes of 2 slender bristles, of the disk achenes of 20 to 40 slender, unequal bristles.

103. ARTEMISIA L. Sp. Pl. 845. 1753.REFERENCE: RYDBERG, N. Amer. Fl. **34**: 244–285. 1916.

Herbs or shrubs, usually bitter-aromatic; leaves alternate; heads small, panicled (in ours), nodding, discoid or disciform, the marginal flowers sometimes pistillate; involucre of few-seriate, more or less scarious-margined phyllaries; receptacle glabrous or pubescent; achenes small, thickish; pappus wanting or rarely a low squamellaceous crown.

Leaves narrowly cuneate, 3-toothed at apex.....1. **A. tridentata**.

Leaves entire and filiform, or pinnately parted into filiform lobes.

Heads minute, 1 to 1.5 mm. wide; involucre densely canescent-tomentose.

2. **A. filifolia**.

Heads larger, 3 to 4 mm. wide; involucre not canescent-tomentose.

3. **A. californica**.

1. Artemisia tridentata Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 398. 1841.

Baja California. Western United States; type from the Columbia River.

Shrub up to 5 meters high, densely silky-pubescent, very leafy; leaves sessile, 1 to 3 cm. long, 2 to 5 mm. wide; heads 3 to 4 mm. high, in dense leafy panicles; pappus none.

In some parts of the United States this species is abundant, and is known as sagebrush. It has a bitter flavor and a characteristic odor. The Coahuilla Indians of California ground the seeds into a meal which was made into pinole. The plant is used for various purposes in domestic medicine.

2. Artemisia filifolia Torr. Ann. Lyc. N. Y. **2**: 211. 1828.

Chihuahua. Nebraska and Wyoming to Texas and Nevada; type locality not stated.

Shrub up to 1 meter high, very leafy, cinereous-puberulous; leaves filiform or 3-parted into filiform lobes, 1.5 to 8 cm. long, about 0.2 mm. wide; heads yellow, in long dense leafy panicles; pappus none. "Estafiate," "istafiate."

A decoction of the leaves is employed in domestic medicine as a remedy for intestinal worms and affections of the stomach.

3. Artemisia californica Less. Linnaea **6**: 523. 1831.

Artemisia fischeriana Besser, Nouv. Mém. Soc. Nat. Moscou **3**: 21. 1834.

Artemisia abrotanoides Nutt. Trans. Amer. Phil. Soc. n. ser. **7**: 399. 1841.

Crossostephium californicum Rydb. N. Amer. Fl. **34**: 243. 1916.

Northern Baja California and Guadalupe Island (according to Brandegee and H. M. Hall). California; type from California.

Shrub 1 to 3 meters high, canescent-strigillose, sometimes greenish; leaves about 4.5 cm. long, pinnately divided into few filiform lobes, or the upper entire; heads in long narrow leafy panicles; pappus a minute squamellate crown.

104. LIABUM Adans. Fam. Pl. **2**: 131. 1763.

REFERENCE: Greenman, Key to the Mexican species of *Liabum*, Proc. Amer. Acad. **32**: 293–294. 1897.

Shrubs or herbs; leaves opposite, rarely ternate, usually ovate, petioled, and canescent-tomentose beneath; heads radiate or discoid, yellow, usually small and panicled; involucre graduate, usually about 4-seriate; receptacle sometimes bristly; achenes short, subterete; pappus usually of an inner series of slender bristles and a short outer series of squamellae, or the latter wanting.

Heads discoid.

Phyllaries obtuse.

Leaves green and glabrous beneath.....1. **L. glabrum**.

Leaves white-tomentose beneath.....1a. **L. glabrum hypoleucum**.

Phyllaries acute or acuminate.

Involucre 1.2 to 1.8 cm. high.

Petioles about 4 mm. long; involucre about 7-seriate-----5. *L. pringlei*.

Petioles about 2 cm. long; involucre about 4-seriate-----6. *L. klattii*.

Involucre much shorter.

Phyllaries silky-pubescent-----2. *L. sericolepis*.

Phyllaries not silky-pubescent.

Phyllaries glandular-hispidulous; pedicels stipitate-glandular.

3. *L. adenotrichum*.

Phyllaries not glandular-hispidulous; pedicels not stipitate-glandular.

4. *L. caducifolium*

Heads radiate.

Heads few, large, the involucre 2 to 4 cm. thick-----7. *L. andrieuxii*.

Heads numerous, much smaller, the involucre less than 1 cm. thick.

Phyllaries attenuate; petioles wing-margined throughout--8. *L. bourgeau*.

Phyllaries obtuse; petioles margined only at apex if at all.

Achenes densely hispidulous.

Involucre about 6 mm. high-----9. *L. andromachioides*.

Involucre about 11 mm. high-----10. *L. deppeanum*.

Achenes glabrous or hispidulous only at apex.

Involucre about 4-seriate; pedicels 1 to 1.5 cm. long--11. *L. discolor*.

Involucre 2-seriate; pedicels 2.5 to 5 cm. long-----12. *L. platylepis*.

1. *Liabum glabrum* Hemsl. Biol. Centr. Amer. Bot. 2: 232. 1881.

Known only from the vicinity of the type locality, Iturbide, near Cuernavaca, Morelos.

Shrub, up to 6.5 meters high; branches glabrous or early glabrate; leaves slender-petioled, the blades rhombic-ovate or lance-ovate, 9 to 15 cm. long, 3 to 4 cm. wide, acuminate, serrulate, cuneate at base, green above, thinly arachnoid and quickly glabrate beneath; heads numerous, thyrsoïd-panicled; involucre about 8 mm. high; achenes sparsely glandular.

1a. *Liabum glabrum hypoleucum* Greenm. Proc. Amer. Acad. 32: 294. 1897.

Jalisco and Morelos; Oaxaca (?); type from Guadalajara, Jalisco. Guatemala and El Salvador.

Leaves permanently arachnoid-tomentose beneath; achenes often glabrous. "Palo de agua" (Oaxaca); "espinillo," "palo de San Nicolás," "papelillo" (El Salvador).

2. *Liabum sericolepis* Hemsl. Biol. Centr. Amer. Bot. 2: 232. 1881.

Known only from the type locality, Valley of Córdoba, Veracruz.

Shrub, scandent (?); branches glabrescent; leaf blades ovate-oblong, 5 to 7.5 cm. long, green above, white-tomentose beneath; heads numerous, densely cymose-panicled; involucre 4 or 5-seriate; immature achenes setulose at apex. (Description compiled.)

3. *Liabum adenotrichum* Greenm. Field Mus. Bot. 2: 439. 1912.

Known only from the type locality, Cerro de Frujano, Distrito del Centro Oaxaca.

Shrub, 3 to 4 meters high; branches floccose-tomentose, glabrate; leaf blades ovate, 6 to 13 cm. long, 2 to 7.5 cm. wide, acuminate, cuneate at base, above arachnoid-tomentose, glabrate, beneath densely white-lanate; inner phyllaries acute or obtuse, the outer acute; achenes hirsute and glandular. (Description compiled.)

4. *Liabum caducifolium* Robins. & Bartlett, Proc. Amer. Acad. 43: 59. 1907.

Known only from the type locality, near Acapulco, Guerrero.

Shrub, leafless at flowering time (the leaves unknown); branches glabrate; heads numerous, cymose-panicled, short-pedicel; involucre 5 mm. high; immature achenes hispidulous; pappus fulvescent.

5. *Liabum pringlei* Robins. & Greenm. Proc. Amer. Acad. **32**: 49. 1896.

Known only from the type locality, mountains near Lake Chapala, Jalisco.

Suffrutescent, about 1 meter high; stems fuscous-tomentulose; leaf blades ovate, 4 to 7.5 cm. long, 2 to 4.2 cm. wide, green above, canescent-tomentose beneath; heads about 6, about 3 cm. wide; phyllaries lanceolate, acuminate, brownish-pubescent, closely imbricate; achenes sericeous.

6. *Liabum klattii* Robins. & Greenm. Amer. Journ. Sci. III. **50**: 156. 1895.

Veracruz and Oaxaca; type from Monte Alban, near City of Oaxaca.

Shrub, up to 6.5 meters high, leafless at flowering time; branches arachnoid, glabrate; leaf blades deltoid-ovate, about 12.5 cm. long and wide, acuminate, cuneate at base, glabrous above, arachnoid beneath; heads rather numerous, in short thyrsoid panicles; phyllaries acuminate; achenes densely pubescent.

7. *Liabum andrieuxii* (DC.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 231. 1881.

Vernonia andrieuxii DC. Prodr. **5**: 16. 1836.

Oaxaca and Chiapas; type collected between Tehuantepec and the Río Coatzacoalcas.

Shrub; branches sordidly tomentose and hispid-glandular; leaf blades deltoid-ovate 8 to 16 cm. long and wide, acuminate, cuneate at base, repand-dentate and often somewhat hastate-lobed near base, green above, canescent-tomentose beneath; heads about 3 at tips of branches; phyllaries attenuate, tomentose, squarrose; achenes densely pubescent; pappus straw-color, varying to purplish.

8. *Liabum bourgeauii* Hieron. Verh. Bot. Ver. Brand. **48**: 208. 1906.

Liabum asclepiadeum Hemsl. Biol. Centr. Amer. Bot. **2**: 231. 1881. Not *L. asclepiadeum* Schultz Bip. 1847.

Veracruz and Chiapas; type from Valley of Córdoba, Veracruz. Guatemala to Costa Rica.

Suffrutescent (?), 2 meters high; branches angled, lanate-tomentose; leaf blades ovate to suborbicular-ovate, 6 to 23 cm. long, 2 to 14 cm. wide, acute or acuminate, cuneately decurrent the whole length of the petiole and usually auriculate-connate at its base, callous-denticulate, green above, arachnoid-tomentose beneath; heads numerous, in dense cymose panicles; involucre 6 to 8 mm. high; achenes hispidulous; pappus without outer squamellae.

9. *Liabum andromachioides* (Less.) Hemsl. Biol. Centr. Amer. Bot. **2**: 231. 1881.

Vernonia andromachioides Less. Linnaea **6**: 397. 1831.

Sinclairia andromachioides Schultz Bip.; Hemsl. Biol. Centr. Bot. **2**: 231. 1881, as synonym.

Veracruz; type from Misantla. El Salvador.

Shrubby; branches glandular-tomentulose, glabrate; leaf blades oval-ovate to suborbicular-ovate, 7 to 16 cm. long, 4.5 to 11 cm. wide, acute, rounded at base, callous-denticulate, green above, griseous-tomentose beneath; heads numerous, in large panicles; phyllaries ciliate.

10. *Liabum deppeanum* (Less.) Hemsl. Biol. Centr. Amer. Bot. **2**: 232. 1881.

Andromachia deppeana Less. Linnaea **6**: 401. 1831.

Veracruz; type from Cuesta Grande del Jacingo.

Shrubby; branches glabrate; leaf blades ovate, 10 to 12 cm. long, 6.5 to 8.5 cm. wide, acuminate, cuneate at base, callous-denticulate, green above, arachnoid-tomentose beneath; heads cymose-panicled.

11. *Liabum discolor* (Hook. & Arn.) Benth. & Hook.; Hemsl. Biol. Centr. Amer. Bot. **2**: 232. 1881.

Sinclairia discolor Hook. & Arn. Bot. Beechey Voy. 433. 1840-41.

Oaxaca (?). Guatemala to Nicaragua; type from Realejo, Nicaragua.

Shrubby; stem arachnoid, glabrate; leaf blades ovate or suborbicular-ovate, 8 to 14 cm. long, acute or acuminate, rounded to cuneate at base, green above, canescent-tomentose beneath; heads numerous, in usually broad panicles; involucre about 8 mm. high.

12. *Liabum platylepis* Schultz Bip.; Klatt, *Leopoldina* **23**: 146. 1887.

Known only from the type locality, Mirador, Veracruz.

Shrub, epiphytic on oaks; branches lanate; leaf blades rhombic, 12.5 cm. long, 9 cm. wide, green above, white-tomentose beneath; heads thyrsoïd-panicled. (Description compiled.)

DOUBTFUL SPECIES.

LIABUM LIEBMANNII Klatt, *Leopoldina* **23**: 146. 1887.

Sinclairia liebmannii Schultz Bip.; Klatt, *Leopoldina* **23**: 146. 1887, as synonym.

Known only from the type locality, Bartolo, Mexico.

Heads terminal, densely thyrsoïd-panicled; phyllaries lanceolate, green; achenes hirsute; pappus rufous. (Description compiled.)

105. LEPIDOSPARTUM A. Gray, *Proc. Amer. Acad.* **19**: 50. 1883.

1. *Lepidospartum squamatum* A. Gray, *Proc. Amer. Acad.* **19**: 50. 1883.

Linosyris squamata A. Gray, *Proc. Amer. Acad.* **8**: 290. 1873.

Tetradymia squamata A. Gray, *Proc. Amer. Acad.* **9**: 207. 1874.

Northern Baja California. California to Nevada and Arizona; type from California.

Rigid broomlike shrub 1 to 2 meters high; branches and obovate-spatulate entire leaves (about 1 cm. long) of young plants densely canescent-tomentose; older branches and stem practically glabrous, green, with minute, appressed, scale-like leaves 1 to 2 mm. long; heads pale yellow, 10 to 18-flowered, in long racemes or narrow panicles, discoid, 1 cm. high; involucre about 4-seriate, strongly graduate, about 5 mm. high, of ovate to oblong, appressed, scarious-margined phyllaries; achenes glabrous; pappus of abundant soft white bristles.

106. HAPLOESTHES A. Gray, *Mem. Amer. Acad. n. ser.* **4**: 109. 1849.

1. *Haploesthes greggii* A. Gray, *Mem. Amer. Acad. n. ser.* **4**: 109. 1849.

Coahuila; type from Ciénaga Grande. Oklahoma and Texas to Colorado and Arizona.

Herbaceous or suffrutescent, 60 cm. high or less, erect, rather fleshy, pale green, glabrous; leaves opposite, narrowly linear or filiform, 3 to 7 cm. long, 1 to 2 mm. wide, acute, entire, 1-nerved, connate at base; heads in small panicles, pale yellow, radiate, about 1 cm. wide; involucre 2-seriate, equal, of "4" or 5 very broadly oval or obovate-oval, blunt, many-nerved phyllaries; achenes slender, 10-ribbed, hispidulous, 2 mm. long; pappus of about 24 scabrid bristles, about as long as the achene or longer.

107. PEUCEPHYLLUM A. Gray in Torr. *U. S. & Mex. Bound. Bot.* **74**. 1859.

1. *Peucephyllum schottii latisetum* I. M. Johnston, *Proc. Calif. Acad.* **IV**. **12**: 1212. 1924.

Baja California and Sonora; type from San Marcos Island, Gulf of California.

Shrub up to 3 meters high, much branched, resinous-glandular on the young parts; leaves alternate, crowded, linear-filiform, about 2 cm. long, 1 mm. wide, thick, entire, obtuse, glandular-punctate; heads solitary at tips of branches, short-peduncled, discoid, dull yellow, about 1 cm. high and thick; involucre 2-seriate, equal, 8 to 10 mm. high, the phyllaries lance-linear, caudate-attenuate, herbaceous above; achenes densely silky-pilose, about 2.5 mm. long; pappus several-seriate, the outer of numerous graduate bristles, the inner of about 15 linear acuminate paleaceous awns about 5 mm. long. "Romero" (Baja California).

Used medicinally.

108. SENECIO L. Sp. Pl. 866. 1753.

(Contributed by Dr. J. M. Greenman.)

REFERENCES: Greenman, Monogr. Senecio, Part I, pp. 1-37. 1901; Bot. Jahrb. Engler **32**: 1-33. 1902; Ann. Mo. Bot. Gard. **2**: 573-676. *pl.* 17-20. 1915; op. cit. **3**: 85-194. *pl.* 3-5. 1916; op. cit. **4**: 15-36. *pl.* 4. 1917; op. cit. **5**: 37-107. *pl.* 4-6. 1918.

Herbs, suffruticose plants, shrubs, or woody, scandent or climbing perennials, or even arborescent plants; leaves alternate, very variable, pinnately or palmately veined, entire to variously divided; heads heterogamous and radiate, or discoid; involucre narrowly campanulate, usually subtended by calyculate bracteoles; bracts of the involucre uniseriate, or by overlapping subbiseriate, variable in number but tending to approach a definite series of numbers, namely 5-8-13-21, etc.; ray flowers when present disposed in a single row, fertile, the rays sometimes reduced; disk flowers perfect; corollas slenderly tubular to abruptly ampliate above into a campanulate 5-toothed limb, the teeth mostly short; anthers obtuse or slightly sagittate at the base; style branches truncate, rounded-obtuse, occasionally terminated by a penicillate tuft of hairs or by a triangular, acute or acuminate, dorsally hirtellous appendage; achenes subterete, usually ribbed, glabrous or hirtellous; pappus of numerous white slender setae.

A large genus, widely distributed, but of little economic value.

KEY TO THE SUBGENERA AND SECTIONS.

Style branches truncate, rounded-obtuse, or occasionally terminated by a penicillate tuft of hairs. (Subgenus **EUSENECIO**.)

Stems erect or ascending, not climbing.

Stems not abruptly terminated by a foreshortening of the main axis; oil tubes not richly developed in the cortex.

Leaves pinnately veined.

Stems more or less ligneous at the base; suffruticose plants.

Involucre barely calyculate.....**I. INCANI.**

Involucre distinctly calyculate.....**II. SUFFRUTICOSI.**

Shrubs or treelike plants.....**III. FRUTICOSI.**

Leaves palmately veined.....**IV. PALMATINERVII.**

Stems abruptly terminated by a foreshortening of the main axis, and bearing at the apex two to several more or less pedunculate, compound, corymbose cymes; oil tubes richly developed in the cortex.

V. TERMINALES.

Stems climbing.....**VI. STREPTOTHAMNI.**

Style branches terminated by a triangular, acute or acuminate, dorsally hispidulous appendage; stems prostrate or scandent. (Subgenus **PSEUDOGYNOXIS**.).....**VII. CONVULVOLOIDEI.**

KEY TO THE SPECIES.**I. INCANI.**

A single species in Mexico.....**1. S. palmeri.**

II. SUFFRUTICOSI.

Inflorescence several to many-headed.

Leaves bi-tri-pinnatisect, not auriculate.

Stems conspicuously tufted-pubescent in the leaf axils; leaves 1.5 to 6 cm. broad.....**2. S. lyoni.**

Stems not conspicuously tufted-pubescent in the leaf axils; leaves 1.5 cm. or less broad.....**3. S. cedrosensis.**

Leaves lance-attenuate and entire to ovate and irregularly laciniate; upper leaves sessile and auriculate.

Leaves glabrous.....4. *S. lemmoni*.

Leaves white-tomentose beneath.....5. *S. alvarazensis*.

Leaves linear and entire to pinnately parted with narrow remote lateral divisions; upper leaves not auriculate.

Involucral bracts usually 21.

Heads 1 to 1.5 cm. high; bracteoles conspicuous, two-thirds as long as the involucre.....6. *S. douglasii*.

Heads 1 to 1.2 cm. high; bracteoles inconspicuous, less than half as long as the involucre.....7. *S. filifolius*.

Involucral bracts usually 13.....8. *S. flaccidus*.

Leaves narrowly lanceolate, entire to sparingly dentate, never pinnately parted.

Upper leaves auriculate.

Involucral bracts 21.....9. *S. picridis*.

Involucral bracts 13.....10. *S. carnerensis*.

Upper leaves not auriculate.....11. *S. stoechadiformis*.

Inflorescence few-headed; heads frequently solitary.

Stems procumbent.....12. *S. procumbens*.

Stems erect.....13. *S. calcarius*.

III. FRUTICOSI.

Leaves lanceolate.

Calyculate bracteoles broad, conspicuous.....14. *S. cinerarioides*.

Calyculate bracteoles narrow, inconspicuous.

Plants more or less tomentose.

Leaves sessile or nearly so, sparingly tomentose beneath...15. *S. argutus*.

Leaves distinctly petiolate, densely and permanently tomentose beneath.

16. *S. thomasi*.

Plants glabrous.....17. *S. salignus*.

Leaves oblong-ovate to ovate-rotund.

Leaves cuneate at the base.....18. *S. schaffneri*.

Leaves cordate at the base.

Involucre densely tomentose.....19. *S. barba-johannis*.

Involucre glabrous or nearly so.

Stem and branches densely hirsute-tomentose....20. *S. hirsuticaulis*.

Stem and branches floccose-tomentose to glabrous.

21. *S. aschenbornianus*.

IV. PALMATINERVII.

Inflorescence densely white-tomentose to glabrous, in no sense glandular.

Heads numerous, small or medium-sized, 6 to 12 mm. high.

Upper leaf surface closely and conspicuously reticulate-veined.

Involucre tomentose.

Heads radiate.....22. *S. roldana*.

Heads discoid.....23. *S. jaliscanus*.

Involucre glabrous.

Lower leaf surface tomentose.....24. *S. hartwegi*.

Lower leaf surface glabrous.....25. *S. seemannii*.

Upper leaf surface not closely and conspicuously reticulate-veined.

Heads disposed in glomerules.....26. *S. robinsonianus*.

Heads not disposed in glomerules.

Petioles not densely lanate27. *S. albonervius*.

Petioles densely lanate.

Leaves permanently tomentose on both surfaces.

27a. *S. eriophyllus*.

Leaves tomentose beneath, glabrate above.....28. *S. lanicaulis*.

Heads few, large, 12 to 20 mm. high.

Leaves angulate-lobed, strongly reticulate-veined.

Leaves angulately 5-lobed.....29. *S. reticulatus*.

Leaves 7 to 13-lobed.....30. *S. acerifolius*.

Leaves subpinnately incised, not strongly reticulate-veined.

31. *S. ehrenbergianus*.

Inflorescence more or less glandular-hirtellous, often with hirsutish hairs intermixed.

Leaves 3 to 5-lobed, somewhat halberd-shaped.

Heads ligulate.....32. *S. anisophyllus*.

Heads discoid.

Leaves not peltate.

Basal lobes of leaf reflexed.....33. *S. chrismarii*.

Basal lobes of leaf horizontally spreading.....34. *S. hederæfolius*.

Leaves excentrically peltate.....35. *S. alienus*.

Leaves 5 to 13-lobed, not halberd-shaped.

Involucre 5 to 7 mm. high.

Ray flowers conspicuous.

Leaves 5 to 12 cm. broad, 5 to 7-lobed.

Leaves sparingly tomentose beneath.

Leaves angulately 5-lobed.....36. *S. hederoides*.

Leaves sinuately 7-lobed.....37. *S. oaxacanus*.

Leaves densely tomentose beneath.....38. *S. hypomalacus*.

Leaves 20 to 25 cm. broad, 7 to 13-lobed.....39. *S. langlassei*.

Ray flowers absent.....40. *S. cristobalensis*.

Ray flowers inconspicuous.

Upper leaves mostly dentate.....41. *S. cordovens*.

Upper leaves mostly entire.....42. *S. macrobotrys*.

Involucre 8 to 12 mm. high.

Ray flowers much reduced, inconspicuous.

Bracts of the inflorescence foliaceous.....43. *S. angulifolius*.

Bracts of the inflorescence setaceous.....44. *S. brachyanthus*.

Ray flowers conspicuous.

Main lobes of the leaf not again angulate-lobed.

Leaves peltate.....45. *S. chapalensis*.

Leaves not peltate.

Peduncles and involucre bracts granulose-hirtellous.

46. *S. sartorii*.

Peduncles and involucre bracts subhirsute.....47. *S. petasitis*.

Main lobes of the leaf again angulate-lobed.

Leaf blade about as broad as long.....48. *S. platanifolius*.

Leaf blade broader than long.....49. *S. gilgii*.

V. TERMINALES.

Leaves pinnately veined.

Leaves ovate-oblong, rounded to cordate at the base.

Involucre 10 to 13 mm. high.....50. *S. orcuttii*.

Involucre 4 to 7 mm. high.

Leaves thin; pubescence white-floccose.....51. *S. chicarrens*.

Leaves thickish; pubescence tawny.....52. *S. grandifolius*.

Leaves lanceolate, gradually narrowed at the base.

Involucral bracts 5.

Veins not strongly reticulate.....53. *S. uspantanensis*.

Veins strongly reticulate.

Heads radiate; stems above papillose.....54. *S. standleyi*.

Heads discoid; stems above glabrous or ferruginous.

55. *S. cobanensis*.

Involucral bracts 8.

Stems above smooth.....56. *S. andrieuxii*.

Stems above pubescent.....57. *S. liebmännii*.

Leaves palmately veined.

Leaves glabrous.....58. *S. praecox*.

Leaves arachnoid-tomentose beneath.....59. *S. velatus*.

VI. STREPTOTHAMNI.

A single species in Mexico.....60. *S. parasiticus*.

VII. CONVULVULOIDEI.

Heads 1 to 1.5 cm. high; bracteoles squarrose.....61. *S. kermesinus*.

Heads 1.5 to 2 cm. high; bracteoles appressed.....62. *S. confusus*.

1. *Senecio palmeri* A. Gray, Proc. Amer. Acad. 11: 80. 1876.

Guadalupe Island, Baja California, whence the type.

Suffruticose, 1 meter or less high, persistently white-tomentose throughout; leaves oblong-spathulate, 3 to 9 cm. long, obtuse, entire to sinuate-dentate, narrowed at the base into a petiole; inflorescence a terminal, pedunculate, few to several-headed, corymbose cyme; heads 10 to 14 mm. high, radiate; disk flowers numerous; achenes sericeous-pubescent.

2. *Senecio lyoni* A. Gray, Syn. Fl. ed. 2. 1²: 454. 1886.

Islands off Baja California; type from San Clemente Island.

Suffruticose; stems terete below, subangulate and striate above, persistently tomentose in the leaf axils; leaves 3 to 13 cm. long, 1 to 6 cm. broad, bi-tri-pinnatisect into linear obtuse divisions, glabrous above, tomentulose to nearly or quite glabrous beneath; heads 10 to 12 mm. high, few, on long bracteate peduncles, radiate; ray flowers 10 to 12; rays yellow; disk flowers numerous; achenes canescent-pubescent.

3. *Senecio cedrosensis* Greene, Bull. Calif. Acad. 1: 194. 1885.

Cedros Island, Baja California, whence the type.

Suffruticose; stem below ligneous, covered with a grayish bark; branches sparingly crisp-hirsute with jointed hairs; leaves bi-tri-pinnatisect, 2 to 7 cm. long, 0.5 to 1.5 cm. broad, pinnately parted into short, irregularly dentate or incised divisions; heads about 1 cm. high, radiate; disk flowers exceeding the involucre; achenes canous-hirtellous.

4. *Senecio lemmoni* A. Gray, Proc. Amer. Acad. 17: 220. 1882.

Arizona and northern Baja California; type from Camp Lowell and Santa Catalina Mountains, Arizona.

Suffruticose, glabrous or nearly so; stem much branched, covered with a brownish, more or less deciduous cortex; leaves lanceolate, entire to irregularly and remotely salient-toothed, membranaceous, the lower narrowed into a petiole, the upper sessile and auriculate-amplexicaul; heads 10 to 12 mm. high, radiate; ray flowers about 12; rays yellow; disk flowers numerous, exceeding the involucre; achenes hirtellous.

5. *Senecio alvarazensis* Greenm. Field Mus. Bot. 2: 349. 1912.

Northern Mexico; type from Álvarez, San Luis Potosí.

Suffruticose; stems erect, branched, above striate and flocculent-tomentose; upper leaves sessile and auriculate-clasping, irregularly laciniate-lobed or sub-pinnate, 3 to 8 cm. long, 1 to 4.5 cm. broad, arachnoid-tomentulose above, densely and persistently white-tomentose beneath; inflorescence cymose, many-headed; heads about 1 cm. high, radiate; bracts of the involucre usually 21, lanceolate, 7 to 8 mm. long, black-tipped; ray flowers 10 to 12; rays yellow; disk flowers about 50; achenes canous-hirtellous.

6. *Senecio douglasii* DC. Prodr. 6: 429. 1837.

California to northern Baja California and Sonora; type from California.

Suffruticose, white-tomentose to nearly or quite glabrous; stems erect, more or less branched; leaves thickish, linear and entire to pinnately divided into 3 to several long, linear, acute divisions, the margins revolute; inflorescence terminating the stem and branches in a few-headed corymbose cyme; heads 1 to 1.5 cm. high, nearly as broad, radiate; involucre conspicuously calyculate; bracts of the involucre usually 21; ray flowers about 12; rays yellow; disk flowers about 60; mature achenes 4 to 5 mm. long, canescent-pubescent with upwardly appressed hairs.

7. *Senecio filifolius* Nutt. Trans. Amer. Phil. Soc. n. ser. 7: 414. 1841.

Southwestern United States, mainly east of the Rocky Mountains, to Coahuila and Chihuahua; type from "banks of the Missouri, towards the Rocky Mountains."

Suffruticose, white-tomentose to nearly glabrous; stems erect, usually branched, leafy; leaves linear and entire to pinnately divided into few to several linear divisions, the margins revolute; heads few to several, 1 to 1.5 cm. high, radiate; involucre not conspicuously calyculate, the bracteoles mostly less than half as long as the 21 bracts of the involucre; ray flowers 8 to 13; rays yellow; disk flowers 40 to 50; achenes canous-hirtellous.

8. *Senecio flaccidus* Less. Linnaea 5: 161. 1830.

Senecio regiomontanus DC. Prodr. 6: 429. 1837.

Senecio longilobus Benth. Pl. Hartw. 18. 1839.

Chihuahua to Hidalgo; type from the Llanos de Perote.

Suffruticose, more or less deciduously white-tomentose; stems 1 meter or less high; leaves 2 to 8 cm. long, flaccid, linear and entire to pinnately divided into few linear, elongate, divaricately spreading lateral divisions; heads 10 to 12 mm. high, radiate; involucre calyculate with short setaceous bracteoles; bracts of the involucre usually 13, about 6 mm. long, tomentulose to glabrous; achenes sericeous-pubescent.

9. *Senecio picridis* Schauer, Linnaea 19: 733. 1847; 20: 697. 1847.

South Mexico; type from Zimapán, Hidalgo.

Stems erect, 1 meter or less high, ligneous below, floccose-tomentose; leaves narrowly lanceolate, 3 to 13 cm. long, 5 to 10 mm. broad, acute, entire or inconspicuously denticulate, at first arachnoid-tomentulose but more or less glabrate above, permanently white-tomentose beneath, the lowermost leaves gradually narrowed into a slightly winged petiole, the upper leaves sessile and auriculate or subsagittate at the base; heads 8 to 10 mm. high, radiate; bracts of the involucre usually 21; ray flowers 8 to 10; rays yellow; disk flowers numerous; achenes sericeous-hirtellous.

10. *Senecio carnerensis* Greenm. Monogr. Senecio 1: 25. 1901; Bot. Jahrb.

Engler 32: 22. 1902; Ann. Mo. Bot. Gard. 1: 273. 1914.

Northern Mexico; type from Carneros Pass, Coahuila.

Suffruticose; leaves petiolate to sessile and auriculate, oblanceolate to spatulate, 1.5 to 5 cm. long, 1 cm. or less broad, subentire to acutely dentate, white-tomentose on both surfaces in the early stages, more or less glabrate above; heads 8 to 10 mm. high, radiate; bracts of the involucre usually 13; ray flowers about 8; rays yellow; disk flowers 30 to 40; achenes sericeous-hirtellous.

11. *Senecio stoechadiformis* DC. Prodr. 6: 429. 1837.

South Mexico; type from Villalpando.

Suffruticose, canescent-lanate throughout; stem erect, usually branched; leaves lanceolate to linear, 3 to 13 cm. long, 2 to 10 mm. broad, attenuate at both ends, acute at the apex, entire or remotely denticulate, floccose-tomentulose above in the early stages but somewhat glabrate, persistently white-tomentose beneath; margins commonly revolute; heads 8 to 12 mm. high, radiate; bracts of the involucre usually numerous; achenes canous-hirtellous.

12. *Senecio procumbens* H. B. K. Nov. Gen. & Sp. 4: 177. 1820.

Senecio helleri Klatt, Abh. Naturf. Ges. Halle 15: 333. 1882.

South Mexico at high altitudes; type from the mountains near Toluca.

A low suffruticose alpine plant, white-tomentose throughout; stems prostrate or ascending, 5 to 20 cm. high, leafy; leaves oblanceolate or somewhat spatulate, 1.5 to 5 cm. long, 0.5 to 1 cm. broad, entire to sinuate-dentate, white-tomentose on both surfaces, occasionally somewhat glabrate above; heads 1 to 1.5 cm. high, few or solitary, radiate; disk flowers numerous; achenes glabrous.

13. *Senecio calcarius* H. B. K. Nov. Gen. & Sp. 4: 184. 1820.

Senecio mairetanus DC. Prodr. 6: 430. 1837.

Senecio chrysactis Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. 2: 237. 1881

South Mexico, rocky places above timber line; type collected between Mazatlán and Chilpancingo, Guerrero.

A low branched erect shrub, 1 meter or less high, white-tomentose throughout; branches leafy; leaves linear-lanceolate, 2 to 10 cm. long, 1.5 to 10 mm. broad, acute, entire, coriaceous, revolute-margined, entire, at first tomentulose, later more or less glabrous above, densely and permanently white-tomentose beneath; heads few, 1.5 to 2 cm. high, radiate; bracts of the involucre about 21, floccose-tomentose; ray flowers usually 13; rays bright yellow; disk flowers numerous; achenes glabrous.

14. *Senecio cinerarioides* H. B. K. Nov. Gen. & Sp. 4: 183. 1820.

South Mexico; type from Morán.

Fruticose, 1 to 2.5 meters high; stem below smooth and glabrous, above angled, striate and, as well as the branches, tomentulose; leaves sessile, narrowly lanceolate, 5 to 18 cm. long, 0.5 to 1.5 cm. broad, acute, entire or denticulate, tomentulose above in the younger stages, later glabrate, persistently white-tomentose beneath, the upper leaves usually auriculate-sagittate at the base; inflorescence many-headed; involucre bracts usually 21, the calyculate bracteoles lanceolate, conspicuous, subsquarrose; ray flowers about 13; rays yellow; disk flowers numerous; achenes sparingly hirtellous or glabrous.

15. *Senecio argutus* H. B. K. Nov. Gen. & Sp. 4: 183. 1820.

South Mexico; type from Cofre de Perote.

Suffruticose; upper part of stem and branches striate; leaves tomentulose on both surfaces, somewhat glabrate above; heads many, 10 to 13 mm. high, radiate; involucre of about 13 bracts; ray flowers commonly 8; rays pale yellow; disk flowers numerous; achenes hirtellous.

16. *Senecio thomasii* Klatt, Abh. Naturf. Ges. Halle 15: 332. 1881; Leopoldina 24: 126. 1888.

Senecio lindenii Schultz Bip.; Klatt, Abh. Naturf. Ges. Halle 15: 332. 1881.

Senecio deppeanus Hemsl. Biol. Centr. Amer. Bot. 2: 239. 1881.

South Mexico; type from Orizaba; type of *S. deppeanus* from Malpais de Naulingo.

Fruticose, 1 to 2 meters high; stem erect, striate, at first tomentose, somewhat glabrate; leaves petiolate, lanceolate, 5 to 18 cm. long, 1 to 5 cm. broad, acuminate, acute, entire or denticulate, floccose-tomentulose above in the younger stages but glabrate, densely and permanently white-tomentose beneath; inflorescence many-headed; heads about 8 mm. high, radiate; ray flowers usually 8; rays yellow; disk flowers 20 to 25; achenes puberulent.

17. *Senecio salignus* DC. Prodr. 6: 430. 1837.

Cineraria salicifolia H. B. K. Nov. Gen. & Sp. 4: 188. 1820.

Senecio vernus DC. Prodr. 6: 430. 1837.

Cineraria verna Mairet; DC. Prodr. 6: 430. 1837.

Senecio axillaris Klatt, Abh. Naturf. Ges. Halle 15: 333. 1881.

Southern Arizona through Mexico to Guatemala; type collected between Cerro Ventoso and Morán.

Shrub, 1 to 2 meters high, glabrous throughout; stem branched, terete, covered with a brownish cortex; leaves sessile, narrowly lanceolate, 3 to 12 cm. long, 0.5 to 1.5 cm. broad, entire or denticulate; inflorescence a terminal paniculate cyme; heads many, 8 to 10 mm. high, radiate; involucre bracts usually 8, stramineous, shorter than the disk flowers; ray flowers commonly 5; rays bright yellow; achenes hirtellous-pubescent. "Jarilla" (Valley of Mexico); "jaral amarillo" (Valley of Mexico); "chilca" (Chiapas); "flor de dolores" (Guatemala).

A decoction of the leaves is employed locally as a remedy for intermittent fevers, and in the form of fomentations to reduce the pain of rheumatism and similar affections.

18. *Senecio schaffneri* Schultz Bip.; Klatt, Leopoldina 24: 126. 1888.

Senecio grandifolius var. *glabrior* Hemsl. Biol. Centr. Amer. Bot. 2: 240. 1881, in part.

South Mexico; type from Mirador, Veracruz.

Shrub 1 to 4 meters high; stem below covered with a grayish bark, above, as well as the branches in the younger stages, somewhat striate and arachnoid-tomentose but soon glabrate; leaves petiolate, oblong-lanceolate to ovate, 5 to 15 cm. long, 2 to 12 cm. broad, sinuate-angulate-lobed, cuneate at the base, conspicuously reticulate-veined, glabrous above, pubescent beneath especially on the midrib and lateral nerves; petioles 2 to 7 cm. long, naked; heads many, 10 to 12 mm. high, radiate; bracts of the involucre usually 5; ray flowers mostly 3; rays yellow; disk flowers about 6; achenes glabrous.

19. *Senecio barba-johannis* DC. Prodr. 6: 430. 1837.

Senecio grahami Benth. Pl. Hartw. 18. 1839.

Senecio pullus Klatt, Abh. Naturf. Ges. Halle 15: 333. 1882. Not *S. pullus*

Klatt, Bull. Herb. Boiss. 4: 469. 1896.

South Mexico.

Shrub 2 to 3 meters high; stem below covered with a grayish brown cortex, branched, and densely tomentose in the younger parts; leaves petiolate, ovate to oblong-ovate, 5 to 15 cm. long, 3 to 9 cm. broad, mucronate-acute, callous-denticulate and more or less sinuate, rather thick in texture, at first tomentulose above but soon becoming glabrous and smooth except on the midvein and lateral nerves densely and persistently tomentose beneath, cordate at the base; petioles 2.5 to 8 cm. long, densely tomentose; heads many, about 1 cm. high, radiate; involucre tomentose; ray flowers usually 5; disk flowers 10 to 15; achenes glabrous. "Barba de Juan de Dios" (Valley of Mexico); "gordolobo" (Hidalgo).

Villada reports that the sap of the thick stems is sometimes resorted to by travelers as a substitute for drinking water.

- 20. *Senecio hirsuticaulis*** Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler. 32: 22. 1902; Field Mus. Bot. 2: 280. 1907.

East central Mexico; type collected between San Luis Potosí and Tampico.

Shrub; stem above and the branches, as well as the petioles, densely hirsute-pubescent with spreading hairs; leaves petiolate, ovate-oblong to ovate-rotund, 5 to 12 cm. long, 3 to 9 cm. broad, acute at the apex, subangulately 5 to 7-lobed, usually subcordate at the base, slightly hirtellous above especially on the midrib and lateral nerves, densely and permanently tomentose beneath; heads about 1 cm. high, radiate; bracts of the involucre usually 13, glabrous; ray flowers mostly 8; disk flowers 20 to 25; achenes glabrous.

- 21. *Senecio aschenbornianus*** Schauer, Linnaea 20: 698. 1847.

South Mexico; type from the Valley of Toluca.

Shrub 1 to nearly 3 meters high; stem below covered with a brownish bark, the younger parts and the branches floccose-tomentulose but soon glabrate; leaves petiolate, broadly oblong-ovate to ovate-rotund, 5 to 12 cm. long, 3.5 to 10 cm. broad, shallowly and subangulately 5 to 9-lobed, acute at the apex, mucronate-denticulate, short-cordate to rounded at the base, at first tomentulose above but soon glabrate, densely and persistently lanate-tomentose beneath; heads about 8 mm. high, radiate; bracts of the involucre commonly 8, glabrous; ray flowers 6 to 8; rays yellow; disk flowers about 12; achenes glabrous.

- 22. *Senecio roldana*** DC. Prodr. 6: 431. 1837.

Roldana lobata Llav. & Lex. Nov. Veg. Deser. 2: 13. 1825.

Senecio sublobatus DC. Prodr. 6: 310. 1837, nomen nudum.

Cineraria angulata Alamán; DC. Prodr. 6: 431. 1837.

Cineraria lobata Mairet; DC. Prodr. 6: 431. 1837.

Senecio schumannianus Schauer, Linnaea 20: 698. 1847.

South Mexico.

An erect branched shrub, 2 to 3 meters high, white-tomentose in the younger parts; leaves petiolate, subpalmately nerved, subrotund to oblong-ovate, 5 to 22 cm. long, nearly or quite as broad, sinuate-angulate-lobed, obtuse or acute, callous-denticulate, at first lightly floccose but soon glabrate above, densely and persistently lanate-tomentose beneath; petioles 0.5 to 13 cm. long; heads many, radiate; ray flowers usually 5; rays yellow; disk flowers 10 to 12; achenes glabrous.

- 23. *Senecio jaliscanus*** S. Wats. Proc. Amer. Acad. 26: 143. 1891.

Southwestern Mexico; type from Chapala Mountains, near Guadalajara, Jalisco.

Stem 2 to 3 meters high, ligneous below, striate and woolly-tomentose above; leaves petiolate, oblong-ovate, 5 to 20 cm. long, nearly or quite as broad, 5 to 7-angulate-lobed, cordate, subpalmately nerved, at first arachnoid-tomentulose above but soon glabrate, permanently white-tomentose beneath; petioles 1 to 15 cm. long; heads about 12 mm. high, discoid, 15 to 20-flowered; achenes glabrous.

- 24. *Senecio hartwegi*** Benth. Pl. Hartw. 18. 1839.

West-central Mexico; type from Bolaños, Jalisco.

Stem fruticose; branches, petioles, and lower leaf surface tomentose; leaves petiolate, suborbicular, 3 to 9 cm. long, nearly or quite as broad, repand-angulate, cordate, palmately 7 to 9-nerved, glabrous and strongly reticulate-nerved on the upper surface; heads small, radiate; achenes puberulent.

- 25. *Senecio seemannii*** Schultz Bip. in Seem. Bot. Voy. Herald 311. 1856.

Southern Arizona and northern Mexico; type from the Sierra Madre, northwestern Mexico.

Stem erect, 1 to 2 meters high, ligneous at the base, angulate-channeled and more or less purplish-lineolate above, glabrous; leaves petiolate, orbicular-ovate, 4 to 24 cm. long, nearly or quite as broad, repand-angulate-lobed, callous-

denticulate, shallowly cordate to subtruncate at the base, glabrous on both surfaces or occasionally slightly flocculent-tomentulose beneath in the early stages but soon glabrate; heads small, radiate; achenes hirtellous or glabrous.

26. *Senecio robinsonianus* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Trees & Shrubs 1: 19. *pl.* 10. 1902.

Shrub 2 to 3 meters high; stems terete, covered with a white, densely matted tomentum; leaves petiolate, ovate-rotund, 15 to 20 cm. long, nearly or quite as broad, palmately 7 to 9-nerved from just above the truncate or shallowly cordate base, denticulate to sinuately sublobate, hirtellous-pubescent above, densely and persistently lanate-tomentulose beneath; inflorescence a terminal panicle; heads radiate, disposed in glomerules; achenes glabrous.

27. *Senecio albonervius* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Ann. Mo. Bot. Gard. 1: 275. 1914.

South Mexico; type from the Valley of Tamascaltepec.

Arborescent, 2 to 4 meters high; stem at first white-tomentulose, later glabrate; leaves petiolate, broad-ovate, 3 to 5 cm. long, nearly or quite as broad, sinuately 4 to 11-lobed, remotely callous-denticulate, cordate at the base, at first tomentulose on both surfaces, more or less glabrate above except on the midrib and nerves; petiole 3 to 10 cm. long; inflorescence a terminal many-headed panicle; heads radiate; achenes glabrous.

27a. *Senecio eriophyllus* Greenm. Field Mus. Bot. 2: 282. 1907.

South Mexico; type from hills near Tula, Oaxaca.

Shrub; stem in the dried state of a dark gray or blackish wood, covered with a light gray cortex; ultimate branches white floccose-tomentulose in the early stages, glabrate; leaves petiolate, ovate to ovate-oblong, 6 to 10 cm. long, 5 to 8 cm. broad, sinuate-angulate-lobed, rounded to cordate at base, densely and persistently white-tomentulose on both surfaces; inflorescence a terminal panicle; heads about 12 mm. high, discoid, 10 to 12-flowered; involucre bracts 8, stramineous, floccose-tomentulose at the base, glabrous toward the apex; achenes glabrous.

28. *Senecio lanicaulis* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Field Mus. Bot. 2: 283. 1907.

South Mexico; type from Pinabete, Chiapas.

Shrub; stem above densely lanate-tomentulose; leaves petiolate, subrotund to reniform, cordate, palmately 7 to 9-nerved, 7 to 25 cm. broad, shallowly sinuate-lobed, unequally mucronate-dentate, at first tomentulose but soon glabrate above, densely and permanently white-lanate-tomentulose beneath; inflorescence terminal, many-headed; heads radiate; ray flowers 6 to 8; disk flowers 12 to 20; achenes glabrous.

29. *Senecio reticulatus* DC. Prodr. 6: 431. 1837.

Senecio dictyophyllus Benth. Pl. Hartw. 43. 1840.

South Mexico; type from Villalpando, Michoacán.

Stems erect, 30 to 60 cm. high, from a ligneous base, glabrous; leaves short-petiolate, orbicular-ovate, 3 to 6 cm. long, nearly or quite as broad, shallowly 7 to 13-angulate-lobed, glabrous on both surfaces, paler beneath, strongly reticulate-nerved, callous-denticulate, subtruncate to slightly cordate at the base; inflorescence a terminal, somewhat leafy, few-headed, subcorymbose cyme; heads 1 to 1.5 cm. high, radiate; ray flowers 6 to 8; rays bright yellow; disk flowers numerous; achenes glabrous.

30. *Senecio acerifolius* Hemsl. Biol. Centr. Amer. Bot. 2: 235. 1881.

South Mexico; type from Oaxaca.

Base of stem unknown but probably ligneous; upper portion of plant glabrous; leaves petiolate, subrotund, acutely 5-angulate-lobed, 4 to 7 cm. long and broad; inflorescence few-headed; heads 12 to 16 mm. high, radiate; disk flowers 30 to 40; achenes glabrous.

- 31. *Senecio ehrenbergianus*** Klatt, Leopoldina **24**: 125. 1881.

South Mexico; type from Puebla.

Stem scandent, densely lanate-tomentose at the ligneous base, herbaceous and glabrous or slightly pubescent above; leaves petiolate, lanceolate to ovate in general outline, 4 to 12 cm. long, 1.5 to 10 cm. broad, more or less incise-lobed, cuneate to subcordate at the base, sparingly pubescent on both surfaces, paler beneath; heads few, large, 1.2 to 2 cm. high, radiate; disk flowers numerous; achenes glabrous.

- 32. *Senecio anisophyllus*** Klatt, Leopoldina **24**: 124. 1888.

Senecio hederæfolius Buchinger & Schultz Bip., not Hemsl.; Klatt, Leopoldina **23**: 124. 1888.

South Mexico; type from Pelado.

Shrubby; stem terete, glabrous, branched; lower leaves petiolate, cordate, trilobate, 7-nerved, the upper leaves sessile, lanceolate, acute; heads radiate, comparatively few, disposed in a subcorymbose cyme; ray flowers about 6; disk flowers 25 to 30; achenes glabrous.

- 33. *Senecio chrismarii*** Greenm. Monogr. *Senecio* **1**: 26. 1901; Bot. Jahrb. Engler **32**: 22. 1902; Ann. Mo. Bot. Gard. **1**: 278. 1914.

South Mexico.

Shrub; stem at first sparingly pubescent, later becoming glabrous; leaves petiolate, palmately nerved, triangular-ovate in general outline, 7 to 10 cm. long, 5 to 8 cm. broad, hastate or somewhat halberd-shaped, 3 to 5-lobed, mucronate-denticulate, deeply cordate, above sparingly hirtellous, beneath glabrous or sparsely puberulent on the nerves; petioles slender, 4 to 9 cm. long; inflorescence a terminal, loose, few-headed, densely glandular-puberulent panicle; heads 1.2 to 1.5 cm. high, discoid; disk flowers about 20; achenes glabrous.

- 34. *Senecio hederæfolius*** Hemsl. Biol. Centr. Amer. Bot. **2**: 241. 1881.

South Mexico.

Base of plant unknown; stem above and the inflorescence glandular-puberulent; leaves petiolate, suborbicular in general outline, 3 to 10 cm. in diameter, 3 to 5-angulate-lobed, callous-denticulate; inflorescence a terminal paniculate cyme; heads discoid, about 20-flowered; achenes glabrous.

- 35. *Senecio alienus*** Robins. & Seat. Proc. Amer. Acad. **28**: 110. 1893.

South Mexico; type collected near Pátzcuaro, Michoacán.

Stem below ligneous; leaves petiolate, excentrically peltate, triangular-ovate in general outline, 3 to 5-angulate-lobed, 5 to 10 cm. long, nearly as broad, apiculate-acute, callous-denticulate, essentially glabrous on both surfaces, paler beneath; inflorescence a terminal, somewhat leafy, minutely glandular-hirtellous panicle; heads about 12 mm. high, discoid; flowers few; achenes glabrous.

- 36. *Senecio hederoides*** Greenm. Monogr. *Senecio* **1**: 26. 1901; Bot. Jahrb. Engler **32**: 22. 1902; Bull. Herb. Boiss. II. **6**: 868. 1906.

South Mexico; type from Reyes, Oaxaca.

Shrub; younger stems and branches tomentulose; leaves petiolate, palmately nerved, ovate-rotund, 3 to 8 cm. long, nearly or quite as broad, mostly 5-lobed, abruptly cuneate to subcordate at the base, granulose-hirtellous above, sub-tomentose beneath, the lobes mucronate-acute, the margins callous-dentate; heads numerous, 10 to 12 mm. high, radiate; bracts of the involucre usually 8, glandular-hirtellous; ray flowers commonly 5; rays yellow; disk flowers about 10; achenes glabrous.

- 37. *Senecio oaxacanus*** Hemsl. Biol. Centr. Amer. Bot. **2**: 244. 1881.

South Mexico; type from Oaxaca.

Shrub; leaves petiolate, membranaceous, 3 to 5-nerved from the base, sub-orbicular, 7 to 10 cm. long, equally broad, sinuately 7 to 9-lobed, callous-denticu-

late, hirtellous-puberulent above, subtomentose beneath; heads many, 8 to 9 mm. high, radiate; involucre bracts 8 to 9 mm. long; ray flowers 4 to 6; disk flowers 6 to 9; achenes glabrous.

38. *Senecio hypomalacus* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Ann. Mo. Bot. Gard. 1: 278. *pl.* 10. 1914.

South Mexico; type from mountains of Telixtlahuaca, Oaxaca.

An erect shrub; leaves petiolate, or the uppermost sessile, ovate-rotund to ovate-oblong, palmately 3 to 5-nerved, distinctly 5 to 11-lobed, densely crisp-hirtellous above, lanate-tomentose beneath, callous-denticulate, subcordate to truncate at the base; petioles 6 cm. or less long; heads many, 10 to 12 mm. high, radiate; disk flowers about 10, much longer than the involucre; achenes glabrous.

39. *Senecio langlassei* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Field Mus. Bot. 2: 283. 1907.

South Mexico; type from the Sierra Madre, Michoacán or Guerrero.

Shrub 3 to 4 meters high; leaves petiolate, palmately nerved, ovate-rotund, 10 to 20 cm. long, equally broad, 7 to 13-lobed, granulose-hirtellous on the upper surface, white-tomentose beneath as well as on the petioles, the margins denticulate; inflorescence a terminal many-headed paniculate cyme; heads 1 cm. or less high, radiate; ray flowers 6 to 8; disk flowers 15 to 20; achenes glabrous.

40. *Senecio cristobalensis* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Bull. Herb. Boiss. II. 6: 867. 1906.

South Mexico; type collected between San Cristóbal and Teopisca.

Shrub; stems in the younger stages purplish and glandular-hirtellous; leaves petiolate, palmately nerved, subrotund, 3 to 14 cm. long, quite as broad, 7 to 9-lobed, cordate, mucronate-denticulate, glandular-hirtellous above, paler and crisp-hirtellous beneath; inflorescence a terminal many-headed paniculate cyme; heads discoid; involucre bracts usually 8, glandular-hirtellous; disk flowers 10 to 12, much longer than the involucre; achenes glabrous.

41. *Senecio cordovensis* Hemsl. Biol. Centr. Amer. Bot. 2: 238. 1881.

South Mexico; type collected near Córdoba, Veracruz.

Stems more or less ligneous; leaves petiolate, suborbicular, peltate, 5 to 16 cm. in diameter, 9 to 11-lobed, remotely callous-denticulate, somewhat hirtellous above, tomentulose beneath; petioles 3 to 10 cm. long; inflorescence a terminal many-headed paniculate cyme; heads about 1 cm. high, radiate; ray flowers 3 to 5, inconspicuous; rays much reduced and more or less irregular; disk flowers 8 to 10; achenes glabrous.

42. *Senecio macrobotrys* Hemsl. Biol. Centr. Amer. Bot. 2: 243. 1881.

South Mexico; type from Orizaba, Veracruz.

Scandent shrub (?); stems above terete, purplish, ferruginous-puberulent; lower stem leaves petiolate, suborbicular, 10 to 30 cm. in diameter, excentrically peltate, 9 to 11-lobed, callous-denticulate, somewhat hirtellous-puberulent above, tomentulose beneath; petioles 3 to 12 cm. long; uppermost leaves sessile, oblong-ovate; inflorescence a terminal, rather leafy, many-headed, paniculate cyme; heads about 1 cm. high, subdiscoid; involucre bracts usually 8, glandular-hirtellous; ray flowers 2 to 5, the corollas reduced to short filiform tubes; disk flowers 7 to 11; achenes glabrous.

This species may prove eventually to be conspecific with *S. cordovensis*.

43. *Senecio angulifolius* DC. Prodr. 6: 431. 1837.

Senecio acerifolius K. Koch, Wochenschr. 237. 1861.

South Mexico.

Shrubby plant, 1.5 to 3 meters high; stem soft-woody; leaves petiolate, or the uppermost winged-petiolate to sessile, suborbicular, 6 to 15 cm. long, nearly or quite as broad, 5 to 7-angulate lobed, cordate at the base, not infrequently

peltate, slightly hirtellous above, more or less tomentose beneath, the margins callous-denticulate; inflorescence a terminal, somewhat leafy, glandular-hirtellous, paniculate cyme; heads 1 to 1.5 cm. high, inconspicuously radiate, or rays sometimes wanting; disk flowers about 12; achenes glabrous.

43a. *Senecio angulifolius* var. *ingens* Greenm. Ann. Mo. Bot. Gard. **1**: 276. 1914.

South Mexico; type from Mount Ixtaccihuatl.

Inflorescence compact, fewer and larger-headed than in the species; heads 1.5 to 2 cm. high, 40 to 50-flowered.

44. *Senecio brachyanthus* Greenm. Monogr. *Senecio* **1**: 26. 1901; Bot. Jahrb. Engler **32**: 22. 1902; Ann. Mo. Bot. Gard. **1**: 277. 1914.

South Mexico; type collected between Ayusinapa and Petatlán, Guerrero.

Shrub; stem terete, covered below with a brownish cortex; leaves petiolate, palmately nerved, suborbicular, about 7-lobed, peltate or cordate at the base, mucronate-denticulate, sparingly hirtellous on both surfaces, paler beneath; petioles 13 cm. or less in length, naked, or occasionally winged; heads 10 to 12 mm. high, heterogamous; involucre bracts 8, glandular-hirtellous; ray flowers mostly 5, more or less reduced; disk flowers 8 to 10; achenes glabrous.

45. *Senecio chapalensis* S. Wats. Proc. Amer. Acad. **25**: 155. 1890.

Southwest Mexico; type from Lake Chapala.

Shrub; leaves petiolate, palmately nerved, peltate, ovate-orbicular, 5 to 7-angulate-lobed, 3 to 10 cm. long, nearly or quite as broad, callous-denticulate, slightly hirtellous above, paler and tomentulose beneath; petioles slender, 3 to 12 cm. long; heads 12 to 14 mm. high, conspicuously radiate; ray flowers 5; rays whitish in the dried state; disk flowers 12 to 14; achenes striate, glabrous.

45a. *Senecio chapalensis* var. *areolatus* Greenm. Monogr. *Senecio* **1**: 26. 1901; Bot. Jahrb. Engler **32**: 22. 1902; Ann. Mo. Bot. Gard. **1**: 278. 1914.

South Mexico; type collected in wet canyon above Cuernavaca, Morelos.

Shrub 1.5 to 2 meters high; leaves glabrous or essentially so on both surfaces, strikingly areolate beneath; rays smaller than in the type.

46. *Senecio sartorii* Schultz Bip.; Hemsl. Biol. Centr. Amer. Bot. **2**: 247. 1881.

South Mexico; type from the Cordilleras of Veracruz.

Shrub; branches terete, ferruginous-pubescent; leaves petiolate, suborbicular, 5 to 20 cm. in diameter, obtusely 7 to 11-lobed, callous-denticulate, shallowly cordate, glandular-hirtellous above, tomentose beneath; petioles 10 cm. or less in length, the uppermost leaves sessile and oblong-ovate; heads 10 to 12 mm. high, radiate; involucre bracts 8, ferruginous-puberulent; ray flowers commonly 5; rays conspicuous, distinctly 4 or 5-nerved; disk flowers 10 to 15; achenes glabrous.

47. *Senecio petasitis* (Sims) DC. Prodr. **6**: 431. 1837.

Cineraria petasitis Sims in Curtis's Bot. Mag. *pl.* 1536. 1813.

Cineraria platanifolia Schrank, Pl. Rar. *pl.* 95. 1817. Not *Senecio platanifolius* Benth.

South Mexico; described originally from cultivated specimens grown in England.

Shrub; stem above and the branches subvelvety-pubescent; leaves petiolate, ovate-orbicular, 3 to 18 cm. long, nearly or quite as broad, sinuately 7 to 13-lobed, callous-denticulate, cordate to subtruncate at the base, closely and finely pubescent on the upper surface, densely subhirsute-tomentose beneath; petioles 2 to 14 cm. long, subhirsute; heads 12 to 15 mm. high, radiate; involucre bracts usually 8, subhirsute-pubescent; ray flowers commonly 5; rays bright yellow; disk flowers about 15; achenes glabrous.

48. *Senecio platanifolius* Benth. Pl. Hartw. 43. 1840.

South Mexico; type from Chico.

Stems erect, 1 meter or less high, ligneous at the base, herbaceous and granulose-hirtellous with hirsutish hairs intermixed above; leaves orbicular, 3 to 12 cm. long and broad, cordate, 5 to 9-lobed, dentate, crisp-hirsute above, pubescent with long soft hairs on the veins beneath; petioles 3 to 15 cm. long; heads usually few, relatively large, about 1.5 cm. high, radiate; involucral bracts 13, granulose-hirtellous; ray flowers about 12; disk flowers numerous; achenes glabrous.

49. *Senecio gilgii* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 26. 1902; Field Mus. Bot. 2: 282. 1907.

South Mexico to Guatemala; type collected near Pinabete, Chiapas.

Shrub; stem and branches pubescent above with spreading tawny hairs; leaves long-petiolate, rotund to subreniform, 10 to 30 cm. broad, cordate, 7 to 9-nerved, sinuately lobed and the lobes again sublobate, mucronate-denticulate, hirtellous-pubescent on both surfaces; petioles 8 to 14 cm. long, densely pubescent; heads large, 1.5 to 1.7 cm. high, radiate; involucral bracts 13, densely hirsute-pubescent; ray flowers 8 to 10; rays yellow, conspicuous; disk flowers about 30; achenes striate, glabrous.

50. *Senecio orcuttii* Greenm. Field Mus. Bot. 2: 350. 1912.

South Mexico; type from Omealca, near Córdoba, Veracruz.

Arboreous, 2 to 3 meters high; leaves petiolate, oblong-ovate in general outline, 60 cm. or less long, 30 to 35 cm. broad, deeply pinnately parted into oblong-lanceolate lobes 4 to 8 cm. long and 1.5 to 4 cm. broad, acuminate, acute, remotely apiculate-dentate, ciliate, dark green above, paler beneath, sparingly pubescent on both surfaces to glabrous; heads numerous, 12 to 15 mm. high, radiate; involucral bracts 8, linear, 12 to 13 mm. long; ray flowers showy, yellow; disk flowers 12 to 15; achenes glabrous.

51. *Senecio chicarrensis* Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Field Mus. Bot. 2: 285. 1907.

South Mexico; type collected near Chicarras, Chiapas.

Shrub; stem leafy and white-tomentose above; leaves long-petiolate, oblong-ovate, 12 to 27 cm. long, 10 to 18 cm. broad, sinuately and somewhat irregularly lobed subcordate to abruptly contracted into an unequal base, glabrous above, floccose-tomentose beneath especially along the prominent midrib and lateral nerves; involucral bracts 8; ray flowers 2 or 3; rays short, 2 to 2.5 mm. long; disk flowers about 9; achenes glabrous.

52. *Senecio grandifolius* Less. Linnaea 5: 162. 1830.

Senecio ghiesbreghtii Hort. Hal.; Regel, Ind. Sem. Hort. Petrop. 36. 1860; Gartenflora 9: 230. pl. 296. 1860.

South Mexico; described from cultivated material.

Shrub, 3 to 4 meters high; stem and branches above bearing tufts of brownish tomentum in the leaf axils; leaves petiolate, oblong-ovate, 15 to 40 cm. long, 5 to 22 cm. broad, the lower subincised-lobed, the upper sinuate-dentate, acute, puberulent on the upper surface in the young stages but soon glabrate, crisp-tomentulose with tawny hairs beneath, subcordate to rounded at the base, margins callous-denticulate; petioles 5 to 10 cm. long; heads 6 to 8 mm. high, radiate; involucral bracts 8; ray flowers commonly 5; rays yellow; disk flowers 10 to 12; achenes glabrous.

53. *Senecio uspantanensis* (Coulter) Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb. Engler 32: 22. 1902; Field Mus. Bot. 2: 286. 1907.

Senecio ghiesbreghtii var. *uspantanensis* Coulter, Bot. Gaz. 20: 52. 1895 (excluding John Donnell Smith no. 1598).

South Mexico and Guatemala; type from San Miguel Uspantán, Depart. Quiché, Guatemala.

Arboreous; leaves lanceolate to elliptic-lanceolate, including the petiole 10 to 45 cm. long, 2 to 10 cm. broad, acuminate, acute, entire or remotely and inconspicuously callous-denticulate, gradually narrowed at the base into a petiole 2.5 to 12 cm. in length, glabrous on both surfaces, thickish, dark green or almost black in the dried state, somewhat paler beneath, the midrib and lateral nerves prominent on the under leaf surface but the veinlets indistinct; heads many, small, 8 to 10 mm. high; involucral bracts 5, glabrous; ray flowers 2 or 3; disk flowers 3 to 5; achenes glabrous.

54. *Senecio standleyi* Greenm., sp. nov.

Southwestern Mexico; type from Sierra Madre, Michoacán or Guerrero, alt. 2,000 meters, 18 Feb., 1899, *E. Langlassé* 895 (Gray Herb. and U. S. Nat. Herb.).

Arboreous, 4 to 5 meters high; stem above papillose-hirsute; leaves petiolate, lanceolate to oblanceolate, including the petiole 8 to 16 cm. long, 2 to 3.5 cm. broad, acuminate, acute, entire or inconspicuously callous-denticulate, gradually narrowed at the base into a slender petiole 2 to 3 cm. long, glabrous on both surfaces, strongly reticulate-veined; inflorescence many-headed; heads 8 to 10 mm. high, radiate; bracts of the involucre 5, glabrous; ray flowers 1 to 3; rays yellow; disk flowers 4 to 6; achenes glabrous.

55. *Senecio cobanensis* Coulter, Bot. Gaz. 16: 101. 1891.

South Mexico and Guatemala; type from Cobán, Depart. Alta Verapaz, Guatemala.

Shrub; stems erect, glabrous, leafy at the apex; leaves lanceolate to somewhat oblanceolate, 10 to 12.5 cm. long, 1 to 3 cm. broad, acuminate, acute, remotely callous-denticulate, glabrous on both surfaces, conspicuously reticulate-nerved; heads about 1 cm. high, discoid; involucral bracts usually 5, oblong, 5 to 6 mm. long, obtuse, glabrous, thickened at the base; disk flowers about 5; achenes glabrous.

56. *Senecio andrieuxii* DC. Prodr. 6: 430. 1837.

Senecio subverticillatus DC. Prodr. 6: 430. 1837.

Cineraria verticillata Mair. et DC. Prodr. 6: 430. 1837.

South Mexico; type from Toluca.

Shrub; stem erect, glabrous; leaves petiolate, crowded at the apex of the stem, lanceolate, including the petiole 15 to 30 cm. long, 2 to 5 cm. broad, acute, entire or remotely and inconspicuously callous-denticulate, glabrous, thickish, not strongly reticulate-veined, narrowed at the base into a petiole 2 to 6 cm. in length; heads many, 8 to 10 mm. high, radiate; involucral bracts 8, glabrous; ray flowers usually 5; disk flowers 10 to 12; achenes glabrous.

57. *Senecio liebmannii* Buchinger; Klatt, Leopoldina 24: 125. 1888.

South Mexico; type from Laguna.

Shrub; stem glabrous below, densely ferruginous-tomentose toward the top; leaves petiolate, lanceolate, including the petiole 6 to 10 cm. long, 1 to 1.5 cm. broad, acute, remotely and somewhat sinuate-dentate, narrowed at the base into a short petiole 0.5 to 1 cm. in length, strongly reticulate-nerved and glabrous on both surfaces; heads 8 to 10 mm. high, radiate; involucral bracts 8, glabrous; ray flowers commonly 5; disk flowers about 8; achenes glabrous.

58. *Senecio praecox* (Cav.) DC. Prodr. 6: 431. 1837.

Cineraria praecox Cav. Icon. Pl. 3: 23. pl. 244. 1794.

Central Mexico; described originally from specimens grown at the Botanical Garden of Madrid.

Shrub, or small tree, 1.5 to 5 meters high; stems soft-woody or fleshy, terete, glabrous throughout; leaves clustered at the apex of the stem, petiolate, palmately veined, ovate in general outline, 6 to 18 cm. long, two-thirds as broad, cordate, 5 to 7-angulate-lobed with acuminate lobes, entire-margined, glabrous

on both surfaces; heads radiate; ray flowers 5 or 6; rays yellow; disk flowers 15 to 18; achenes glabrous. "Palo loco" (Valley of Mexico); "palo bobo" (*Bárcena*); "tesapacle," "tezacpatli," "tezcapatli" (Nahuatl).

A decoction of the leaves is used as a domestic remedy for wounds and rheumatism.

This is one of the most striking species of the entire genus. The stems are fleshy, "the wood very soft and pithy" (ex Dr. J. Gregg), and the cortical portion is permeated with resin tubes. The plant is locally known as "candelero."

59. *Senecio velatus* Greenm. Ann. Mo. Bot. Gard. 1: 280. pl. 13. 1914.

Southwestern Mexico; type from bluffs of barranca, near Guadalajara, Jalisco.

Shrub or small tree, similar in habit to the preceding species; stem and branches at the apex rusty-pubescent; leaves petiolate, palmately 7-nerved, ovate-rotund in general outline, about 10 cm. long and broad, 7 to 9-angulate-lobed, persistently white-arachnoid-tomentulose beneath; heads about 1.5 cm. high, radiate; involucre bracts 8, glabrous; ray flowers 3 to 5; rays yellow; disk flowers 6 or 7; achenes glabrous.

60. *Senecio parasiticus* Hemsl. Biol. Centr. Amer. Bot. 2: 244. 1881.

Cacalia parasitica Schultz Bip. Bot. Zeit. 15: 759. 1857.

South Mexico; type collected near Orizaba.

A scandent or climbing woody plant; stem glabrous; leaves short-petiolate, somewhat fleshy, lanceolate to ovate-lanceolate, including the petiole 4 to 8 cm. long, 1 to 3 cm. broad, entire, abruptly narrowed at the base into a petiole 1 cm. or less in length; inflorescence a terminal, more or less leafy, paniculate cyme; heads 10 to 12 mm. high, discoid; involucre bracts 8, glabrous; disk flowers 15 to 20; achenes glabrous.

61. *Senecio kermesinus* Hemsl. Biol. Centr. Amer. Bot. 2: 242. 1881.

Gynoxis haenkei DC. Prodr. 6: 326. 1837.

Senecio convolvuloides Greenm. Monogr. Senecio 1: 26. 1901; Bot. Jahrb.

Engler 32: 22. 1902.

South Mexico; type collected by Haenke.

Stem scandent, ligneous; branches striate; leaves petiolate, ovate to ovate-lanceolate, 3 to 10 cm. long, 1 to 6 cm. broad, acuminate, acute, subentire to coarsely dentate, rounded to shallowly cordate at the base, glabrous or slightly puberulent in the young stages; inflorescence a terminal, somewhat leafy, hirtellous-puberulent, paniculate cyme; heads in anthesis 1 to 1.5 cm. high, radiate; rays deep orange-colored; involucre calyculate with setaceous, densely hirtellous, somewhat squarrose bracteoles; bracts of the involucre commonly 13, sparingly hirtellous to glabrous, 5 to 7 mm. long; disk flowers about 40; achenes glabrous.

This species is known in Chiapas under the name of "flor de niño."

62. *Senecio confusus* Britten, Journ. Bot. Brit. & For. 36: 260. 1898.

Senecio cordifolius β *neaei* DC. Prodr. 6: 326. 1837.

Gynoxis berlandieri DC. Prodr. 6: 326. 1837.

Gynoxis berlandieri α *cordifolia* DC. Prodr. 6: 326. 1837.

Gynoxis berlandieri β *cuneata* DC. Prodr. 6: 326. 1837.

Senecio berlandieri Hemsl. Biol. Centr. Amer. Bot. 2: 236. 1881.

Tamaulipas and San Luis Potosí to Chiapas; type collected near Tampico.

Stem scandent, ligneous, 1 to 6 meters long, climbing over shrubs and trees; branches striate, glabrous or essentially so; leaves petiolate, ovate to ovate-lanceolate, 3 to 10 cm. long, 1 to 4 cm. broad, acuminate, acute, entire to coarsely dentate, cuneate to subcordate, glabrous or nearly so on both surfaces; petioles 1 to 2 cm. long; inflorescence terminating the stem and branches in a somewhat leafy paniculate cyme; heads in anthesis 1.5 to 2 cm. high, radiate; involucre conspicuously calyculate with long linear appressed bracteoles; bracts of the

involucre usually 21, glabrous or slightly puberulent; ray flowers about 15, rays deep orange-colored; disk flowers numerous, 60 or more; achenes puberulent.

DOUBTFUL SPECIES.

SENECIO CHENOPODIODES H. B. K. Nov. Gen. & Sp. 4: 179. 1820. This species, which was based on specimens collected at Campeche, Mexico, is of doubtful status. Its relationship, however, is with *S. confusus*.

109. GOCHNATIA H. B. K. Nov. Gen. & Sp. 4: 19. *pl.* 309. 1820.

Shrubs; leaves alternate, entire or toothed; heads usually glomerate, discoid; involucre many-seriate, graduate, of indurate phyllaries; corollas all equally 5-lobed; achenes pubescent; pappus of numerous stiffish bristles; anthers long-caudate at base.

Leaves green and merely puberulous beneath.

Leaves entire.....1. *G. arborescens*.

Leaves serrulate.....2. *G. glomeriflora*.

Leaves canescent or griseous-tomentose beneath.

Heads about 18-flowered.....3. *G. purpusi*.

Heads 4 to 6-flowered.

Leaves grayish green on both sides, pubescent above.....4. *G. smithii*.

Leaves bright green and glabrous above (at least at maturity), canescent-tomentose beneath.

Leaves elliptic-lanceolate or elliptic, acute or acutish, 2 to 5 cm. long.

5. *G. hypoleuca*.

Leaves oval, rounded or obtuse at apex, 4.5 to 20 mm. long.

6. *G. obtusata*.

1. Gochnatia arborescens T. S. Brandeg. *Zoe* 5: 163. 1903.

Cape region of Baja California; type from Cañón de Santa María.

Arborescent, 3 to 4 meters high, the trunk 20 to 30 cm. thick; stem puberulous; leaf blades ovate, 3.5 to 6.5 cm. long, 2.5 to 4.5 cm. wide, short-petioled, obtuse; heads thick-cylindric, 1.8 cm. high, 13 to "20"-flowered, crowded at tips of branches; involucre about 10-seriate, graduate, 1.5 cm. high, the phyllaries stramineous, arachnoid-ciliate, otherwise glabrous.

2. Gochnatia glomeriflora A. Gray, Proc. Amer. Acad. 19: 57. 1883.

Perezia capitata S. Wats. Proc. Amer. Acad. 25: 156. 1890.

Jalisco and Morelos; type from Cuernavaca, Morelos.

Suffrutescent (?), about 2.5 meters high; stem glandular-puberulous; leaves subsessile, ovate to suborbicular, 5 to 11 cm. long, 2.5 to 8.8 cm. wide, acute to acuminate, cordate at base, subcoriaceous, venose-reticulate; heads 1.3 cm. high, clustered in the leaf axils, "4" or 5-flowered; phyllaries acuminate.

3. Gochnatia purpusi T. S. Brandeg. *Zoe* 5: 240. 1906.

Known only from the type locality, Tehuacán, Puebla.

Shrub; stem and lower leaf surface (at first also the upper) densely cinereous-tomentose; leaves subsessile, elliptic, 1.8 to 3 cm. long, 5 to 14 mm. wide, crenate-denticulate or subentire, coriaceous; heads in terminal glomerules, about 12 mm. high, about 18-flowered; involucre lanate-tomentose.

4. Gochnatia smithii Robins. & Greenm. Proc. Amer. Acad. 32: 50. 1896.

Oaxaca; type from Cuicatlán.

Shrubby; young branches tomentulose-puberulous; leaves petioled, the blades lanceolate or lance-oblong, about 4 cm. long, 1.2 to 1.8 cm. wide, entire, griseously tomentose-pilose beneath; heads about 13 mm. high, in dense glomerules, 6-flowered; involucre about 7 mm. high, the phyllaries mostly obtuse, ciliolate.

5. *Gochnatia hypoleuca* (DC.) A. Gray, Proc. Amer. Acad. **19**: 57. 1883.

Moquinia hypoleuca DC. Prodr. **7**: 23. 1838.

Coahuila and Nuevo León to Querétaro; type from Monterrey, Nuevo León. Texas.

Shrub 2 to 2.5 meters high or "small tree," the stem cinereous- or canescent-tomentose; leaves short-petioled or sessile; heads 8 to 10 mm. high, 4 to 6-flowered, crowded toward tips of branches; involucre 5 to 6 mm. high, the phyllaries obtuse to (inner) acute or obtusely acuminate. "Chomonque" (Durango); "ocotillo."

6. *Gochnatia obtusata* Blake, Contr. U. S. Nat. Herb. **22**: 652. 1924.

Puebla and Oaxaca; type from Tehuacán, Puebla.

Similar to *G. hypoleuca*; leaves smaller, obtuse or rounded; involucre longer (6 to 8 mm.), the phyllaries acute or sharply acuminate.

110. *ONOSERIS* Willd. Sp. Pl. **3**: 1480, 1702. 1804.

1. *Onoseris rupestris* (Benth.) Greenm. Proc. Amer. Acad. **41**: 268. 1905.

Caloseris rupestris Benth. Pl. Hartw. **88**. 1841.

Rhodoseris conspicua Turcz. Bull. Soc. Nat. Moscou **24**: 95. pl. 2. 1851.

Pereziopsis donnell-smithii Coulter, Bot. Gaz. **20**: 53. pl. 6. 1895.

Onoseris conspicua Greenm. Proc. Amer. Acad. **41**: 268. 1905.

Michoacán (or Guerrero) to Oaxaca and Chiapas. Guatemala; type from Mount Chorro.

"Shrub, 4 meters high," white-tomentose throughout, the upper surface of the leaves usually and the involucre sometimes glabrate; leaves alternate, 25 to 40 cm. long (including petiole), lyrate-pinnatifid, the terminal lobe very large, deltoid, usually hastate, coarsely dentate, the 2 or 3 lower pairs of lobes much smaller, unequal, the rachis very narrowly winged; heads paniced, cylindric-turbinate, 6 to 12-flowered, about 2.5 cm. high; involucre graduate, 2.3 to 2.5 cm. high, of linear or linear-lanceolate attenuate phyllaries; corollas crimson, all bilabiate (4 and 1); pappus 2 cm. long, of numerous brownish white bristles; anthers long-caudate at base. "Papelillo."

111. *TRIXIS* (P. Br. Civ. Nat. Hist. Jam. **312**. 1756, hyponym); Crantz, Inst. Herb. **1**: 329. 1766.

REFERENCE: Robinson & Greenman, Revision of the Mexican and Central American species of *Trixis*, Proc. Amer. Acad. **40**: 6-14. 1904.

Shrubs, rarely herbs; leaves alternate, entire or dentate; heads cymose or paniced, yellow; involucre double, the outer phyllaries few, usually shorter, linear to ovate, herbaceous, the inner 5 to 10, equal, subherbaceous; flowers all hermaphrodite and fertile, the corollas all bilabiate, the outer lip 3-toothed, the inner 2-cleft; achenes subcylindric, papillose; pappus of numerous usually brownish bristles; anthers caudate at base.

The following names are reported for species of this genus whose identity is uncertain: "Metatera" (Hidalgo); "manzanilla" (Sinaloa); "pichaguilla," "pichaga."

Leaves decurrent.

Leaves shortly decurrent.....1. *T. decurrens*.

Leaves long-decurrent, winging the stem.

Outer phyllaries equaling or surpassing the inner.

Outer phyllaries lance-ovate or oblong-lanceolate, acuminate.....2. *T. alata*.

Outer phyllaries elliptic, barely acute.....3. *T. calcicola*.

Outer phyllaries shorter than the inner.

Outer phyllaries narrow, about one-third as long as the inner.

4. *T. mexicana*.

Outer phyllaries broad, two-thirds as long as the inner.

5. *T. pterocaulis*.

Leaves not decurrent (sometimes slightly so in *T. rugulosa*, *T. megalophylla*, and *T. wrightii*).

Outer phyllaries ovate, large, usually exceeding the inner--6. *T. longifolia*.

Outer phyllaries linear to narrowly ovate, usually much shorter than the inner.

Leaves glabrous or nearly so beneath, sometimes glandular.

Leaves conspicuously glandular beneath.

Inflorescence appressed-pubescent-----16. *T. californica*.

Inflorescence spreading-villous-----17. *T. silvatica*.

Leaves not glandular beneath.

Outer phyllaries linear or lance-linear-----18. *T. radialis*.

Outer phyllaries spatulate to oval-obovate-----19. *T. wrightii*.

Leaves silky-pubescent or tomentose beneath.

Inner phyllaries 5; heads 5 to 7-flowered-----7. *T. oligantha*.

Inner phyllaries 8; heads 10 to 25-flowered.

Larger leaves narrowly lanceolate or linear-lanceolate, usually 1 cm wide or less.

Heads small, about 1.3 cm. high; leaves not revolute.

8. *T. hyposericea*.

Heads larger, 1.5 to 2 cm. high; leaves usually strongly revolute.

Leaves 6 to 12 mm. wide, silky-tomentose beneath--9. *T. pringlei*.

Leaves usually 2 to 5 mm. wide, silky-pilose beneath.

10. *T. angustifolia*.

Larger leaves lanceolate or lance-oblong, more than 1 cm. wide.

Involucre subcanescently silky-pubescent-----11. *T. haenkei*.

Involucre green.

Inflorescence conspicuously glandular-----13. *T. megalophylla*.

Inflorescence pubescent, not strongly glandular.

Leaves merely apiculate, densely tomentose beneath.

14. *T. nelsonii*.

Leaves gradually acuminate, silky-pubescent beneath.

Leaves densely silky-pilose beneath----12. *T. peninsularis*.

Leaves rather sparsely pilose beneath----15. *T. rugulosa*.

1. *Trixis decurrens* DC. Prodr. 7: 68. 1838.

Perdicium decurrens Sessé & Moc.; DC. Prodr. 7: 68. 1838, as synonym.

Known only from the type locality, Ayacapitla, Morelos.

Stems several, sparsely branched; leaves lance-ovate, crowded, acuminate, entire; heads terminal, subsolitary; outer phyllaries 5, ovate-lanceolate, the inner 8. (Description compiled.)

2. *Trixis alata* D. Don, Trans. Linn. Soc. 16: 192. 1830.

Guerrero; type from Mexico, without definite locality.

Suffrutescent (?), densely stipitate-glandular and pilose, branched above, very leafy; leaves oblong-ovate or lance-ovate, 5 to 8 cm. long, denticulate, sessile; heads large, about 2 cm. high, crowded, leafy-bracted.

3. *Trixis calcicola* Robinson, Proc. Amer. Acad. 49: 516. 1913.

Known only from the type locality, Iguala Canyon, near Iguala, Guerrero.

Shrubby, the branches broadly winged; leaves oblong, 10 to 14.5 cm. long, 2.3 to 3 cm. wide, acuminate, denticulate, glandular and puberulous; heads crowded; outer phyllaries 1.7 cm. long, the inner 1.2 cm.

4. *Trixis mexicana* Lex. in Llave & Lex. Nov. Veg. Descr. 1: 27. 1824.

Querétaro, Michoacán, and Guerrero; type from Vallisoletum, Michoacán.

Shrubby, "scandent"; stem broadly, branches narrowly winged; leaves short-petioled, the blades lance-ovate or oblong-ovate, 4 to 14 cm. long, denticulate,

acuminate, appressed-pilose beneath; heads loosely paniced; involucre 12 mm. high, the outer phyllaries linear or lanceolate.

5. ***Trixis pterocaulis*** Robins. & Greenm. Proc. Amer. Acad. 40: 8. 1904.

Known only from the type locality, Manzanillo, Colima.

Much branched; leaves sessile or short-petioled, the blades oval or elliptic-oblong, 3 to 10 cm. long, denticulate, very sparsely pubescent beneath; heads loosely paniced; outer phyllaries elliptic to oval-ovate.

6. ***Trixis longifolia*** D. Don, Trans. Linn. Soc. 16: 191. 1830.

Perdicium longifolium Sessé & Moc.; D. Don, Trans. Linn. Soc. 16: 192. 1838, as synonym.

Trixis obvallata Hook. & Arn. Bot. Beechey Voy. 300. pl. 65. 1840.

Trixis conferta Benth. Pl. Hartw. 289. 1848.

Sonora to San Luis Potosí and Guerrero; type from Mexico, without definite locality.

Shrubby, 1 to 1.5 meters high, leafy; leaves lanceolate, 3 to 8 cm. long, acuminate, subentire or denticulate, usually conduplicate and falcate, from essentially glabrous to somewhat appressed-villous beneath; heads numerous, crowded, leafy-bracted; involucre 1.5 to 2.5 cm. high. "Hierba del golpe" (Sinaloa); "lobo buase" (Sonora); "rosilla de dos colores."

The flower heads are sometimes placed in the ears as a remedy for earache.

6a. ***Trixis longifolia sericea*** Robins. & Greenm. Proc. Amer. Acad. 40: 9. 1904.

?*Trixis involucrata* D. Don, Trans. Linn. Soc. 16: 193. 1830.

Hidalgo and Michoacán; type from Tula, Hidalgo.

Similar; leaves conduplicate, densely silky-pilose beneath.

6b. ***Trixis longifolia platyphylla*** Robins. & Greenm. Proc. Amer. Acad. 40: 9. 1904.

Guerrero; type from Acapulco.

Leaves elliptic to obovate, 5 to 10 cm. long, 1.5 to 4 cm. wide, entire or denticulate, more or less densely silky-pubescent beneath.

7. ***Trixis oligantha*** Robins. & Greenm. Proc. Amer. Acad. 40: 9. 1904.

Oaxaca; type from Monte Alban.

Leaves on petioles 1 cm. long or less, lance-elliptic or lanceolate, 3 to 9 cm. long, 1.5 to 2.5 cm. wide, acuminate, denticulate, subsericeously tomentose-pilose beneath; panicle broad, the heads somewhat crowded, 1.2 to 1.8 cm. high; outer phyllaries lance-elliptic or lanceolate, equaling or sometimes surpassing the inner.

8. ***Trixis hyposericea*** S. Wats. Proc. Amer. Acad. 25: 157. 1890.

Known only from the type locality, near Guadalajara, Jalisco.

Slender shrub; leaves short-petioled, the blades narrowly lanceolate or lance-linear, attenuate, 4 to 9.5 cm. long, 6 to 13 mm. wide, green above, silky-pilose beneath; outer phyllaries linear or lanceolate, two-thirds as long as the inner or less.

9. ***Trixis pringlei*** Robins. & Greenm. Proc. Amer. Acad. 40: 10. 1904.

Known only from the type locality, Tomellín Canyon, Oaxaca.

Leaves lanceolate, 3 to 7 cm. long, 6 to 12 mm. wide, acuminate, entire, silky-tomentose beneath; involucre glandular-puberulent. (Description compiled.)

10. ***Trixis angustifolia*** DC. Prodr. 7: 69. 1838.

Trixis rosmarinifolia Nees, Linnaea 20: 699. 1847.

Durango to Aguascalientes and San Luis Potosí; type from "Cantoue," San Luis Potosí.

Branching shrub; leaves narrowly lanceolate to narrowly linear, 3 to 8 cm. long, 2 to 5 (rarely 10) mm. wide, strongly revolute, acuminate, more or less densely appressed-silky-pilose beneath; outer phyllaries lance-linear, usually about two-thirds as long as the inner; involucre glandular-puberulous. "Arnica" (San Luis Potosí); "hierba del aire" (Durango); "Montezuma de campo" (Coahuila).

The plant is employed as a remedy for rheumatism

11. *Trixis haenkei* Schultz. Bip. in Seem. Bot. Voy. Herald. 314. 1856.

Jalisco and Puebla; type from the Sierra Madre of northwestern Mexico.

Shrub; leaves lance-oblong or lanceolate, 3 to 14 cm. long, 1 to 4.5 cm. wide, entire or denticulate, green or grayish above, silky-pilose-tomentose beneath; heads densely crowded, 1.5 to 2 cm. high.

12. *Trixis peninsularis* Blake, Contr. U. S. Nat. Herb. 22: 654. 1924.

Cape Region of Baja California; type from San José del Cabo.

Shrub; leaves short-petioled, the blades lanceolate or lance-elliptic, 4 to 8 cm. long, 8 to 20 mm. wide, acuminate, serrulate, revolute-margined, densely silky-pilose beneath; heads 1.6 to 1.8 cm. high; outer phyllaries mostly linear, two-thirds as long as the inner or less.

13. *Trixis megalophylla* Greenm. Proc. Amer. Acad. 41: 270. 1905.

Known only from the type locality, between Sochi and Tlalkinsala, Guerrero.

Shrub; branches obscurely winged; leaves oblong-ovate or oval-oblong, the larger 7.5 to 17 cm. long, 2.5 to 6 cm. wide, entire or denticulate, revolute-margined, glandular-puberulous and pilose beneath; heads 1.5 to 1.8 cm. high; outer phyllaries lanceolate or oblanceolate, about equaling or exceeding the inner.

14. *Trixis nelsonii* Greenm. Proc. Amer. Acad. 41: 270. 1905.

Known only from the type locality, between San Cristóbal and Teopisca, Chiapas.

Leaves petioled, the blades elliptic to elliptic-obovate, 3 to 7 cm. long, 1 to 3 cm. wide, rugose above, densely griseous-tomentose beneath; petioles 5 to 8 mm. long; heads about 1.5 cm. high, rather crowded; involucre glandular-pubescent, the outer phyllaries mostly oblanceolate, half or two-thirds as long as the inner.

15. *Trixis rugulosa* Robins. & Greenm. Proc. Amer. Acad. 40: 10. 1904.

Michoacán, Guanajuato, and Querétaro; type not designated.

Shrub; branches sometimes obscurely winged; leaves lanceolate, 3 to 8 cm. long, 7 to 22 mm. wide, sparingly appressed-pilose beneath; inflorescence loose; outer phyllaries two-thirds as long as the inner, or less.

16. *Trixis californica* Kellogg, Proc. Calif. Acad. 2: 182. f. 53. 1863.

Trixis suffruticosa S. Wats. Bot. Calif. 2: 459. 1880.

Trixis angustifolia latiuscula A. Gray, Syn. Fl. 1²: 410. 1884.

Sonora to Coahuila, Zacatecas, and San Luis Potosí; Baja California and islands; type from Cedros Island, Baja California. California to Texas.

Shrub about 1 meter high; leaves lanceolate or oblong-lanceolate, 2.5 to 11 cm. long, 0.5 to 3 cm. wide, acuminate, entire or denticulate, scarcely revolute-margined, green on both sides, beneath densely gland-dotted, otherwise nearly or quite glabrous; heads 1.3 to 1.8 cm. high; outer phyllaries linear or lance-linear.

17. *Trixis silvatica* Robins. & Greenm. Proc. Amer. Acad. 40: 12. 1904.

Oaxaca; type from the Río Tehuantepec.

Leaves ovate-oblong, 5 to 8 cm. long, 2 to 3 cm. wide, thin, acuminate, sharply dentate, glandular and finely pubescent beneath; heads 2 cm. long; outer phyllaries equaling or exceeding the inner. (Description compiled.)

18. *Trixis radialis* (L.) Kuntze, Rev. Gen. Pl. 1: 370. 1891.*Inula trixis* L. Amoen. Acad. 5: 406. 1759.*Perdicium radiale* L. Sp. Pl. ed. 2. 1248. 1763.*Trixis inula* Crantz, Inst. Herb. 1: 329. 1766.*Perdicium laevigatum* Berg. Act. Holm. 33: 238. pl. 7. 1772.*Perdicium havanense* H. B. K. Nov. Gen. & Sp. 4: 155. 1820.*Trixis frutescens* P. Br.; Spreng. Syst. Veg. 3: 501. 1826.*Trixis laevigata* Lag.; Spreng. Syst. Veg. 3: 501. 1826.*Trixis havanensis* Spreng. Syst. Veg. 3: 501. 1826.*Prenanthes fruticosa* Willd.; Less. Linnaea 5: 33. 1830, as synonym.*Trixis glabra* D. Don, Trans. Linn. Soc. 16: 297. 1830.*Trixis frutescens obtusifolia* Less. Syn. Gen. Comp. 414. 1832.*Trixis frutescens glabrata* Less. Syn. Gen. Comp. 414. 1832.*Trixis frutescens subglabra* Kuntze, Rev. Gen. Pl. 1: 370. 1891.

Tamaulipas and Tepic, south to Yucatán and Chiapas. Guatemala to Panama; West Indies, South America; Texas; type from Jamaica.

Much-branched shrub, the branches glabrous or somewhat pubescent; leaves usually elliptic, varying to lanceolate or oval, 3 to 10 cm. long, 1 to 3.5 cm. wide, entire or dentate, glabrous or sparsely pubescent especially on the costa beneath; heads numerous, rather crowded, 1.5 to 2 cm. high; outer phyllaries mostly linear or lance-linear, usually half or two-thirds as long as the inner. "Tokabán," "tokabal" (Yucatán); "plumilla" (Chiapas); "hierba del aire" (Veracruz); "falsa árnica" (Urbina); "Juan de calle," "árnica de monte," "chucha" (Colombia); "palo de Santa María" (Panama); "diente de león" (Nicaragua); "San Pedro," "Santo Domingo," "tulán verde," "Carmen" (El Salvador).

The plant is used locally as a remedy for diabetes, sores, and venereal diseases.

19. *Trixis wrightii* Robins. & Greenm. Proc. Amer. Acad. 40: 14. 1904.

Sinaloa and Tres Mariás Islands; type from Mazatlán.

Similar to *T. radialis*; branches sometimes obscurely winged; heads 1.5 to 1.8 cm. high; outer phyllaries up to 7 mm. wide.

DOUBTFUL SPECIES.

TRIXIS PIPITZAHUAC Schaffner; Herrera, Naturaleza 3: 407. 1876, nomen nudum. This name, never published in connection with a description, probably refers to one of the well-known species of the genus. The vernacular name is given as "pipitzahoac," and the roots are said to contain a resinous substance used as a drastic.

112. *JUNGIA* L. f. Suppl. Pl. 58, 390. 1781.**1. *Jungia pringlei* Greenm. Field Mus. Bot. 2: 286. 1907.**

Michoacán; type from Uruapan.

"Shrub 3 meters high," glandular-puberulous and somewhat pilose; leaves alternate or the upper subopposite, petioled, the blades of the larger oval-ovate or orbicular-ovate, about 12 cm. long, shallowly about 7-lobed, cordate or subcordate at base, pubescent beneath like the stem and reticulate; heads numerous, in large panicles, whitish, about 1 cm. wide; involucre nearly 1-seriate, equal, about 7 mm. high; receptacle paleaceous; corollas all bilabiate, the outer lip 3-toothed, the inner bifid; achenes about 3 mm. long; pappus silvery-white, of barbellate bristles 5 mm. long.

ADDITIONS AND CORRECTIONS.

In the several years that have passed during the publication of the various parts of this volume, there have appeared descriptions of a rather large number of new species of Mexican trees and shrubs. Although it is not feasible to include these in the keys to species, it has seemed desirable to enumerate them. It has been possible to examine authentic material of a part of the new species, and in some cases such examination has resulted in their being recognized at once as synonymous with earlier published species. In the case of species described in some of the larger or more critical genera the writer has made no attempt to determine their validity, therefore it is not to be assumed that all the additional species listed here are considered valid by the writer.

There are included also in this appendix additional vernacular names gleaned from several sources. The greater part of them have been obtained in connection with the identification of extensive collections made in the States of Sinaloa and Nayarit by Sr. Jesús G. Ortega. There have been accumulated a large number of additional vernacular names as a result of recent explorations in Central America, but it has not appeared necessary to list them here, since they will be enumerated in a flora of Central America now in course of preparation.

Corrections of typographical errors have been made only in the case of a few which are not obvious. In a work of such extent some typographical errors are bound to occur, but most of them will be recognized at once as such.

The number of species of Mexican trees and shrubs recognized as valid in the present volume is approximately 5,700. There is no doubt that this number will be greatly increased by further exploration in Mexico.

CYATHEACEAE.

Page 41. Dr. Reko states that in Chinantla, Oaxaca, *Cyathea princeps* is known as "rabo de chango," "rabo de mico," "rabo de mono," and "rabo de machín."

PINACEAE.

Page 51. The Nahuatl term for pine tree is "oco-cuahuitl," which is said to signify "torch tree." The following names are reported in literature for undetermined species of *Pinus*: "Tzivireni" (Michoacán, *Ramírez*); "pizomlab" (Huastec, *Asiain*); "tziin," "tzinkiup" (tree), "tzinuapk" (resin), "poptzin" (Mixe, *Belmar*); "cueramu" (Tarascan, *León*); "ocotel" (Popocatepetl, *Gadow*).

Page 54. *Pinus pinceana*. "Pino" (Sinaloa).

Page 55. *Pinus leiophylla*. Known in Oaxaca as "pino gretado;" on Popocatepetl as "tlacocote" (*Gadow*).

Page 56. *Pinus teocote*. The Aztec name, "xal-ocotl," signifies "sand pine;" the name "teocote," "pine of the gods." Robelo states that this name was given because of the fact that only the nobles were permitted to use the resin as incense.

Page 58. *Pinus patula*. The term for the cones is "huajolote" or "guajolote," from "quaholotl," "woody ear (of corn)." The name "ocote macho" is said to be applied to this species.

To the species of *Pinus* listed should be added the following:

Pinus muricata Don, Trans. Linn. Soc. Bot. 17: 441. 1837. A California species, represented in northern Baja California and on Cedros Island by var. *anthonyi* Lemmon (Handb. West. Amer. Coneb. 43. 1895).

Pinus radiata Don, Trans. Linn. Soc. Bot. 17: 442. 1837. A California species. Var. *binata* Lemmon (West Amer. Coneb. 42. 1895) is reported from Guadalupe Island, Baja California.

Page 59. *Abies religiosa*. This tree occurs also in Sinaloa, where it is known as "cahuita;" in Guerrero it is called "hoja petate." Sahagún states that the nobles and rich men at certain seasons of the year decorated the doors of their dwellings with fir branches. Robelo states that when the priests sacrificed themselves by piercing various parts of their bodies with maguey spines, they carefully collected the blood upon fir branches. The branches were used by the Aztecs for making brooms, and are still employed thus in some localities.

Page 63. *Cupressus benthamii*. By European botanists this is regarded as a form of *C. lusitanica* Mill. (Gard. Dict. ed. 8. *Cupressus* no. 3. 1768), or as a synonym of that species. It is probable that the Mexican tree was carried at an early date to Portugal (hence the specific name), where it has since been in cultivation. It seems necessary, therefore, to adopt Miller's misleading name for the Mexican species. In Sinaloa the tree is known as "táscate."

To the listed species of *Cupressus* should be added the following:

Cupressus forbesii Jepson, Madroño 1: 75. 1922. Northern Baja California

GNETACEAE.

Page 64. *Ephedra trifurca*. Known in Texas as "cañatilla."

The following species is to be added to those listed:

Ephedra peninsularis I. M. Johnston, Univ. Calif. Publ. Bot. 7: 437. 1922. Baja California, the type from Magdalena Island.

POACEAE.

Page 66. *Olyra latifolia*. "Carrizo verde" (Tabasco, Ramírez).

Page 68. *Lasiacis globosa*. "Carriillo" (Sinaloa).

Lasiacis ruscifolia. "Otatillo" (Sinaloa).

PHOENICACEAE.

Page 73. *Washingtonia filifera*. Said to be known in California as "palmito." *Acanthorrhiza mocinni*. "Palma de abanico" (Oaxaca).

Page 75. *Brahea dulcis*. Reko reports for this species the names "izhuate," "ixhautl," and "isuate."

Page 81. *Chamaedorea lindeniana*. Reko reports that a plant, perhaps of this species, is known in Oaxaca as "cola de pescado" and "rabo de bobo."

Page 82. To the species of *Chamaedorea* are to be added the following:

Chamaedorea pringlei S. Wats. Proc. Amer. Acad. 26: 157. 1891. Type from Tamasopo Canyon, San Luis Potosí.

Chamaedorea rigida Wendl. Gard. Chron. III. 36: 246. 1904. Mexico.

ARACEAE.

Page 85. *Monstera deliciosa*. "Paaktzatz" (Mixe, *Belmar*). The adventitious roots are employed locally for making strong baskets.

Page 87. *Philodendron radiatum*. Occurring also in Sinaloa and known as "cola de faisán." Another species of *Philodendron*, perhaps *P. fenzlii*, is known in Sinaloa as "colomo."

LILIACEAE.

Page 88. *Hesperoyucca whipplei*. Known in California as "quijote."

Page 89. *Samuela carnerosana*. "Palma," "palma de San Pedro" "palma barreta" (Coahuila).

Page 91. *Yucca elata*. "Palmilla" (Chihuahua).

Page 92. *Yucca treculeana*. "Palma de San Juan," "palma ceniza" (*Endlich*).

Page 93. *Yucca australis*. "Datiles" (fruits), "palma grande" (Coahuila). The fiber is known as "ixtle de palma." The fruits are eaten raw or cooked with sugar, and pigs are said to be fond of them. The flowers also are cooked and eaten. The names "palma china," "palma de aparejo," and "palma de sudadero" reported by *Endlich* under *Yucca valida* probably pertain to *Y. australis*.

Page 94. *Yucca macrocarpa*. "Palma" (Chihuahua).

Yucca mohavensis. By the Coahuila Indians of California the fiber of the leaves was employed for weaving and for making sandals and saddle mats. The green fruit was roasted over coals and eaten. The ripe fruit is sweet but slightly astringent, and was eaten raw.

Page 100. *Dasyllirion cedrosanum*. "Sotol" (Zacatecas).

SMILACACEAE.

Page 101. The Mexican and Central American species of *Smilax* have been treated recently by Apt (Repert. Sp. Nov. Fedde 18: 385. 1922).

Page 104. The following species of *Smilax* should be added to those listed:

Smilax gymnopoda Apt, Repert. Sp. Nov. Fedde 18: 401. 1922. Type from Jalapa, Veracruz.

Smilax kerberi Apt, Repert. Sp. Nov. Fedde 18: 408. 1922. Type probably from Veracruz.

AMARYLLIDACEAE.

Page 107. A descriptive account of the genus *Agave* has been published by Berger (Die Agaven. Jena, 1915). On account of conditions resulting from the war, this was received in the United States too late for the inclusion of the data in the Trees and Shrubs of Mexico.

The following names are reported, relating to species of *Agave* whose identification is uncertain: "Ehpuqua" (Michoacán, Tarascan); "benal" (leaf), "boe" (pulque), "itzi," "tzim" (Huastec, *Asiain*); "keihnnoo," "keitz," "keitznoo" (pulque), "tzaktz" (Mixe, *Belmar*); "acamba," "atieni" (aguamiel), "orori" (Tarascan, *León*); "guada" (Otomí, *Buelna*).

Page 117. *Agave karwinskii*. Dr. Reko states that this species is known in Oaxaca as "espadilla," and bears the Zapotec names "bixuexe" and "tobasiche." It is cultivated commonly along hedges and produces a superior class of mescal.

Page 119. *Agave tequilana*. *Endlich* reports that this furnishes "ixtle de Tequila," "ixtle de mescal," and "jarcia." It is called also "maguey de Tequila" and "maguey mezcal."

Page 123. *Agave potatorum*. The Tarascan name "acamba" has been reported for the species.

Page 126. *Agave deserti*. "Mezcal" (California). By the Coahuila Indians, who call the plant "amul," the fiber is used for cordage, bowstrings, and brushes.

The leaves and stalks are eaten after having been cooked for one or two days in pits in the sand. The flowers also are eaten, and are sometimes dried for use in winter.

Page 128. *Agave compluviata*. This name should be placed in synonymy under the following, the earlier name for the species:

Agave complicata Trel.; Ochoterena, Mem. Soc. Antonio Alzate 33: 100. 1913. Type from Durango.

Page 130. *Agave atrovirens*. Known also as "maguey de pulque" and "teometl."

Page 133. *Agave asperrima*. "Maguey bruto," "maguey de cerro" (*Ochoterena*); "maguey" (Zacatecas); "maguey cenizo" (Coahuila).

Page 141. *Agave striata*. "Guapilla" (Hidalgo).

Page 142. The following species of *Agave* are to be added to those listed:

Agave cernua Berger, Agaven 122. f. 29, 30. 1915. Believed to be a native of Mexico; described from cultivated plants.

Agave chrysoglossa I. M. Johnston, Proc. Calif. Acad. IV. 12: 998. 1924. Type from San Pedro Nolasco Island, Gulf of California.

Agave conjuncta Berger, Agaven 194. f. 64. 1915. Described from cultivated plants, probably of Mexican origin.

Agave cupreata Trel. & Berger; Berger, Agaven 197. 1915. Type from the Sierra Madre of Michoacán or Guerrero. "Maguey de mezcal."

Agave difformis Berger, Agaven 95. f. 18. 1915. Described from cultivated plants, perhaps of Mexican origin.

Agave erosa Berger, Agaven 191. 1915. Described from cultivated plants, perhaps of Mexican origin.

Agave flaccifolia Berger, Agaven 42. 1915. Described from cultivated plants, perhaps of Mexican origin.

Agave kirchneriana Berger, Agaven 252. 1915. Type from Xochipila and Zumpango, Guerrero. "Maguey delgado."

Agave noli-tangere Berger, Agaven 103. 1915. Described from cultivated plants, perhaps of Mexican origin.

Agave oweni I. M. Johnston, Proc. Calif. Acad. IV. 12: 999. 1924. Type from an island in Guaymas Harbor, Sonora.

Agave pampaniniana Berger, Agaven 193. f. 62. 1915. Described from cultivated plants, perhaps of Mexican origin.

Agave paupera Berger, Agaven 235. 1915. Described from cultivated plants, perhaps of Mexican origin.

Agave purpusorum Berger, Agaven 111. 1915. Type from Tehuacán, Puebla.

Agave schneideriana Berger, Agaven 256. 1915. Described from cultivated plants of Mexican origin.

Agave sleviniana I. M. Johnston, Proc. Calif. Acad. IV. 12: 1000. 1924. Type from La Paz, Baja California.

Agave vernae Berger, Agaven 245. f. 73. 1915. Described from cultivated plants, perhaps of Mexican origin.

DIOSCOREACEAE.

Page 144. *Dioscorea macrostachya*. In a recent monograph of the genus *Dioscorea*, *Testudinaria cocolmeca* is referred definitely by Knuth (in Engl. Pflanzenreich IV. 43: 164. 1924) to synonymy under this species. The root of the plant is a large hard tuber, partly above ground, its covering consisting of a thick dark coat that is broken into numerous polygonal plates. Dr. Reko has furnished the following information with regard to the plant: "Bejuco de coraza," "cocolmecatl." The young fleshy asparagus-like shoots contain an

albuminous juice that is used in the preparation of *pozonque*, a delicious and very nutritious refreshment, made of ground chocolate, mashed soft corn, and this juice, beaten into a light foamy mass. The ground starchy matter of the enormous rhizome is used as a *barbasco*, for stupefying fish. It probably contains the same alkaloid, dioscorine, that has been found in other species.

PIPERACEAE.

Page 152. *Piper palmeri*. This has been collected also in Nayarit, where it is called "cordoncillo."

Page 154. *Piper hispidum*. "Pie de guicharo," "tripa de zopilote" (Sinaloa).
Piper leucophyllum. "Tripa de zopilote" (Sinaloa).

Page 155. *Piper jaliscanum*. "Cocolmeca" (Sinaloa).

To the list of species of *Piper* are to be added the following:

Piper abalienatum Trel. Amer. Journ. Bot. 8: 216. pl. 8, f. 1. 1921. Type from Colima.

Piper aguilanum C. DC. Ann. Cons. Jard. Genève 21: 318. 1920. *Piper albicaule* Trel. Amer. Journ. Bot. 8: 216. pl. 8, f. 2. 1921. Type from Santa Rosa, near Aguila, Michoacán or Guerrero. Both these names were based upon the same collection.

Piper albidiflorum C. DC. Ann. Cons. Jard. Genève 21: 309. 1920. Type from El Tabasal, Michoacán or Guerrero.

Piper brachypus Trel. Amer. Journ. Bot. 8: 215. pl. 6. 1921. Type from Manzanillo, Colima.

Piper botteri C. DC. Ann. Cons. Jard. Genève 21: 307. 1920. Type from Orizaba, Veracruz.

Piper consociatum C. DC. Ann. Cons. Jard. Genève 21: 317. 1920. Type from El Muleto, Michoacán or Guerrero.

Piper diguetianum Trel. Amer. Journ. Bot. 8: 215. 1921. Type from Jalisco.

Piper manzanilloanum C. DC. Ann. Cons. Jard. Genève 21: 308. 1920. *Piper palmeri manzanilloanum* C. DC.; Rose, Contr. U. S. Nat. Herb. 1: 354. 1895. Type from Manzanillo, Colima.

Piper michelianum C. DC. Ann. Cons. Jard. Genève 21: 317. 1920. *Piper mas* Trel. Amer. Journ. Bot. 8: 215. pl. 7, f. 2. 1921. Type from El Muleto, Michoacán or Guerrero.

Piper pachosanum C. DC. Ann. Cons. Jard. Genève 21: 306. 1920. Type from Pacho Forest, Veracruz.

Piper plumanum C. DC. Not. Syst. Lecomte 3: 14. 1914. Type from Sierra de Pluma, Oaxaca.

Piper pringlei C. DC. Ann. Cons. Jard. Genève 21: 312. 1920. Type from Cuernavaca, Morelos.

Piper rosei C. DC. Ann. Cons. Jard. Genève 21: 316. 1920. *Piper rosei* C. DC.; Trel. Amer. Journ. Bot. 8: 215. 1921. Type from Sierra Madre near Colomas, Sinaloa. Both species are based upon the same collections.

Piper tepicanum C. DC. Not. Syst. Lecomte 3: 44. 1914. Type from Cerro de San Juan, Tepic.

Piper udicola C. DC. Ann. Cons. Jard. Genève 21: 314. 1920. Type from Tabasco.

Piper udimontanum C. DC. Ann. Cons. Jard. Genève 21: 306. 1920. Michoacán and Morelos (type from Cuernavaca).

Piper velutinovarium C. DC. Ann. Cons. Jard. Genève 21: 314. 1920. Type from Puerto de Alvarado, Veracruz.

Page 156. *Piper chinantlense*. A synonym is *Piper rovirosae* C. DC. Ann. Cons. Jard. Genève 21: 310. 1920.

LACISTEMACEAE.

Page 156. *Lacistema myricoides* should be placed in synonymy under the following name: **Lacistema aggregatum** (Berg) Rusby, Bull. N. Y. Bot. Gard. 4: 447. 1907. *Piper aggregatum* Berg, Act. Helv. 7: 131. pl. 10. 1777. This species has been collected in Sinaloa, where it is known as "guayparín."

SALICACEAE.

Page 158. *Populus angustifolia*. The Gosiute Indians of Utah use the young shoots of this species for basket making. A kind of honey dew produced on the under side of the leaves by aphids is gathered and used in much the same way as sugar.

Populus monticola. A synonym is *Populus brandegeei* Schneider, Ill. Handb. Laubh. 1: 23. 1904. It is probably this species of which Clavigero writes (Historia de la California, 1789): "The *guaribo*, the largest tree of California, is so like the cottonwood [álamo, of Spain] that at first glance it can not be distinguished; but nevertheless it is quite different in the quality of the wood, which is very good for rafters and all kinds of construction. Unfortunately, this tree grows only in a few rugged and almost inaccessible places, like the pines in the southern part of the peninsula."

Page 159. *Populus dimorpha*. "Alamo," "chopo" (Sinaloa).

Populus arizonica. The Pima Indians of Arizona formerly ate the fresh catkins of this and related species, stripping off the flowers between the teeth.

Page. 160. The following names are reported for undetermined species of *Salix*: "Tocoy" (Huastec, *Asiain*); "hoo-cuy" (Zoque, *Gonzales*); "xitzo" (Otomí, *Buelna*). By some of the North American Indians willow bark was smoked like tobacco. The Chiricahua Indians are said to have obtained a yellow dye from the trees, while the Pimas employed the inner bark for making breech clouts and skirts.

Page 161. *Salix humboldtiana*. This and its synonyms should be placed in synonymy under **Salix chilensis** Mol. (Sagg. Chil. 169. 1782), the oldest name for the species.

Page 162. *Salix taxifolia*. "Jaray" (Sinaloa). The branches are used for rough brooms, and the bark as a remedy for malaria.

JUGLANDACEAE.

Page 165. *Juglans*. *Buelna* reports the Otomí name for walnut (nogal) as "ttzatchu." Walnut bark is said to have been employed by some of the Indians of the United States for poisoning fish.

Page 166. *Hicoria pecan*. "Napakoma" (*Villada*). *Villada* gives the Nahuatl name as "quauhacacatl."

Page 167. After *Hicoria pecan* insert the following:

Hicoria diguetii (Dode) Standl. *Carya diguetii* Dode, Bull. Soc. Bot. France 55: 470. 1908. Described from Mexican specimens.

BETULACEAE.

Page 168. *Alnus jorullensis*. This species occurs also in Sinaloa, where it is called "alizo." At Orizaba it is said to be called "ilite verde."

Alnus arguta. "Alizo" (Sinaloa).

Page 169. *Carpinus caroliniana*. Collected also in Sinaloa.

Page 171. An elaborate monograph of the American oaks has been published recently by Trelease (Mem. Nat. Acad. Sci. 20. 1924). In this there are described and illustrated many new species from Mexico.

Page 197. After *Quercus candicans* insert the following species:

Quercus pilarius Trel. Mem. Nat. Acad. Sci. 20: 44. pl. 19. 1924. Type from Finca San Juan de las Chicharras, Tapachula, Chiapas.

Quercus toxicodendrifolia Trel. Mem. Nat. Acad. Sci. 20: 48. pl. 33. 1924. Type from Zacualtipán, Hidalgo.

Quercus boqueronae Trel. Mem. Nat. Acad. Sci. 20: 48. pl. 33. 1924. Type from Cerro del Boquerón, Chiapas.

Quercus radlkoferiana Trel. Mem. Nat. Acad. Sci. 20: 49. pl. 35. 1924. Oaxaca and adjoining states; type from Chinantla, Oaxaca.

Quercus porphyrogenita Trel. Mem. Nat. Acad. Sci. 20: 51. pl. 39. 1924. Nuevo León, the type from Monterrey.

Quercus substenocarpa Trel. Mem. Nat. Acad. Sci. 20: 52. pl. 41. 1924. Type from Hacienda de Tamasopo.

Quercus baldoquinae Trel. Mem. Nat. Acad. Sci. 20: 53. pl. 43. 1924. Type from Cerro Baldoquín, Michoacán.

Quercus harmsiana Trel. Mem. Nat. Acad. Sci. 20: 54. pl. 45. 1924. Type from Cerro Baldoquín, Ario de Rosales, Michoacán, at 1,800 to 2,000 meters. "Encino."

Quercus mixteca Trel. Mem. Nat. Acad. Sci. 20: 54. pl. 46. 1924. Puebla (type from Sierra de Mixteca, San Luis) and Oaxaca.

Quercus conjungens Trel. Mem. Nat. Acad. Sci. 20: 55. pl. 48. 1924. Guanajuato (type from Acámbaro) and Hidalgo.

Quercus cancellata Trel. Mem. Nat. Acad. Sci. 20: 55. pl. 49. 1924. Puebla, the type from Sierra de Mixteca.

Quercus subspathulata Trel. Mem. Nat. Acad. Sci. 20: 56. pl. 52. 1924. Type from State of Durango.

Quercus crenatifolia Trel. Mem. Nat. Acad. Sci. 20: 57. pl. 52. 1924. Type from Chiquilistlán, Jalisco.

Quercus aurantiaca Trel. Mem. Nat. Acad. Sci. 20: 57. pl. 53. 1924. Type collected between Agua Caliente de Huachara and Basagote, Chihuahua.

Quercus rekonis Trel. Mem. Nat. Acad. Sci. 20: 60. pl. 57. 1924. Type from Apango, Oaxaca.

Quercus prinopsis Trel. Mem. Nat. Acad. Sci. 20: 61. pl. 58. 1924. San Luis Potosí, the type from Pelote.

Quercus chartacea Trel. Mem. Nat. Acad. Sci. 20: 61. pl. 59. 1924. Oaxaca (type from Salomé, Cuicatlán) and Chiapas. "Encino amarillo," "chaporro (chaparro?)."

Quercus centralis Trel. Mem. Nat. Acad. Sci. 20: 61. pl. 60. 1924. Mexico (type from Contreras, Distrito Federal), and Puebla. "Encino."

Quercus panduriformis Trel. Mem. Nat. Acad. Sci. 20: 62. pl. 62, 63. 1924. Michoacán, Jalisco, and Morelos; type from El Chuen, Ario de Rosales, Michoacán. "Encino." "encino roble."

Quercus poculifer Trel. Mem. Nat. Acad. Sci. 20: 64. pl. 69. 1924. Oaxaca (type from Las Sedas) and Puebla.

Quercus haematophlebia Trel. Mem. Nat. Acad. Sci. 20: 66. pl. 74. 1924. Type from Dolores, Tepic.

Quercus barbanthera Trel. Mem. Nat. Acad. Sci. 20: 68. pl. 81. 1924. Type from Chiapas. Guatemala.

Quercus callosa Benth. Pl. Hartw. 91. 1842. Chiapas. Guatemala (type from Las Casillas) and Honduras.

Quercus obscura Trel. Mem. Nat. Acad. Sci. 20: 71. pl. 88, 89. 1924. Type from the Sierra Madre.

Quercus transmontana Trel. Mem. Nat. Acad. Sci. 20: 71. pl. 89. 1924. Michoacán, the type from Pátzcuaro.

Quercus vellifera Trel. Mem. Nat. Acad. Sci. 20: 73. pl. 90. 1924. Type from western Mexico.

Quercus durangensis Trel. Mem. Nat. Acad. Sci. 20: 73. pl. 91. 1924. Durango.

Quercus diversicolor Trel. Mem. Nat. Acad. Sci. 20: 73. pl. 92-94. 1924. Chihuahua, the type from the Sierra Madre. Arizona and New Mexico.

Quercus rhodophlebia Trel. Mem. Nat. Acad. Sci. 20: 74. pl. 95-97. 1924. Jalisco, Zacatecas (type from Plateado), and Michoacán.

Quercus ariaefolia Trel. Mem. Nat. Acad. Sci. 20: 74. pl. 97. 1924. Type from Álvarez, San Luis Potosí.

Quercus uhdeana Trel. Mem. Nat. Acad. Sci. 20: 75. pl. 100. 1924. Type perhaps from Real del Monte, Hidalgo.

Quercus alvarezensis Trel. Mem. Nat. Acad. Sci. 20: 76. pl. 104. 1924. Type from Álvarez, San Luis Potosí.

Quercus purpusi Trel. Mem. Nat. Acad. Sci. 10: 76. pl. 105. 1924. Type from Salto de Agua, Mexico; Michoacán (?).

Quercus conglomerata Trel. Mem. Nat. Acad. Sci. 20: 77. pl. 106. 1924. Mexico and Michoacán (type from Tlalpujahua).

Quercus innuncupata Trel. Mem. Nat. Acad. Sci. 20: 77. pl. 108. 1924. Michoacán, the type from Loma de Santa María.

Quercus revoluta Trel. Mem. Nat. Acad. Sci. 20: 78. pl. 111, 112. 1924. Puebla, the type from Honey Station.

Quercus loeseneri Trel. Mem. Nat. Acad. Sci. 20: 79. pl. 110. 1924. Type from Saltillo, Coahuila.

Quercus deserticola Trel. Mem. Nat. Acad. Sci. 20: 79. pl. 113, 114. 1924. Querétaro and Hidalgo; type from Desierto.

Quercus alveolata Trel. Mem. Nat. Acad. Sci. 20: 80. pl. 114. 1924. Type from Cerro del Gavilán, Puebla.

Quercus manzanillana Trel. Mem. Nat. Acad. Sci. 20: 80. pl. 116. 1924. Type from Manzanilla, near Puebla.

Quercus lecomteana Trel. Mem. Nat. Acad. Sci. 20: 81. pl. 115. 1924. Type from Perote, Veracruz.

Quercus vallicola Trel. Mem. Nat. Acad. Sci. 20: 81. pl. 116. 1924. Type from Santa Fe, Valley of Mexico.

Quercus texcocana Trel. Mem. Nat. Acad. Sci. 20: 81. pl. 117. 1924. Valley of Mexico, the type from Texcoco.

Quercus subtriloba Trel. Mem. Nat. Acad. Sci. 20: 81. pl. 118. 1924. Type from Hidalgo.

Quercus frutex Trel. Mem. Nat. Acad. Sci. 20: 82. pl. 120. 1924. Valley of Mexico, the type from Cuauhtepac.

Quercus alpesceus Trel. Mem. Nat. Acad. Sci. 20: 83. pl. 122. 1924. Type from "Mt. Kankandó."

Quercus potosina Trel. Mem. Nat. Acad. Sci. 20: 84. pl. 123-125. 1924. Type from San Luis Potosí.

Quercus cordifolia Trel. Mem. Nat. Acad. Sci. 20: 84. pl. 125. 1924. Type from the Sierra Madre, 40 miles south of Saltillo, Coahuila.

Quercus chihuahuensis Trel. Mem. Nat. Acad. Sci. 20: 85. pl. 129-131. 1924. Chihuahua (type collected near the city of Chihuahua) and Sonora.

Quercus jaliscensis Trel. Mem. Nat. Acad. Sci. 20: 86. pl. 132. 1924. Type collected between Colotlán and Plateado, Jalisco.

Quercus jaralensis Trel. Mem. Nat. Acad. Sci. 20: 86. pl. 133, 134. 1924. Coahuila, the type from Jaral.

Quercus undata Trel. Mem. Nat. Acad. Sci. 20: 86. pl. 135. 1924. Durango, the type from Sierra de la Candela. "Encino blanco."

Quercus infralutea Trel. Mem. Nat. Acad. Sci. 20: 87. pl. 136. 1924. Type from Sierra de Alamos, Sonora.

Quercus invaginata Trel. Mem. Nat. Acad. Sci. 20: 87. pl. 137, 138. 1924. Type from Sierra de la Paila, Coahuila.

Quercus praeco Trel. Mem. Nat. Acad. Sci. 20: 88. pl. 139. 1924. Type collected between Huejuquilla and Mesquitec, Jalisco.

Quercus convallata Trel. Mem. Nat. Acad. Sci. 20: 88. pl. 140. 1924. Type from Sierra de Nayarit, Huichol, Jalisco.

Quercus pallescens Trel. Mem. Amer. Acad. Sci. 20: 89. pl. 141. 1924. Type from Bolaños, Jalisco.

Quercus sacame Trel. Mem. Nat. Acad. Sci. 20: 89. pl. 142. 1924. Chihuahua, the type from "Bajío de Tonachic," Sierra Madre. "Rojaca sacamé," "encino manzano."

Quercus bipedalis Trel. Mem. Nat. Acad. Sci. 20: 89. pl. 143. 1924. Type from Santa Teresa, Tepic.

Quercus depressipes Trel. Mem. Nat. Acad. Sci. 20: 90. pl. 144. 1924. Type from Sierra de la Candela, Durango. "Encinillo."

Quercus perpallida Trel. Mem. Nat. Acad. Sci. 20: 91. pl. 147. 1924. Type from Sierra de Alamos, Sonora.

Quercus opaca Trel. Mem. Nat. Acad. Sci. 20: 92. pl. 148. 1924. Type from Ixmiquilpan, Hidalgo.

Quercus sebifera Trel. Mem. Nat. Acad. Sci. 20: 93. pl. 149. 1924. Type from Comitán, Chiapas.

Quercus schenckiana Trel. Mem. Nat. Acad. Sci. 20: 93. pl. 150. 1924. Type from Sierra de Mixteca near San Luis, Puebla.

Quercus ceripes Trel. Mem. Nat. Acad. Sci. 20: 93. pl. 150. 1924. Type from Cerro de Paxtla, near Tehuacán, Puebla.

Quercus striatula Trel. Mem. Nat. Acad. Sci. 20: 93. pl. 151, 152. 1924. Durango (type from Sierra de la Candela, at 3,000 meters), Tepic, and Zacatecas.

Quercus hartmani Trel. Mem. Nat. Acad. Sci. 20: 95. pl. 154. 1924. Chihuahua, the type from Puerta de San Diego, at 2,100 meters.

Quercus undulata Torr. Ann. Lyc. N. Y. 2: 248. pl. 4. 1828. Chihuahua. Southwestern United States.

Quercus sillae Trel. Mem. Nat. Acad. Sci. 20: 102. pl. 171. 1924. Type from La Silla, near Monterrey, Nuevo León.

Quercus nitidissima Trel. Mem. Nat. Acad. Sci. 20: 122. pl. 218. 1924. Type from Cadereyta, Querétaro.

Quercus duraznillo Trel. Mem. Nat. Acad. Sci. 20: 122. pl. 220, 221. 1924. Chihuahua (type collected between Baquiriachic and La Joya), Sonora, and Durango. "Encino duraznillo," "encino colorado," "encino."

Quercus balsequillana Trel. Mem. Nat. Acad. Sci. 20: 123. pl. 220. 1924. Type from Río Balsequillo, Chihuahua.

Quercus viminea Trel. Mem. Nat. Acad. Sci. 20: 123. pl. 222. 1924. Chihuahua (type from Agua Caliente de Huachara) and Sonora.

Quercus bolanyosensis Trel. Mem. Nat. Acad. Sci. 20: 123. pl. 223. 1924. Jalisco (type collected west of Bolaños) and Tepic.

Quercus peninsularis Trel. Mem. Nat. Acad. Sci. 20: 124. pl. 225. 1924. Baja California, the type from San Pedro Mártir.

Quercus epileuca Trel. Mem. Nat. Acad. Sci. 20: 126. pl. 229. 1924. Sonora (type from Sierra del Nacori, at 1,800 meters) and Michoacán.

Quercus campanariensis Trel. Mem. Nat. Acad. Sci. 20: 126. pl. 228. 1924. Type from Campanario, near Morelia, Michoacán.

Quercus incarnata Trel. Mem. Nat. Acad. Sci. 20: 126. pl. 229-231. 1924. Chihuahua (type collected between Ojitos and Bocoyna, at 2,500 meters), Durango, and Michoacán, "Encino prieto."

Quercus felipensis Trel. Mem. Nat. Acad. Sci. 20: 129. pl. 237. 1924. Oaxaca, the type from Cerro de San Felipe, at 2,600 meters or more.

Quercus moreliana Trel. Mem. Nat. Acad. Sci. 20: 130. pl. 241. 1924. Type from Campanario, Morelia, Michoacán.

Quercus errans Trel. Mem. Nat. Acad. Sci. 20: 131. pl. 245. 1924. Veracruz (type from Perote) and Hidalgo.

Quercus hahnii Trel. Mem. Nat. Acad. Sci. 20: 131. pl. 247. 1924. Hidalgo (type from forest of Cajalpa, near Toluca) and Distrito Federal.

Quercus esperanzae Trel. Mem. Nat. Acad. Sci. 20: 132. pl. 248. 1924. Type from Esperanza, Puebla.

Quercus orbiculata Trel. Mem. Nat. Acad. Sci. 20: 132. pl. 249. 1924. Type from San Luis Potosí.

Quercus miguelitensis Trel. Mem. Nat. Acad. Sci. 20: 132. pl. 249. 1924. Type from mountains of San Miguelito, San Luis Potosí.

Quercus urbani Trel. Proc. Amer. Phil. Soc. 60: 32. pl. 2. 1921. Type from Michoacán or Guerrero, at 1,800 meters.

Quercus radiata Trel. Proc. Amer. Phil. Soc. 60: 33. pl. 3. 1921. Type collected near Santa Teresa, Tepic.

Quercus konzattii Trel. Proc. Amer. Phil. Soc. 60: 33. pl. 4. 1921. Type from Cuesta de Huauchillo, Nochistlán, Oaxaca, at 2,000 meters.

Quercus tepicana Trel. Mem. Nat. Acad. Sci. 20: 135. pl. 255. 1924. Type from Pedro Paulo, Tepic.

Quercus pennivenia Trel. Mem. Nat. Acad. Sci. 20: 135. pl. 256. 1924. Chihuahua and Sonora; type from some unknown locality in the Sierra Madre.

Quercus aerea Trel. Mem. Nat. Acad. Sci. 20: 135. pl. 257. 1924. Type from La Bufa, Cosihuiriachic, Chihuahua.

Quercus jonesi Trel. Mem. Nat. Acad. Sci. 20: 136. pl. 257. 1924. Type from Chiquilistlán, Jalisco.

Quercus coccolobaefolia Trel. Mem. Nat. Acad. Sci. 20: 136. pl. 258. 1924. San Luis Potosí and Guanajuato (type from Santa Rosa).

Quercus planipocula Trel. Mem. Nat. Acad. Sci. 20: 136. pl. 259. 1924. Tepic (type from foothills near Pedro Paulo) and Sinaloa.

Quercus rosei Trel. Mem. Nat. Acad. Sci. 20: 137. pl. 260. 1924. Type from Santa Teresa, Tepic.

Quercus coffeaecolor Trel. Mem. Nat. Acad. Sci. 20: 137. pl. 261. 1924. Type from foothills near Coloma, Sinaloa.

Quercus aequivenulosa Trel. Mem. Nat. Acad. Sci. 20: 138. pl. 261. 1924. Type collected near Santa Teresa, Tepic.

Quercus praineana Trel. Mem. Nat. Acad. Sci. 20: 138. pl. 262. 1924. Type from mountains near Etzatlán, Jalisco.

Quercus langlassei Trel. Mem. Nat. Acad. Sci. 20: 138. pl. 263. 1924. Sinaloa to Michoacán.

Quercus chiquihuitillonis Trel. Mem. Nat. Acad. Sci. 20: 139. pl. 264. 1924. Michoacán and Guerrero; type from Chiquihuitillo, at 900 meters.

Quercus productipes Trel. Mem. Nat. Acad. Sci. 20: 140. pl. 264. 1924. Type from "mountains east of S. Leonel, toward Tepic."

Quercus exaristata Trel. Mem. Nat. Acad. Sci. 20: 140. pl. 266. 1924. Type from Pedro Paulo, Tepic.

Quercus endlichiana Trel. Mem. Nat. Acad. Sci. 20: 141. pl. 267. 1924. Durango (type from Sierra de la Candela) and Chihuahua. "Encino," "roble," "rojaca," "rocuró."

Quercus trinitatis Trel. Mem. Nat. Acad. Sci. 20: 144. pl. 277. 1924. Type from Trinidad, Hidalgo.

Quercus crispifolia Trel. Mem. Nat. Acad. Sci. 20: 147. pl. 286. 1924. Type from Finca San Juan de las Chicharras, Tapachula, Chiapas.

Quercus incrassata Trel. Mem. Nat. Acad. Sci. 20: 147. pl. 287. 1924. Type from Finca San Juan de las Chicharras, Tapachula, Chiapas.

Quercus botryocarpa Trel. Mem. Nat. Acad. Sci. 20: 150. pl. 295. 1924. Type from foothills near Pedro Paulo, Tepic.

Quercus synthetica Trel. Mem. Nat. Acad. Sci. 20: 151. pl. 296, 297. 1924. Type from Huatusco, Veracruz.

Quercus acapulcensis Trel. Mem. Nat. Acad. Sci. 20: 153. pl. 302. 1924. Type from Acapulco, Guerrero.

Quercus tahuasalana Trel. Mem. Nat. Acad. Sci. 20: 154. pl. 302. 1924. Michoacán; type from El Tahuasal. "Encino prieto."

Quercus caeruleocarpa Trel. Mem. Nat. Acad. Sci. 20: 163. pl. 321. 1924. Type from Contreras, Distrito Federal.

Quercus zempoaltepecana Trel. Mem. Nat. Acad. Sci. 20: 164. pl. 323. 1924. Oaxaca, the type from Mount Zempoaltepec.

Quercus cuajimalpana Trel. Mem. Nat. Acad. Sci. 20: 165. pl. 324. 1924. Type from Cuajimalpa, Distrito Federal.

Quercus bourgaei Oerst.; Trel. Mem. Nat. Acad. Sci. 20: 168. pl. 336. 1924. Valley of Mexico, the type from San Nicolás.

Quercus subavenia Trel. Mem. Nat. Acad. Sci. 20: 169. pl. 338. 1924. Type from Honey Station Puebla.

Quercus hypoxantha Trel. Mem. Nat. Acad. Sci. 20: 170. pl. 339. 1924. Type from mountains near Saltillo, Coahuila, at 2,300 meters.

Quercus imbricariaefolia Trel. Mem. Nat. Acad. Sci. 20: 174. pl. 348. 1924. Hidalgo (type from Real del Monte) and Mexico.

Quercus colimae Trel. Mem. Nat. Acad. Sci. 20: 174. pl. 349. 1924. Type from Cerro Grande, Jalisco. "Encino blanco," "encino blanco chino," "zau-cillo," "chilillo."

Quercus malifolia Trel. Mem. Nat. Acad. Sci. 20: 175. pl. 348. 1924. Type from San Andrés Chalchicomula, Volcán de Orizaba.

Quercus obovalifolia Fourn.; Trel. Mem. Nat. Acad. Sci. 20: 175. pl. 351. 1924. Type from Valley of Mexico.

Quercus axillaris Fourn.; Trel. Mem. Nat. Acad. Sci. 20: 176. pl. 352. 1924. Type from San Nicolás, Valley of Mexico.

Quercus subcrispata Trel. Mem. Nat. Acad. Sci. 20: 176. pl. 353. 1924. Type from Manzanilla, Puebla.

Quercus circummontana Trel. Mem. Nat. Acad. Sci. 20: 177. pl. 356. Veracruz (type from Mirador) and Michoacán.

Quercus fournieri Trel. Mem. Nat. Acad. Sci. 20: 177. pl. 357. 1924. Type from foot of Cofre de Perote, Veracruz.

Quercus serrulata Trel. Mem. Nat. Acad. Sci. 20: 179. pl. 361. 1924. Type from Chiquilistlán, Jalisco.

Quercus alamosensis Trel. Mem. Nat. Acad. Sci. 20: 179. pl. 361. 1924. Type from Sierra de Alamos, Sonora.

Quercus rossii Trel. Mem. Nat. Acad. Sci. 20: 179. pl. 362. 1924. Tepic and Jalisco to Michoacán; type from Araparicuaro, Ario de Rosales, Michoacán. "Encino prieto," "encino colorado."

Quercus tepoxuchilensis Trel. Mem. Nat. Acad. Sci. 20: 180. pl. 363. 1924. Puebla, the type from Tepoxúchil.

Quercus simillima Trel. Mem. Nat. Acad. Sci. 20: 180. pl. 363. 1924. San Luis Potosí.

Quercus impressa Trel. Mem. Nat. Acad. Sci. 20: 181. pl. 364. 1924. Type from Salomé, Oaxaca.

Quercus seleri Trel. Mem. Nat. Acad. Sci. 20: 181. pl. 364. 1924. Type from Casa de Tepozteco, Morelos, at 2,000 meters.

Quercus roseovenulosa Trel. Mem. Nat. Acad. Sci. 20: 182. pl. 366. 1924. Type from Salto de Agua, Mexico.

Quercus sipuraca Trel. Mem. Nat. Acad. Sci. 20: 182. pl. 366. 1924. Chihuahua, the type from "Bajío de Tonachic." "Sipúraca," "encino Colorado," "encino cascalote."

Quercus acherodophylla Trel. Mem. Nat. Acad. Sci. 20: 183. pl. 367. 1924. Type from Honey Station, Puebla.

Quercus saltillensis Trel. Mem. Nat. Acad. Sci. 20: 183. pl. 368, 369. 1924. Type collected 40 miles south of Saltillo, Coahuila.

Quercus carnerosana Trel. Mem. Nat. Acad. Sci. 20: 183. pl. 369. 1924. Type from Carneros Pass, Coahuila.

Quercus cerifera Trel. Mem. Nat. Acad. Sci. 20: 184. pl. 370. 1924. Type from Bajucua, Chiapas.

Quercus crispipilis Trel. Mem. Nat. Acad. Sci. 20: 184. pl. 370. 1924. Chiapas. Guatemala, the type from Uaxac Canal.

Quercus canbyi Trel. Mem. Nat. Acad. Sci. 20: 188. pl. 379, 380. 1924. Type from Monterrey, Nuevo León.

Quercus karwinskii Trel. Mem. Nat. Acad. Sci. 20: 188. pl. 379. 1924. Type from some unknown locality in Mexico.

Quercus tonaguaiae Trel. Mem. Nat. Acad. Sci. 20: 190. pl. 385. 1924. Type from Tonagua, Oaxaca.

Quercus vexans Trel. Mem. Nat. Acad. Sci. 20: 190. pl. 386. 1924. Type from Huatusco, Veracruz.

Quercus candolleana Trel. Mem. Nat. Acad. Sci. 20: 191. pl. 387. 1924. Type from Huatusco, Veracruz.

Quercus conspersa Benth. Pl. Hartw. 92. 1842. Chiapas. Guatemala, the type from Las Casillas Mountains.

Quercus albocincta Trel. Mem. Nat. Acad. Sci. 20: 193. pl. 394. 1924. Type from Sierra de Alamos, Sonora.

ULMACEAE.

Page 201. After *Celtis* insert the following genus:

PHYLLOSTYLON Capanema; Benth. & Hook. Gen. Pl. 3: 35. 1880.

1. **Phyllostylon brasiliensis** Capanema; Benth. & Hook. Gen. Pl. 3: 352. 1880.

Tamaulipas, San Luis Potosí, and Hidalgo. Cuba, Hispaniola, and South America; type from Brazil.

A large tree whose wood is of some value. Known in Mexico as "cerón."

MORACEAE.

Page 203. *Chlorophora tinctoria*. "Mora amarilla" (Sinaloa).

Page 210. *Ficus cotinifolia*. "Tescalama," "chipil," "capulina" (Sinaloa).

Page 213. *Fiscus goldmanii*. "Salate" (Sinaloa).

URTICACEAE.

Page 219. *Urera caracasana*. "Ortiguilla" (Sinaloa).

Page 221. *Pouzolzia nivea*. "Samo el coche," "samo prieto" (Sinaloa).

After *Pouzolzia pringlei* insert:

Pouzolzia occidentalis Wedd. Arch. Mus. Paris 9: 410. 1856. *Pouzolzia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 404. 1924. Chiapas West Indies, Central America, and northern South America.

LORANTHACEAE.

Page 223. *Razoumofskya vaginata*. "Toje" (Chihuahua); "pasto de pino" (Chihuahua).

Page 227. *Phoradendron schumannii*. "Pasto de encino" (Chihuahua).

Phoradendron nervosum. "Lirio," "lirio parásito" (Veracruz).

Page 228. *Phoradendron californicum*. "Toje" (Sinaloa).

Phoradendron ligatum. "Pasto" (Chihuahua).

Page 229. *Phoradendron bolleanum*. "Pasto de madroño" (Chihuahua).

Phoradendron velutinum. "Liga," "muérdago" (Mexico). A decoction of the leaves and flowers is employed as a remedy for wounds.

Page 231. *Phoradendron tomentosum*. "Pasto de encino" (Chihuahua).

Page 233. *Struthanthus quercicola*. "Correguela" (Veracruz.)

Struthanthus haenkeanus. "Toje" (Sinaloa).

Page 235. *Psittacanthus calyculatus*. "Lirio," "lirio parásito," "matapalo," "muérdago" (Veracruz).

OPILIACEAE.

Page 236. *Agonandra racemosa*. "Margarita" (Sinaloa).

OLACACEAE.

Page 237. *Ximenia pubescens*. Reported also from Baja California.

Ximenia parviflora. "Nanche" (Sinaloa).

ARISTOLOCHIACEAE.

Page 241. *Aristolochia taliscana*. "Guaco," "bejuco guaco" (Sinaloa).

POLYGONACEAE.

Page 246. *Coccoloba schiedeana*. "Roble de la costa" (Sinaloa).

After *Coccoloba acapulcensis* insert:

Coccoloba petrophila T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 404. 1924.
Type from Camarón, Veracruz.

CHENOPODIACEAE.

Page 252. To the species of *Atriplex* add:

Atriplex hymenelytra (Torr.) S. Wats. Proc. Amer. Acad. 9: 119. 1874.
Obione hymenelytra Torr. U. S. Rep. Expl. Miss. Pacif. 4: 129. pl. 20. 1857.
Northern Baja California. California to Arizona.

Page 253. *Dondia*. The name "chamiso" is reported from Sinaloa for a species of doubtful identity.

AMARANTHACEAE.

Page 256. *Chamissoa altissima*. "Cuaumecate barba de viejo" (Sinaloa).

Lagrezia monosperma. "Tacote" (Colima). The species has been collected also in Oaxaca.

Page 258. *Iresine interrupta*. "Viejos" (Sinaloa).

ALLIONIACEAE.

Page 261. *Pisonia aculeata*. "Garabato blanco" (Nayarit). To the synonymy of this species add: *Pisonia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 404. 1924.

Page 260. After *Neea sphaerantha* insert:

Neea chiapensis Standl. Journ. Washington Acad. Sci. 16: 14. 1926.
Mountains east of Monserrate, Chiapas.

BATIDACEAE.

Page 263. *Batis maritima*. "Saladilla" (Tamaulipas); "vidrillo," "chamís" (Sinaloa).

PHYTOLACCACEAE.

Page 263. *Stegnosperma halimifolium*. "Ojo de zanate" (Sinaloa).

Page 264. *Phaulothamnus spinescens*. "Putia" (Sinaloa). This shrub has been collected also in Texas, and doubtless occurs in northeastern Mexico.

Petiveria alliacea. "Rama del zorrillo," "jupachumi" (Sinaloa).

Page 265. *Rivina humilis*. "Colorín" (Sinaloa).

RANUNCULACEAE.

Page 267. *Clematis drummondii*. "Barbas de chivato" (Sinaloa).

MENISPERMACEAE.

Page 273. To the genus *Hyperbaena* the following species are to be added:

Hyperbaena ilicifolia Standl. Proc. Biol. Soc. Washington **37**: 43. 1924. Type from Cayaco, Michoacán.

Hyperbaena denticulata Standl. Proc. Biol. Soc. Washington **37**: 44. 1924. Type from Manzanillo, Colima.

LAURACEAE.

Page 286. The date of Mez's monograph of the American Lauraceae is 1889, not 1869.

Acrodiclidium misantlae T. S. Brandeg. is a synonym of *Ocotea veraguensis*; see below.

Page 290. *Persea americana*. For "ahuacuahuitl" read "ahuacaquahuitl." The name "xinene" should be placed under *P. schiedeana* (page 289). The name "palta" is said not to be in use in Colombia.

Page 291. Place as synonym under *P. podadenia*: *Persea podadenia glaberramea* I. M. Johnston, Contr. Gray Herb. n. ser. **70**: 69. 1924. The type of this variety is from Orizaba.

Page 292. *Persea liebmanni*. "Tepehuacate" (Sinaloa).

To the species of *Persea* add:

Persea hartmannii I. M. Johnston, Contr. Gray Herb. n. ser. **70**: 69. 1924. Type from Batopilas, Chihuahua.

Sassafridium macrophyllum. "Laurelillo" (Nayarit); "haya" (Sinaloa).

Misanteca jurgensenii. "Aguacatillo" (Oaxaca).

Page 294. In the synonymy of *Phoebe tampicensis*, for "*Ocotea angustata*" read "*Phoebe angustata*."

Page 295. To the species of *Phoebe* add:

Phoebe longipes I. M. Johnston, Contr. Gray Herb. n. ser. **70**: 69. 1924. Type from Mexico, the locality not known.

Ocotea veraguensis. To the synonymy add: *Acrodiclidium misantlae* T. S. Brandeg. Univ. Calif. Publ. Bot. **6**: 497. 1919.

Page 296. After *Ocotea klotzschiana* insert:

Ocotea pyramidata Blake, Univ. Calif. Publ. Bot. **7**: 326. 1920. Type from Zacuapan, Veracruz.

HERNANDIACEAE.

Page 298. *Gyrocarpus americanus*. "Jutamo" (Sinaloa).

After *Gyrocarpus* insert the following genus:

SPARATTANTHELIUM Mart. Flora **1841**²: Beibl. 40. 1841.

According to Hemsley, specimens of this genus were collected in southern Mexico by Jurgensen. They may perhaps be referable to the Guatemalan species described recently by the writer (Proc. Biol. Soc. Washington **37**: 51. 1924) as *Sparattanthelium guatemalense*.

PAPAVERACEAE.

Page 300. *Bocconia arborea*. "Chicolate" (Nayarit).

CAPPARIDACEAE.

Page 303. *Capparis flexuosa*. "Mimbre del monte," "tablelojeca" (Sinaloa).

Page 304. *Capparis indica*. "Palo zapo," "vara prieta" (Sinaloa).

After *Capparis indica* add:

Capparis mollicella Standl. Proc. Biol. Soc. Washington **37**: 44. 1924. Type from La Bajada, Nayarit.

Page 305. *Crataeva tapia*. "Perihuate," (Sinaloa); "trompo" (Guerrero).

Forchammeria. The genus has been treated recently by Standley (Journ. Washington Acad. Sci. **14**: 269–272. 1924).

Page 306. *Forchammeria macrocarpa*. A synonym is *F. purpusii* Loesener, Repert. Sp. Nov. Fedde **16**: 204. Dec. 31, 1919.

Forchammeria lanceolata. This is *Drypetes crocea*; see page 1671.

After *Forchammeria lanceolata* insert:

Forchammeria longifolia Standl. Journ. Washington Acad. Sci. **14**: 271. 1924. Type from Pueblo Nuevo, Veracruz.

Forchammeria sessilifolia Standl. Journ. Washington Acad. Sci. **14**: 272. 1924. Type from María Madre Island.

HYDRANGEACEAE.

Page 308. After *Hydrangea oerstedii* insert:

Hydrangea seemannii Riley, Kew Bull. **1924**: 207. 1924. Type from the Sierra Madre. The "Sierra Madre" reference under *H. oerstedii* pertains to this species.

ESCALLONIACEAE.

Page 313. After *Phyllonoma laticuspis* insert:

Phyllonoma coriacea Riley, Kew Bull. **1924**: 208. 1924. Type from the Sierra Madre. Reported by Seemann as *Dulongia acuminata* H. B. K.

Page 316. Before Cunoniaceae insert the following family:

BRUNELLIACEAE. Brunellia Family.

1. **BRUNELLIA** Ruiz & Pav. Fl. Peruv. Chil. Prodr. 71. 1794.

1. **Brunellia comocladifolia** Humb. & Bonpl. Pl. Aequin. **1**: 211. 1808.

Southern Mexico. Costa Rica, West Indies, and South America.

The plant described by Hooker and Arnott (Bot. Beechey Voy. 282. 1837–39) from Tepic as *Brunellia ? quadrilocularis* is unknown to the present writer.

MALACEAE.

Page 337. *Amelanchier denticulata*. "Tomistlacati" (Guerrero). Reported as a tree of 3 to 9 meters.

AMYGDALACEAE.

Page 343. *Licania arborea*, "Palo carnero" (Oaxaca).

KRAMERIACEAE.

Page 348. *Krameria bicolor*. "Tajuy," "guachapurillo" (Sinaloa).

MIMOSACEAE.

Page 351. *Prosopis juliflora* and its synonyms should be placed in synonymy under the following, the proper name for the species:

Prosopis chilensis (Molina) Stuntz, U. S. Dept. Agr. Bur. Pl. Ind. Inv. Seeds **31**: 85. 1914. *Ceratonia chilensis* Molina, Sagg. Stor. Nat. Chile **172**. 1782.

Page 353. For *Prosopis juliflora velutina* substitute ***Prosopis chilensis velutina*** (Wooton) Standl.

For *Prosopis juliflora glandulosa* substitute ***Prosopis chilensis glandulosa*** (Torr.) Standl.

Page 354. *Piptadenia constricta*. "Iguano blanco" (Sinaloa). This species extends also to El Salvador, where it is known as "lengua de vaca" and "quebracho."

Page 355. *Goldmania foetida*. "Sicoche" (Sinaloa).

Page 359. *Mimosa distachya*. "Cuca de árbol" (Sinaloa).

Mimosa polyantha. "Gatuño" (Sinaloa).

Page 361. *Mimosa albida*. "Tapa vergüenza" (Veracruz).

Page 362. *Mimosa pigra*. "Coatante" (Nayarit).

Page 366. After *Mimosa aculeaticarpa* insert:

Mimosa chaetocarpa T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 182. 1922. Type from Camarón, Veracruz.

Mimosa endlichii Harms, Repert. Sp. Nov. Fedde 18: 93. 1922. Type from Río San Juan, Chihuahua.

Page 368. *Leucaena lanceolata*. "Bolillo" (Sinaloa).

Leucaena diversifolia. "Guaje" (Guerrero).

Page 373. *Acacia cochliacantha*. For the Mexican material referred here the name *Acacia cymbispina* Sprague and Riley has been proposed (Kew Bull. Misc. Inf. 1923: 394. 1923). The authors state that the Mexican plant is specifically distinct from that occurring in Ecuador. The species is known in Sinaloa also as "vinolo."

Page 374. *Acacia macracantha*. "Algarrobo," "espina de tinto" (Sinaloa).

Page 375. *Acacia hindsii*. "Jarretadera" (Sinaloa, Nayarit).

Page 377. *Acacia millefolia*. "Mauto" (Sinaloa).

Page 378. *Acacia acatlensis*. "Huajillo" (Puebla).

Page 381. *Acacia angustissima*. "Day" (Sinaloa).

Page 385. *Calliandra anomala*. This and its synonyms should be referred to synonymy under the following:

Calliandra grandiflora (L'Hér.) Benth. Journ. Bot. Hook. 2: 139. 1840. *Mimosa grandiflora* L'Hér. Sert. Angl. 30. 1788. See Riley, Kew Bull. 1923: 397. 1923.

Page 386. *Calliandra houstoniana*. "Chivato grande" (Sinaloa).

Page 380. *Acacia crassifolia*. A synonym of this is *Bauhinia lunarioides* A. Gray (see page 417).

Page 388. After *Calliandra capillata* insert:

Calliandra langlassei Harms, Repert. Sp. Nov. Fedde 17: 87. 1921. Type from Chichihualco, Guerrero.

Calliandra mexicana T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 183. 1922. Type from Remudadero, Veracruz.

Calliandra seleri Harms, Repert. Sp. Nov. Fedde 17: 90. 1921. Type from Hacienda Santa Rita, near Zapaluta, Distrito de Comitán, Chiapas.

Calliandra scopulina T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 183. 1922. Type from Camarón, Veracruz.

Calliandra socorrensis I. M. Johnston, Contr. Gray Herb. n. ser. 70: 71. 1924. Type from Socorro Island.

Page 388. *Lysiloma*. Since the generic name is neuter, the species names should have neuter endings.

Page 390. *Lysiloma divaricatum*. "Mauto" (Sinaloa).

Page 390. *Albizzia occidentalis*. "Trucha," "cico" (Sinaloa).

Page 391. After *Albizzia occidentalis* insert:

Albizzia tomentosa (Micheli) Standl. Journ. Washington Acad. Sci. **13**: 6. 1923. *Pithecollobium tomentosum* Micheli, Mém. Soc. Phys. Hist. Nat. Genève **34**: 285. pl. 28. 1903. The tree occurs also in Sinaloa, where it is known as "palo joso." See page 396.

Page 393. *Pithecollobium lanceolatum*. "Guamúchil bronco" (Sinaloa); "humo cimarrón" (Tamaulipas). The proper name for this species is **Pithecollobium ligustrinum** (Jacq.) Klotzsch. The date of publication of *Mimosa ligustrina* Jacq. should be 1800–1806 (see Riley, Kew Bull. **1923**: 400. 1923).

Pithecollobium calostachys. "Conchi" (Sinaloa).

Page 395. *Pithecollobium arboreum*. "Cañamazo" (Oaxaca). Dr. Reko states that this species is sometimes a tree of 20 meters or more.

Page 396. *Pithecollobium tortum*. "Cucharo," "palo fierro" (Sinaloa).

Pithecollobium tomentosum. This is *Albizzia tomentosa* (Micheli) Standl.; see above.

Page 397. *Pithecollobium mexicanum*. "Manto," "rama de chivato" (Sinaloa).

After *Pithecollobium mexicanum* add:

Pithecollobium caesalpiniioides Standl. Proc. Biol. Soc. Washington **37**: 45. 1924. Type from El Zapote, Mazatlán, Sinaloa. "Tempisque," "guay-pinole."

Pithecollobium latifolium (L.) Benth. Lond. Journ. Bot. **3**: 214. 1844. *Mimosa latifolia* L. Syst. Nat. ed. 10. 1310. 1759. Veracruz. Jamaica and Central and South America.

Pithecollobium leucospermum T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 182. 1922. Type from Camarón, Veracruz.

Pithecollobium paniculatum Pittier, Contr. U. S. Nat. Herb. **20**: 462. 1922. Type from San Gerónimo, Oaxaca.

Pithecollobium pulchellum Pittier, Contr. U. S. Nat. Herb. **20**: 462. 1922. Sinaloa, the type from Culiacán.

Page 399. *Inga xalapensis*. "Juaquiniquil" (Nayarit).

After *Inga spuria* insert:

Inga brevipedicellata Harms, Repert. Sp. Nov. Fedde **19**: 62. 1923. Type from Mirador, Veracruz.

Inga endlichii Harms, Repert. Sp. Nov. Fedde **19**: 63. 1923. Type from Jalapa, Veracruz.

Inga latibracteata Harms, Repert. Sp. Nov. Fedde **19**: 64. 1923. Type from Jalapa, Veracruz.

Inga oophylla Riley, Kew Bull. **1923**: 401. 1923. Type from Ignacio, Sinaloa.

Inga sciadodendron Harms, Repert. Sp. Nov. Fedde **19**: 62. 1923. Type from Mirador, Veracruz.

Inga zacuapanica Harms, Repert. Sp. Nov. Fedde **19**: 63. 1923. Type from Zacuapan, Veracruz.

CAESALPINIACEAE.

Page 405. *Cassia ornithopoides* and its synonym should be referred to synonymy under the oldest name for the species: **Cassia uniflora** Mill. Gard. Dict. ed. 8. *Cassia* no. 5. 1768.

Page 407. *Cassia bicapsularis*. "Vicho" (Nayarit).

Page 409. *Cassia biflora*. "Viche" (Sinaloa).

Cassia wislizeni. "Palo prieto," "pinacatillo" (Durango).

Page 410. *Cassia atomaria*. "Mora hedionda" (Sinaloa).

Cassia emarginata. "Retama" (Tamaulipas); "viche" (Sinaloa).

Page 412. *Poeppigia procera*. "Hoja menuda" (Guerrero).

Page 415. *Bauhinia longiflora*. The older name for this species is *B. chlorantha* T. S. Brandeg., of which *B. longiflora* is a synonym.

Page 417. *Bauhinia lunarioides*. This is to be referred to synonymy under *Acacia crassifolia* A. Gray (page 380).

Page 418. *Bauhinia divaricata*. "Pie de cabra" (Oaxaca); "pata de cabro" (Veracruz).

After *Bauhinia latifolia* insert:

Bauhinia jucunda T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 326. 1920. Type from Barranca de Panoaya, Veracruz.

Bauhinia peninsularis T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 183. 1922. Type from Pescadero, Baja California.

Page 423. *Caesalpinia cacalaco*. "Guachalala," "huisache bola" (Sinaloa). The wood gives a good quality of charcoal. The bark is employed as a remedy for toothache. The pods are used for dyeing, and the seeds are said to be eaten.

Page 424. *Caesalpinia platyloba*. "Quebracha," "arellano," "palo Colorado" (Sinaloa).

Page 425. *Caesalpinia gilliesii*. "Tabachín" (Coahuila); "mal de ojo" (Sonora).

Page 426. *Caesalpinia palmeri*. "Palo piojo" (Sinaloa).

Caesalpinia mexicana. "Guajillo" (Nayarit); "viehe" (Sinaloa).

Page 427. After *Caesalpinia yucatanensis* insert:

Caesalpinia ortegae Standl. Journ. Washington Acad. Sci. 13: 6. 1923. Type from Sinaloa.

Delonix regia. "Acacia" (Guerrero).

Conzattia multiflora. "Zopilote" (Puebla); "árbol de águila" (Oaxaca).

Page 428. *Parkinsonia aculeata*. "Bagote" (Sonora); "cacaporo" (Sinaloa).

Parkinsonia microphylla. This has been transferred recently to the genus *Cercidium* (see below).

Page 429. After *Cercidium plurifoliolatum* insert:

Cercidium macrum I. M. Johnston, Contr. Gray Herb. n. ser. 70: 64. 1924. Tamaulipas and Nuevo León.

Cercidium microphyllum (Torr.) Rose & Johnston, Contr. Gray Herb. n. ser. 70: 66. 1924. *Parkinsonia microphylla* Torr. See page 428.

Cercidium molle I. M. Johnston, Proc. Calif. Acad. IV. 12: 1038. 1924. Type from Agua Verde Bay, Baja California.

Cercidium sonoreae I. M. Johnston, Contr. Gray Herb. n. ser. 70: 66. 1924. Sonora, the type from Guaymas.

FABACEAE.

Page 433. *Toumatea simplex*. "Limoncillo" (Nayarit).

Page 435. *Sophora tomentosa*. This species has been collected also in Tamaulipas.

Page 436. For *Ormosia* and the specific citation substitute the following:

DUSSIA Krug & Urb. in Duss, Légum. Martinique 11. 1891.

1. ***Dussia mexicana*** (Standl.) Harms, Repert. Sp. Nov. Fedde 19: 294. 1924. *Ormosia mexicana* Standl. Contr. U. S. Nat. Herb. 23: 436. 1922.

Page 437. *Crotalaria longirostrata*. "Garbancillo," "tronador" (Sinaloa).

Page 438. *Crotalaria maypurensis*. "Chipilín" (Oaxaca).

After *Crotalaria anargyroides* insert:

Crotalaria polyphylla Riley, Kew Bull. 1923: 333. 1923. Type from the Sierra Madre.

Page 439. *Indigofera ornithopodioides*. This and its synonyms should be referred to synonymy under the following name: ***Indigofera miniata*** Ortega, Hort. Matr. Dec. 98. 1798.

Indigofera lespedezioides. A synonym of this species is *Indigofera acasonicae* T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 326. 1920.

Page 440. *Indigofera suffruticosa*. *Indigofera truxillensis* H. B. K. (Nov. Gen. & Sp. 6: 456. 1823), reported by Rydberg from Mexico, is scarcely distinct from *I. suffruticosa*.

Page 441. The genus *Indigofera* has been treated recently by Rydberg (N. Amer. Fl. 24: 137-153. 1923), and numerous new species have been described from Mexico. The following should be inserted after *Indigofera thibaudiana*:

Indigofera argentata Rydb. N. Amer. Fl. 24: 143. 1923. Coahuila, the type from Sabinas. Western Texas.

Indigofera brevipes (S. Wats.) Rydb. N. Amer. Fl. 24: 143. 1923. *Indigofera leptosepala brevipes* S. Wats. Proc. Amer. Acad. 17: 342. 1882. Chihuahua to Durango and San Luis Potosí; type from San Rafael Mountains, San Luis Potosí. Southern Texas.

Indigofera constricta Rydb. N. Amer. Fl. 24: 145. 1923. A new name for *I. torulosa* Hook. & Arn. 1836, not *I. torulosa* E. Meyer, 1836. On page 440 the former is referred wrongly to synonymy under *I. mucronata*. Tepic and Guerrero, the type from Tepic.

Indigofera discolor Rydb. N. Amer. Fl. 24: 147. 1923. Sinaloa, the type from Lodiago; Veracruz.

Indigofera hartwegii Rydb. N. Amer. Fl. 24: 144. 1923. A new name for *I. mexicana* Benth. 1848, not *I. mexicana* L. f. 1781. On page 439 the former name is referred to synonymy under *I. ornithopodioides*.

Indigofera laevis Rydb. N. Amer. Fl. 24: 144. 1923. Type from Guaymas, Sonora.

Indigofera lancifolia Rydb. N. Amer. Fl. 24: 147. 1923. Type from Acapulco, Guerrero.

Indigofera langlassei Rydb. N. Amer. Fl. 24: 147. 1923. Sinaloa to Guerrero; type from the Sierra Madre of Michoacán or Guerrero.

Indigofera nana Rydb. N. Amer. Fl. 24: 143. 1923. Type from Punguato, near Morelia, Michoacán.

Indigofera nelsonii Rydb. N. Amer. Fl. 24: 150. 1923. Sonora and Baja California; type collected between La Laguna and El Paraíso, Baja California. Perhaps synonymous with this is *I. argentata* I. M. Johnston (Proc. Calif. Acad. IV. 12: 1043. 1924, not *I. argentata* Rydb. 1923), described from Cerralbo Island, Baja California.

Indigofera pueblensis Rydb. N. Amer. Fl. 24: 150. 1923. Type from Cerro de la Yerba, San Luis Tultitlanapa, Puebla.

Indigofera purpusi T. S. Brandeg. Univ. Calif. Publ. Bot. 6: 499. 1919. Veracruz, Mexico, and Oaxaca; type from Barranca de Tenampa, Veracruz.

Indigofera rosei Rydb. N. Amer. Fl. 24: 145. 1923. Zacatecas and Puebla; type from San Juan Capistrano, Zacatecas.

Indigofera sphenoides Rydb. N. Amer. Fl. 24: 142. 1923. Type from San Dieguito, San Luis Potosí.

Page 454. *Parosela diffusa*. "Escoba" (Morelos); "escoba colorada" (Sinaloa).

Page 455. *Parosela zimapanica*. "Hierba hedionda" (Oaxaca).

Page 458. *Parosela greggii*. "Orégano cimarrón" (Coahuila, Endlich). Probably an erroneous name.

Page 459. *Parosela wislizeni*, "Mariola" (Chihuahua, Endlich).

Page 460. *Parosela megacarpa*. To the synonymy add: *Errazurizia megacarpa* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1042. 1924.

Page 463. *Parosela seemanni*. "Engorda cabra" (Zacatecas).

Page 464. *Parosela dorycnoides*. "Engorda cabra" (Durango).

Page 465. After *Parosela decora* insert:

Parosela arsenei Macbride, Contr. Gray Herb. n. ser. **65**: 21. 1922. Type from Morelia, Michoacán.

Parosela caeciliae (Harms) Standl. *Dalea caeciliae* Harms, Verh. Bot. Ver. Brandenb. **56**: 87. 1923. Type from Cerro del Pueblo Viejo, Distrito de Teposcolula, Oaxaca.

Parosela loeseneriana (Harms) Standl. *Dalea loeseneriana* Harms. Verh. Bot. Ver. Brandenb. **56**: 88. 1923. Type from El Parián, Oaxaca.

Parosela longeracemosa T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 184. 1922. Type from Minas de San Rafael, San Luis Potosí.

Page 466. *Brongniartia*. The genus has been monographed by Rydberg (N. Amer. Fl. **24**: 186–197. 1923).

Page 467. *Brongniartia podalyrioides*. “Hierba de la víbora” (Sinaloa). To the synonyms of this species add: *Astragalus frutescens* Kunth, Ind. Sem. Hort. Berol. **1845**: 12. 1845. *Brongniartia bilabiata* Micheli, listed as a synonym of *B. podalyrioides*, is recognized by Rydberg as a distinct species, known only from the type locality, Río San Luis, Michoacán or Guerrero.

Page 468. *Brongniartia lasiocarpa*. According to Rydberg this is a synonym of *Brongniartia oligosperma* Baill. (Adansonia **9**: 240. 1870), listed on page 470 among the doubtful species as “*B. oligospermoides*.”

Page 469. *Brongniartia intermedia*. “Hierba de la víbora.” (Sinaloa.)

After *Brongniartia intermedia* insert:

Brongniartia caeciliae Harms, Repert. Sp. Nov. Fedde **18**: 95. 1922. Type collected between Chicapa and Izhuatán, Juchitán, Oaxaca.

Brongniartia seleri Harms, Repert. Sp. Nov. Fedde **18**: 95. 1922. Type from Mitla, Oaxaca.

Brongniartia paniculata Rose; Rydb. N. Amer. Fl. **24**: 189. 1923. Type from Cuernavaca, Morelos.

Brongniartia pauciflora Rose; Rydb. N. Amer. Fl. **24**: 191. 1923. Type from Río Quintepec, Distrito de Cuicatlán, Oaxaca.

Brongniartia alamosana Rydb. N. Amer. Fl. **24**: 192. 1923. Type from Alamos, Sonora.

Brongniartia strigillosa Rydb. N. Amer. Fl. **24**: 192. 1923. Type from Acaponeta, Tepic.

Brongniartia canescens (S. Wats.) Rydb. N. Amer. Fl. **24**: 193. 1923. *B. minutifolia canescens* S. Wats. Proc. Amer. Acad. **23**: 271. 1888. Type from Ortiz, Chihuahua.

Brongniartia angustata Rydb. N. Amer. Fl. **24**: 194. 1923. Michoacán, Puebla, and Oaxaca; type collected between Mitla and Oaxaca.

Brongniartia argentea Rydb. N. Amer. Fl. **24**: 195. 1923. Type from Distrito de Miahuatlán, Oaxaca.

Brongniartia hirsuta Rydb. N. Amer. Fl. **24**: 194. 1923. Querétaro, the type from Hacienda Ciervo.

Brongniartia pringlei Rydb. N. Amer. Fl. **24**: 195. 1923. Mexico, Querétaro, and Hidalgo; type from Tultenango, Mexico.

Page 470. *Cracca*. The genus has been monographed by Rydberg (N. Amer. Fl. **24**: 157–183. 1923.)

Page 473. *Cracca tepicana*. Also in Sinaloa. “Frijolillo.”

Page 473. *Cracca toxicaria*. The plant described under this name is **Cracca arcuata** Rydb. N. Amer. Fl. **24**: 166. 1923. Type from María Madre Island, Tepic. *Cracca multifolia* Rose is treated by Rydberg as a distinct species, known only from Tepic.

Page 474. *Cracca schiedeana*. This name is a synonym of *Cracca toxicaria* (Swartz) Kuntze. See page 473 for synonymy.

Page 475. After *Cracca palmeri* insert:

Cracca californica Rydb. N. Amer. Fl. **24**: 176. 1923. Type from Mesa Verde, Baja California.

Cracca calva Rydb. N. Amer. Fl. **24**: 161. 1923. Jalisco, the type from the barranca near Guadalajara.

Cracca cathartica (Sessé & Moc.) Rydb. N. Amer. Fl. **24**: 180. 1923. *Galega cathartica* Sessé & Moc. Fl. Mex. ed. 2. 175. 1894; *Cracca schottii* Vail, Bull. Torrey Club **22**: 25. 1895. Yucatán. Honduras, Colombia, and West Indies; type from Porto Rico.

Cracca konzattii Rydb. N. Amer. Fl. **24**: 162. 1923. Type from Las Sedas, Oaxaca.

Cracca foliolosa Rydb. N. Amer. Fl. **24**: 162. 1923. Type from Culiacán, Sinaloa.

Cracca roseana Rydb. N. Amer. Fl. **24**: 164. 1923. Durango and Querétaro; type from Hacienda Ciervo, Querétaro.

Cracca rusbyi Rydb. N. Amer. Fl. **24**: 181. 1923. Type from Santa Catarina, Oaxaca.

Cracca thurberi (A. Gray) Rydb. N. Amer. Fl. **24**: 165. 1923. *Tephrosia thurberi* A. Gray; Rydb. N. Amer. Fl. **24**: 165. 1923, as synonym; *Tephrosia leucantha acuta* Jones, Contr. West. Bot. **12**: 7. 1906. Chihuahua and Sonora; type from Mububi, Sonora. Arizona.

Cracca velutina Rydb. N. Amer. Fl. **24**: 171. 1923. Tepic, the type from Zopilote.

The following plants, described as species of *Tephrosia*, are not transferred here to the genus *Cracca*, since it is not improbable that they may be synonymous with some of the species of *Cracca* described by Rydberg in 1923.

Tephrosia albida T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 406. 1924. Type collected between Tuxtla Gutiérrez and Jalisco, Chiapas.

Tephrosia hypoleuca Riley, Kew Bull. **1923**: 339. 1923. Type from the Sierra Madre.

Tephrosia pachypoda Riley, Kew Bull. **1923**: 340. 1923. Type from the Sierra Madre.

Page 475. *Robinia neomexicana*. The tree listed under this name is referred by Rydberg (N. Amer. Fl. **24**: 226. 1924) to a segregate: *Robinia luxurians* (Dieck) Rydb. N. Amer. Fl. **24**: 226. 1924. *R. neomexicana luxurians* Dieck; Goeze, Gard. Chron. III. **12**: 669. 1892.

Page 476. *Robinia ehrenbergii* is *Gliricidia ehrenbergii* (Schlecht.) Rydb. See page 1665).

Robinia melanocarpa is *Lennea melanocarpa* (Schlecht.) Vatke. See page 1665.

Daubentonia. The synonymy of the plant described here should be placed under *Sesban longifolia* (see below). The genus *Daubentonia* is represented in Mexico by the following species:

Daubentonia drummondii Rydb. Amer. Journ. Bot. **10**: 498. 1923. San Luis Potosí. Southern United States, the type from Texas.

Daubentonia virgata (Cav.) Rydb. N. Amer. Fl. **24**: 208. 1924. *Aeschynomene virgata* Cav. Icon. Pl. **3**: 47. 1794. This species is known only from Mexico.

Sesban. The genus has been treated by Rydberg (N. Amer. Fl. **24**: 202–205. 1924).

Sesban mexicana. The proper name for the plant described here under this name is *Sesban longifolia* (Cav.) DC. The name *Sesban mexicana* is a synonym of *S. longifolia*.

Page 477. *Sesban macrocarpa*. "Curi" (Sinaloa). The plant listed under this name is ***Sesban sonorae*** Rydb. N. Amer. Fl. **24**: 205. 1924. The names *Aeschynomene picta* and *Sesban picta* relate to a species not known from Mexico, although they have often been applied to this Mexican species.

After *Sesban macrocarpa* insert:

Sesban bispinosa (Jacq.) Rydb. N. Amer. Fl. **24**: 203. 1924. *Aeschynomene bispinosa* Jacq. Icon. Pl. Rar. **3**: 13. 1793. Southern Mexico. West Indies and Old World tropics.

Benthamantha. The genus has been treated by Rydberg (N. Amer. Fl. **24**: 243-249. 1924), who recognizes a large number of Mexican species, most of which seem to be based upon characters of slight specific value.

After *Benthamantha mollis* insert:

Benthamantha brandegei Rydb. N. Amer. Fl. **24**: 246. 1924. Baja California and Sonora to Guerrero and Morelos; type from Cape Region mountains of Baja California. Reported also from Costa Rica.

Benthamantha chiapensis Rydb. N. Amer. Fl. **24**: 244. 1924. Type from Jalisco, Chiapas.

Benthamantha glabella (A. Gray) Rydb. N. Amer. Fl. **24**: 247. 1924. *Cracca edwardsii glabella* A. Gray, Proc. Amer. Acad. **17**: 201. 1882. Sonora and Chihuahua to Durango. Southern Arizona.

Benthamantha microphylla Rydb. N. Amer. Fl. **24**: 244. 1924. Type from Río Coajaguillo, Michoacán or Guerrero.

Benthamantha painteri Rydb. N. Amer. Fl. **24**: 246. 1924. Durango and Jalisco; type from Guadalajara, Jalisco.

Benthamantha robusta Rydb. N. Amer. Fl. **24**: 247. 1924. Type from Iguala Canyon, Guerrero.

Benthamantha trifoliolata Rydb. N. Amer. Fl. **24**: 247. 1924. Guerrero and Puebla; type from Tehuacán, Puebla.

Benthamantha wrightii Rydb. N. Amer. Fl. **24**: 246. 1924. Sonora, the type collected between San Pedro and the Sonoita. Arizona.

Before *Diphysa* insert the following genus:

COLUTIA Medic. Vorles. Churpf. Phys. Ges. **2**: 366. 1787.

1. *Colutia frutescens* (L.) Medic. Phil. Bot. **1**: 210. 1789.

Colutea frutescens L. Sp. Pl. 723. 1753.

Sutherlandia frutescens R. Br. in Ait. Hort. Kew. ed. **2**. **4**: 327. 1812.

A native of South Africa, a shrub or tree with handsome red flowers. It is cultivated in Mexico and in some places has become naturalized. Specimens have been reported from Hidalgo, Morelos, Zacatecas, and Coahuila.

Diphysa. The genus has been monographed by Rydberg (N. Amer. Fl. **24**: 209-215. 1924).

Diphysa racemosa. "Guiloche" (Sinaloa).

Page 479. *Diphysa occidentalis*. "Guiloche" (Sinaloa).

After *Diphysa occidentalis* insert:

Diphysa carthagenensis Jacq. Enum. Pl. Carib. 28. 1760. Reported by Rydberg from Yucatán. Colombia and Venezuela, the type from Cartagena, Colombia.

Diphysa microphylla Rydb. N. Amer. Fl. **24**: 213. 1924. Tamaulipas and Nuevo León, the type from Victoria, Tamaulipas.

Diphysa puberulenta Rydb. N. Amer. Fl. **24**: 214. 1924. Sinaloa to Guerrero; type from Acaponeta, Tepic.

Diphysa punctata Rydb. N. Amer. Fl. **24**: 211. 1924. Type from Cuernavaca, Morelos.

Diphysa spinosa Rydb. N. Amer. Fl. **24**: 213. 1924. Yucatán and Chiapas (type from Canjob). Guatemala.

Diphysa villosa Rydb. N. Amer. Fl. **24**: 214. 1924. Type from Yautepec, Morelos.

Page 480. *Lennea robinoides*. This name is to be referred as a synonym to the following:

Lennea melanocarpa (Schlecht.) Vatke; Harms, Repert. Sp. Nov. Fedde **19**: 68. 1923. *Robinia melanocarpa* Schlecht. Linnaea **12**: 305. 1838.

Page 481. *Coursetia glandulosa*. "Chino" (Sinaloa).

Coursetia virgata, listed as a doubtful species, is *Daubentonia virgata* (see page 1663).

After *Coursetia madrensis* insert:

Coursetia seleri Harms, Repert. Sp. Nov. Fedde **19**: 14. 1923. *C. seleri caeciliae* Harms, loc. cit. Oaxaca, the type from Totolapam, Distrito de Yautepec.

Olneya tesota. "Palo tinta" (Baja California).

Page 482. *Gliricidia sepium*. "Cocoite" (Oaxaca).

Page 483. After *Gliricidia sepium* insert:

Gliricidia ehrenbergii (Schlecht.) Rydb. N. Amer. Fl. **24**: 239. 1924. *Robinia ehrenbergii* Schlecht. Linnaea **12**: 303. 1838; *Hybosema ehrenbergii* Harms, Repert. Sp. Nov. Fedde **19**: 66. 1923. Hidalgo, Oaxaca, and Chiapas; type from Grande, Hidalgo.

Page 484. *Hesperothamnus*. The genus has been monographed by Rydberg (N. Amer. Fl. **24**: 235–237. 1924).

Hesperothamnus grandis. This name is to be referred to synonymy under the following:

Hesperothamnus purpusi (Harms) Rydb. N. Amer. Fl. **24**: 236. 1924. *Selerothamnus purpusi* Harms, Repert. Sp. Nov. Fedde **17**: 326. 1921. Type from El Riejo, Puebla.

After *Hesperothamnus grandis* insert:

Hesperothamnus pentaphyllus (Harms) Rydb. N. Amer. Fl. **24**: 236. 1924. *Selerothamnus pentaphyllus* Harms, Repert. Sp. Nov. Fedde **17**: 325. 1921. Oaxaca and Puebla; type from Salomé, Oaxaca.

Hesperothamnus brachycalyx Rydb. N. Amer. Fl. **24**: 237. 1924. Type collected near Domingullo, Oaxaca.

Hesperothamnus ehrenbergii (Harms) Rydb. N. Amer. Fl. **24**: 237. 1924. *Selerothamnus ehrenbergii* Harms, Repert. Sp. Nov. Fedde **17**: 326. 1921. Type from Mestitlán (Hidalgo?).

Page 487. *Meibomia cinerea*. "Pegajoso" (Sinaloa); "ramoncillo" (Nayarit).

After *Meibomia amplifolia* insert:

Meibomia bella Blake, Bot. Gaz. **78**: 282. 1924. Morelos (type from Cuernavaca) and Michoacán.

Meibomia dasyacra Blake, Bot. Gaz. **78**: 287. 1924. Type from mountains near Talpa, Jalisco.

Meibomia hemsleyana Schindler, Repert. Sp. Nov. Fedde **20**: 138. 1924. Chiapas (type locality) and Oaxaca. Guatemala.

Meibomia karwinskii Schindler, Repert. Sp. Nov. Fedde **20**: 146. 1924. Type from some unknown locality in Mexico.

Meibomia langlasseana Schindler, Repert. Sp. Nov. Fedde **20**: 147. 1924. Type from Monte de la Pasuacareta, Michoacán or Guerrero. "Escobilla."

Meibomia micheliana Schindler, Repert. Sp. Nov. Fedde **20**: 139. 1924. Type from the Sierra Madre of Michoacán or Guerrero. Guatemala.

Meibomia pulchra Schindler, Repert. Sp. Nov. Fedde 20: 145. 1924. Type from El Ocote, Michoacán or Guerrero.

Meibomia pycnantha Blake, Bot. Gaz. 78: 271. 1924. Type from Cuernavaca, Morelos; Mexico.

Meibomia sumichrastii Schindler, Repert. Sp. Nov. Fedde 20: 138. 1924. Michoacán, Guerrero, and Oaxaca.

Meibomia tephrophylla Blake, Bot. Gaz. 78: 274. 1924. Type from barranca of Guadalajara, Jalisco.

Page 494. *Canavalia*. The genus has been treated recently by Piper (Contr. U. S. Nat. Herb. 20: 555-588. 1925).

Page 495. After *Canavalia hirsuta* insert:

Canavalia palmeri (Piper) Standl. *Wenderothia palmeri* Piper, Contr. U. S. Nat. Herb. 20: 580. 1925. Michoacán to Chiapas; type from Acapulco.

Page 496. After *Eriosema pulchellum* add:

Eriosema nigropunctatum T. S. Brandeg, Univ. Calif. Publ. Bot. 7: 327. 1920. Type from Palmilla, near Zacuapan, Veracruz.

Page 497. *Dolicholus longeracemosus*. "Piule" (Oaxaca).

Page 501. *Erythrina americana*. "Pipal," "tzompanquanitl" (Chiapas).

Page 506. *Andira jamaicensis*. Omit *A. jamaicensis* and *Geoffraea jamaicensis*. The proper name for the species is *Andira inermis* (Swartz) H. B. K. "Cuartololoti" (Guerrero).

Amerimnon. See Pittier, On the species of *Dalbergia* of Mexico and Central America, Journ. Washington Acad. Sci. 12: 54-64. 1922.

Page 507. *Amerimnon granadillo*. A synonym is *Dalbergia granadillo* Pittier, Journ. Washington Acad. Sci. 12: 62. 1922.

Page 508. Before *Pterocarpus* insert:

Amerimnon cibix (Pittier) Standl. *Dalbergia cibix* Pittier, Journ. Washington Acad. Sci. 12: 59. 1922. Type from Yaxcaba, Yucatán. "Cibix," "kuxub-toooh" (Maya).

Amerimnon congestiflorum (Pittier) Standl. *Dalbergia congestiflora* Pittier, Journ. Washington Acad. Sci. 12: 57. 1922. Type from Cuernavaca, Morelos.

Amerimnon mexicanum (Pittier) Standl. *Dalbergia mexicana* Pittier, Journ. Washington Acad. Sci. 12: 59. 1922. Type from Mexico, the locality not known.

Amerimnon tabascanum (Pittier) Standl. *Dalbergia tabascana* Pittier, Journ. Washington Acad. Sci. 12: 58. 1922. Type from Mayito, Tabasco.

Page 508. *Pterocarpus acapulcensis*. "Granadillo," "palo de rosa" (Guerrero).

Page 509. *Machaerium*. The genus has been treated by Pittier (Contr. U. S. Nat. Herb. 20: 467-477. 1922).

Machaerium biovulatum. A synonym is *Machaerium langlassei* Micheli; Pittier, Contr. U. S. Nat. Herb. 20: 473. 1922. The species occurs in Nayarit, where it is called "cuamecate prieto."

Page 510. After *Machaerium riparium* insert:

Machaerium acanthothyrsus Pittier, Contr. U. S. Nat. Herb. 20: 473. 1922. Type collected between Hacienda del Capricho, Guerrero, and Llano Grande, Oaxaca.

Machaerium chiapense T. S. Brandeg, Univ. Calif. Publ. Bot. 10: 405. 1924. Type collected between Tuxtla Gutiérrez and Jalisco, Chiapas.

Machaerium marginatum Standl. Journ. Washington Acad. Sci. 14: 95. 1924. Oaxaca. El Salvador (type from San Vicente) and Panama. "Uña de gato" (Oaxaca); "sangre bravo" (El Salvador).

Machaerium setulosum Pittier, Contr. U. S. Nat. Herb. 20: 477. 1922. Veracruz, the type from Zacuapan. Guatemala.

Page 511. *Ichthyomethia americana*. "Alejo" (Guerrero).

Page 513. *Lonchocarpus megalanthus*. "Jumay" (Sinaloa).

Lonchocarpus lanceolatus. "Talistillo" (Sinaloa).

Page 515. *Lonchocarpus eriocarinalis*. "Margarita" (Colima). Leaves said to be employed as a remedy for fevers.

After *Lonchocarpus jaliscensis* insert:

Lonchocarpus argyrotrichus Harms, Repert. Sp. Nov. Fedde 17: 320. 1921. Type from Taxmalac, Distrito de Hidalgo, Guerrero.

Lonchocarpus dumetorum T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 181. 1922. Type from Remudadero, Veracruz.

Lonchocarpus fuscopurpureus T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 405. 1924. Type from Remudadero, Veracruz.

Lonchocarpus galeottianus Harms, Repert. Sp. Nov. Fedde 17: 322. 1921. Type from Hacienda de la Concepción, Oaxaca.

Lonchocarpus kerberi Harms, Repert. Sp. Nov. Fedde 17: 322. 1921. Type from Volcán de Colima.

Lonchocarpus malacotrichus Harms, Repert. Sp. Nov. Fedde 17: 323. 1921. Type from some unknown locality in Mexico.

Lonchocarpus seleri Harms, Repert. Sp. Nov. Fedde 17: 324. 1921. Type from Rincón de los Tenates, Distrito de Tuxtla, Veracruz.

Lonchocarpus schiedeanus (Schlecht.) Harms, Repert. Sp. Nov. Fedde 17: 324. 1921. *Robinia schiedeana* Schlecht. Linnaea 12: 306. 1838. Type collected between Veracruz and Santa Fe.

Lonchocarpus stenodon Harms, Repert. Sp. Nov. Fedde 17: 324. 1921. Type from Pinotepa, Chinantla, Oaxaca.

ZYGOPHYLLACEAE.

Page 521. After *Fagonia rosei* insert:

Fagonia densa I. M. Johnston, Proc. Calif. Acad. IV. 12: 1052. 1924. Type from South San Lorenzo Island, Gulf of California.

Page 524. *Viscainoa geniculata*. To the synonymy add: *Vicainoa geniculata pinnata* I. M. Johnston, Univ. Calif. Publ. Bot. 7: 439. 1922.

RUTACEAE.

Page 527. *Casimiroa watsonii*. Also in Sinaloa, where it is called "zapote."

Page 530. After *Amyris thyrsoflora* insert:

Amyris konzattii Standl. Journ. Washington Acad. Sci. 13: 6. 1923. Type from Los Sabinos, between Juchatengo and Santa Ana, Oaxaca.

Page 535. After *Zanthoxylum microcarpum* insert:

Zanthoxylum tenuipes Standl. Journ. Washington Acad. Sci. 16: 15. 1926. Mountains east of Monserrate, Chiapas.

Page 536. Under No. 5, for "*Zanthoxylum fagara*" etc., read: **Esenbeckia pentaphylla** (Macfad.) Griseb. Fl. Brit. W. Ind. 135. 1859.

SIMAROUBACEAE.

Page 542. Before Burseraceae insert the following genus of Simaroubaceae:

PICRASMA Blume, Bijdr. Fl. Ned. Ind. 247. 1825.

1. **Picrasma mexicana** T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 410. 1924. Type from Remudadero, Veracruz. Not seen by the writer.

BURSERACEAE.

Page 548. *Elaphrium bipinnatum*. "Copal de la Virgen" (Sinaloa). To the synonymy add: *Bursera stenophylla* Sprague & Riley, Kew Bull. **1923**: 169. 1923.

Page 549. *Elaphrium odoratum*. To the synonymy add: *Bursera lonchophylla* Sprague & Riley, Kew Bull. **1923**: 168. 1923.

Elaphrium penicillatum. "Copal" (Sinaloa).

Page 552. *Elaphrium excelsum*. To the synonymy add: *Bursera acutidens* Sprague & Riley, Kew Bull. **1923**: 169. 1923; *Bursera sphaerocarpa* Sprague & Riley, op. cit. 170. 1923.

MELIACEAE.

Page 554. *Trichilia*. In the generic description, for "Leaves abruptly pinnate, rarely odd-pinnate," read "Leaves odd-pinnate, rarely abruptly pinnate."

Trichilia havanensis. "Zapotillo" (Tamaulipas).

Page 555. *Trichilia hirta*. "Jumay," "palo colorado chico," "azuica" (Sinaloa).

Page 560. *Swietenia humilis*. "Palo zopilote" (Oaxaca).

MALPIGHIACEAE.

Page 568. After *Bunchosia gracilis* add:

Bunchosia monticola T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 410. 1924. Type from Hacienda Montserrate, Chiapas.

Page 572. *Tetrapteris mexicana*. "Bejuco hueso" (Sinaloa).

After *Hiraea velutina* add:

Hiraea obovata Niedenzu, *Hiraea* 7. 1906. *Hiraea purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 184. 1922. Veracruz. Central America, the type from Costa Rica.

Hiraea polycarpa (T. S. Brandeg.) Standl. *Mascagnia polycarpa* T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 409. 1924. Type from Remudadero, Veracruz; also in Oaxaca.

Page 576. *Banisteria laurifolia*. "Compio" (Nayarit).

Page 577. *Banisteria pallida*. To the synonymy add: *Banisteria nemorum* T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 410. 1924.

Page 578. Before Polygalaceae insert the following family:

VOCHYACEAE. Vochya Family.

1. **VOCHYA** Aubl. Pl. Guian. 18. 1775.

1. ***Vochya tabascana*** (Sprague) Standl. N. Amer. Fl. **25**: 302. 1924.

Vochisia parviflora Villada, Naturaleza II. **3**: 681. 1903. Not *V. parviflora* Spruce, 1875.

Vochisia tabascana Sprague, Kew Bull. **1922**: 183. 1922.

Type collected between Atasta and La Tejería, Tabasco.

POLYGALACEAE.

Page 588. *Polygala appressipilis*. A synonym of this is *Polygala sinaloensis* Riley, Kew Bull. **1923**: 108. 1923.

Page 594. *Securidaca diversifolia*. "Cuaumecate frijolillo" (Nayarit).

EUPHORBIACEAE.

Page 601. *Euphorbia californica*. "Zipehui" (Sinaloa).

Page 602. *Euphorbia schlechtendalii*. "Tencuanete" (Sinaloa).

Page 604. *Euphorbia plicata*. "Jumete," "candelilla de palo" (Sinaloa).

Page 607. After *Pedilanthus rubescens* add:

Pedilanthus petraeus T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 411. 1924. Type from the State of Veracruz.

Page 610. *Phyllanthus acuminatus*. This name and its synonym should be placed in synonymy under the following, the proper name for the species: **Phyllanthus conami** Swartz, Prodr. Veg. Ind. Occ. 28. 1788.

Page 610. After *Astrocasia phyllanthoides* insert:

Astrocasia populifolia I. M. Johnston, Contr. Gray Herb. n. ser. 68: 84. 1923. This was based on the same collections as *Jatropha cercidiphylla* Standl. (Contr. U. S. Nat. Herb. 23: 639. 1923). The latter name has priority of publication. The plant can scarcely be a species of *Jatropha*, but its reference to *Astrocasia* is equally doubtful, and it seems probable, as suggested by Johnston, that it may represent a distinct and new genus.

Page 613. *Croton glabellus*. This has been collected also in the State of Nayarit.

Page 617. *Croton ciliato-glandulosus*. "Trucha" (Sinaloa).

Page 620. *Croton morifolius*. "Ocotillo," "vara blanca" (Sinaloa).

After *Croton morifolius* insert:

Croton sitiens T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 185. 1922. Type from Remudadero, Veracruz.

Page 624. *Acalypha*. The genus has been monographed by Pax and Hoffmann (in Engl. Pflanzenreich IV. 147. xvi).

Page 627. *Acalypha schlechtendaliana*. A synonym is *Acalypha filiformis* Schlecht. Linnaea 19: 235. 1847. Not *A. filiformis* Bojer, 1837.

Page 628. *Acalypha arvensis*. This name should be omitted, since it relates to an annual species. The proper name for the plant described is *A. capitellata* T. S. Brandeg., a species endemic in Mexico.

Acalypha seleriana. Reported by Pax also from Veracruz.

Acalypha unibracteata. Place as a synonym, *A. unibracteata heterantha* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 411. 1924.

Page 630. *Acalypha adenostachya*. The proper name for the plant described is *Acalypha subviscida* S. Wats. The entry for *A. adenostachya*, a distinct species, should be as follows:

Acalypha adenostachya Muell. Arg. Linnaea 34: 21. 1865. Described from southern Mexico.

Page 631. Under No. 40, for "*Acalypha liebmanni*" read "*Acalypha liebmanniana*."

Acalypha schiedeana. Reported by Pax also from Tamaulipas.

Page 632. After *Acalypha frederici* insert:

Acalypha chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 411. 1924. Type collected between Tuxtla Gutiérrez and Jalisco, Chiapas.

Acalypha cinerea Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 102. 1924. Type from some unknown locality in central Mexico.

Acalypha confertiflora Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 53. 1924. Type from Tomellín Canyon, Oaxaca.

Acalypha gaumeri Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 173. 1924. Type from Izamal, Yucatán.

Acalypha glandulosa Cav. Anal. Hist. Nat. Madrid 2: 141. 1801. Type from Salvatierra, Guanajuato.

Acalypha grisea Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 56. 1924. Type from San Marcos, Jalisco.

Acalypha microcephala Muell. Arg. Linnaea 34: 160. 1865. Type from Oaxaca.

Acalypha oreopola Greenm. Proc. Amer. Acad. 39: 82. 1903. Type from Iguala, Guerrero.

Acalypha palmeri Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 157. 1924. Colima (type from Manzanillo), Michoacán, and Guerrero.

Acalypha rubroserrata Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 28. 1924. Puebla and Tlaxcala; type from Puebla.

Acalypha synoica Pax & Hoffm. in Engl. Pflanzenreich IV. 147 xvi: 156. 1924. Type from Tehuacán, Puebla.

Acalypha tricholoba Muell. Arg. Linnaea 34: 16. 1865. Type from Mexico. Guatemala.

Page 632. *Bernardia fasciculata*. This is *Halliophytum fasciculatum* I. M. Johnston; see below.

Page 633. Before *Adelia* insert the following genus:

HALLIOPHYTUM I. M. Johnston, Contr. Gray Herb. n. ser. 68: 88. 1923.

One other species is known from southern California.

Halliophytum fasciculatum (S. Wats.) I. M. Johnston, Contr. Gray Herb. n. ser. 68: 88. 1923. *Bernardia fasciculata* S. Wats. Proc. Amer. Acad. 18: 153. 1883. See page 632.

Halliophytum capense I. M. Johnston, Contr. Gray Herb. n. ser. 68: 89. 1923. *Securinea capensis* I. M. Johnston, Univ. Calif. Publ. Bot. 7: 441. 1922. Type from coast below Pescadero, Baja California.

After *Adelia oaxacana* add:

Adelia virgata T. S. Brandeg. Zoe 4: 406. 1894. Baja California and Sonora; type from Sierra de la Laguna, Baja California.

Page 636. *Jatropha angustidens*. "Quemador," "tachinole," "copal," "chilte" (Sinaloa).

Page 637. *Jatropha purpurea*. "Sangragado" (Sinaloa).

Page 638. *Jatropha cordata*. "Torote," "zapo," "copalillo" (Sinaloa).

Jatropha cinerea. "Zapo" (Sinaloa).

Page 639. *Jatropha cercidiphylla*. A synonym of this is *Astrocasia populi-folia* I. M. Johnston; see page 1669.

Jatropha platyphylla. "Bonete," "boneto" (Sinaloa).

Page 642. After *Jatropha pseudocurcas* insert:

Jatropha grandifrons I. M. Johnston, Contr. Gray Herb. n. ser. 68: 89. 1923. Type from the vicinity of Oaxaca.

Jatropha harmsiana Mattfeld, Repert. Sp. Nov. Fedde 19: 120. 1923. Type from "Telmacan" (Tehuacán?), Mexico.

Jatropha inermiflora (I. M. Johnston) Standl. *Cnidoscolus inermiflorus* I. M. Johnston, Contr. Gray Herb. n. ser. 68: 85. 1923. Type collected between Victoria and Jaumave Valley, Tamaulipas.

Jatropha malacophylla Standl. Proc. Biol. Soc. Washington 37: 45. 1924. Type from El Zapote, Mazatlán, Sinaloa.

Jatropha pringlei (I. M. Johnston) Standl. *Cnidoscolus pringlei* I. M. Johnston, Contr. Gray, Herb. n. ser. 68: 85. 1923. Type from barranca near Guadalajara, Jalisco.

Page 645. After *Manihot aesculifolia* insert:

Manihot mexicana I. M. Johnston, Contr. Gray Herb. n. ser. 68: 90. 1923. Type from Zapotlán, Jalisco.

Manihot rubricaulis I. M. Johnston, Contr. Gray Herb. n. ser. 68: 90. 1923. Type from Iron Mountain, near Durango.

Page 652. As a synonym of *Sapium biloculare*, insert the following: *Sapium biloculare amplum* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1077. 1924. Type from Loreto, Baja California.

Sapium pedicellatum. "Hiza" (Sinaloa).

Page 653. Before Buxaceae insert the following genera of Euphorbiaceae:

DRYPETES Vahl, *Eclog. Amer.* 3: 49. 1807.

1. **Drypetes lateriflora** (Swartz) Krug & Urb. *Bot. Jahrb. Engler* 15: 357. 1892.

Schaefferia lateriflora Swartz, *Prodr. Veg. Ind. Occ.* 38. 1788.

Drypetes crocea Poit. *Mém. Mus. Hist. Nat.* 1: 159. 1815.

Forchammeria lanceolata Standl. *Contr. U. S. Nat. Herb.* 20: 183. 1919.

San Luis Potosí. West Indies, southern Florida, and Central America. Known in El Salvador as "mula."

OPHELLANTHA Standl. *Journ. Washington Acad. Sci.* 14: 97. 1924.

1. **Ophellantha spinosa** Standl. *Journ. Washington Acad. Sci.* 14: 98. 1924. Oaxaca. El Salvador, the type from Izaleo.

BUXACEAE.

Page 654. *Simmondsia californica*. This name and its synonyms are to be placed in synonymy under the following:

Simmondsia chinensis (Link) Schneider, *Ill. Handb. Laubh.* 2: 141. 1907.

Buxus chinensis Link, *Enum. Pl.* 2: 386. 1822. The locality was given originally with doubt as China, but the specimens were probably from southern California.

ANACARDIACEAE.

Page 656. *Spondias mombin*. The proper name for this species is *Spondias purpurea* L. *Spondias mombin* is the oldest name for No. 2, *S. lutea*.

Page 657. *Spondias lutea*. This name is a synonym of *Spondias mombin* L., the oldest name for the species. The tree occurs in Nayarit, where it is known as "obo."

Page 662. After *Astronium konzattii* add:

Astronium fraxinifolium Schott; Spreng. *Syst. Veg. Cur. Post.* 404. 1827. Veracruz. Brazil. A large tree. In Brazil it is highly esteemed for its lumber.

Astronium graveolens Jacq. *Enum. Pl. Carib.* 33. 1760. Guerrero, Oaxaca, and Yucatán. Central America, Colombia, and Venezuela. "Palo de cera," "palo de culebra" (Guerrero); "copaiva" (Oaxaca); "ronrón" (El Salvador, Honduras); "palo obero" (Honduras); "gateado" (Venezuela); "diomate," "yomate," "gusanero," "tibigaro," "marfil vegetal" (Colombia). This, also, is a large tree. The wood is valued highly throughout the range because of its durability and its suitability for cabinetwork. *Astronium konzattii* may not be specifically distinct from *A. graveolens*.

Page 663. *Comocladia mollissima*. It is probable that the following is a synonym of this species: **Comocladia macrophylla** (Hook. & Arn.) Riley, *Kew Bull.* 1923: 175. 1923. *Rhus macrophylla* Hook. & Arn. *Bot. Beechey Voy.* 2: 213. 1840-41. Type from Acapulco.

Page 671. *Rhus terebinthifolia*. "Paguay" (Sinaloa).

CELASTRACEAE.

Page 682. After *Schaefferia stenophylla* add:

Schaefferia oaxacana Standl. *Journ. Washington Acad. Sci.* 13: 7. 1923. Type from Cumbre de las Calaveras, Distrito de Zimatlán, Oaxaca.

HIPPOCRATEACEAE.

Page 686. *Hippocratea acapulcensis*. "Chile de perro" (Sinaloa).

ICACINACEAE.

Page 689. *Calatola laevigata*. "Calate," "calatole" (Oaxaca; from cal-atl-cacalotl=crow-water, *Reko*). The nut is said to impart a black color to water.

SAPINDACEAE.

Page 698. *Serjania californica*. This has been transferred by Johnston to the genus *Paullinia* (*Paullinia californica* I. M. Johnston, Proc. Calif. Acad. IV. 12: 1084. 1924), but the fruit of the plant is unknown and its generic position therefore still uncertain.

Page 699. After *Serjania pacifica* insert:

Serjania ochroclada Radlk. Repert. Sp. Nov. Fedde 17: 357. 1921. Type from Río Santa Lucía, Sierra de Misteca, Puebla.

Serjania unguiculata Radlk. Repert. Sp. Nov. Fedde 17: 359. 1921. Type from Monte Albán, Oaxaca.

Page 699. *Urvillea ulmacea*. "Hiedra" (Veracruz, *Endlich*).

Page 700. *Cardiospermum spinosum*. This has been transferred by Johnston to the genus *Paullinia*; see below.

After *Cardiospermum dissectum* add:

Cardiospermum pygmaeum Radlk. Repert. Sp. Nov. Fedde 17: 361. 1921. Type from Cerro de Santa Lucía, Puebla.

Page 702. *Paullinia fuscescens*. "Pico de guiloche" (Sinaloa).

Page 703. *Paullinia pinnata*. "Cuamecate" (Nayarit).

Paullinia tomentosa. "Ojillo" (Veracruz). *Endlich* reports that the seeds are used as eyes for dolls.

After *Paullinia sonorensis* add:

Paullinia californica (Radlk.) I. M. Johnston, Proc. Calif. Acad. IV. 12: 1084. 1924. See above, and also page 698.

Paullinia spinosa (Radlk.) I. M. Johnston, Proc. Calif. Acad. IV. 12: 1083. 1924. *Cardiospermum spinosum* Radlk. See above and also page 700.

Page 708. *Thouinidium decandrum*. A synonym is *Thouinidium riparium* Radlk. Repert. Sp. Nov. Fedde 17: 363. 1921. "Perico," "cola de perico," "cabo de hacha" (Sinaloa).

Thouinidium insigne. The entry should read: ***Thouinidium insigne*** Radlk. Repert. Sp. Nov. Fedde 17: 363. 1921.

RHAMNACEAE.

Page 712. *Gouania mexicana*. "Guirote de palo" (Sinaloa).

Page 713. *Zizyphus sonorensis*. "Naranjillo" (Tamaulipas); "brasilillo," "confite," "ceituna" (Sinaloa). The species occurs also in Tamaulipas.

Page 714. *Condalia parryi*. To the synonymy add *Condalia parryi microphylla* I. M. Johnston, Univ. Calif. Publ. Bot. 7: 439. 1922. Baja California, the type from Las Huevitas.

Page 715. After *Condalia lycioides* insert:

Condalia globosa I. M. Johnston, Proc. Calif. Acad. IV. 12: 1086. 1924. *C. globosa pubescens* I. M. Johnston, op. cit. 1087. 1924. Baja California, the type from La Paz.

Page 716. *Karwinskia mollis*. "Capulincillo" (Tamaulipas). Collected also in Tamaulipas.

Page 718. *Cormonema*. Recent study has convinced the writer that this genus does not differ in any constant respect from *Colubrina*. The nomenclature of the two species listed here should be changed, as follows:

Colubrina tepicana Standl. *Cormonema mexicana* Rose, Contr. U. S. Nat. Herb. 3: 315. 1895. Not *Colubrina mexicana* Rose, 1895.

Colubrina heteroneura (Griseb.) Standl. Journ. Washington Acad. Sci. 15: 285. 1925. *Zizyphus heteroneurus* Griseb. Bonplandia 1858: 3. 1858; *Rhamnus biglandulosa* Sessé & Moc. Pl. Nov. Hisp. 38. 1887; *Cormonema nelsoni* Rose, Contr. U. S. Nat. Herb. 3: 315. 1895; *Cormonema biglandulosa* Standl. Contr. U. S. Nat. Herb. 23: 718. 1923; *Rhamnus gonzalezii* Riley, Kew Bull. 1923: 173. 1923; *Cormonema multiflora* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 411. 1924. Sinaloa to Guerrero and Veracruz. Central America, the type from Panama. "Brasilillo," "aleznilla" (Sinaloa).

Page 719. *Colubrina glomerata*. "Guacimilla" (Sinaloa).

Page 720. *Colubrina greggii*. "Trompillo" (Puebla).

After *Colubrina greggii* insert:

Colubrina californica I. M. Johnston, Proc. Calif. Acad. IV. 12: 1085. 1924. Baja California, the type from Las Animas Bay.

Page 727. After *Rhamnus mucronata* add:

Rhamnus dianthes Riley, Kew Bull. 1923: 172. 1923. Type from the Sierra Madre.

VITACEAE.

Page 730. Before *Cissus* insert:

Vitis girdiana Munson, U. S. Dept. Agr. Div. Pomol. Bull. 3: 10. 1890. Baja California. Southern California.

Page 733. *Cissus rhombifolia*. "Tripas de zopilote" (Sinaloa).

ELAEOCARPACEAE.

Page 734. After *Sloanea mexicana* insert:

Sloanea quadrivalvis Seem. Bot. Voy. Herald 85. pl. 15. 1853. Nayarit. Central America; type from Veraguas, Panama. "Huesillo" (Nayarit); "terciopelo" (Panama, Costa Rica, El Salvador); "casaco" (Panama).

TILIACEAE.

Page 737. *Belotia*. The genus has been monographed by Sprague (Kew Bull. 1921: 270-278. 1921). The species occurring in Mexico are the following:

Belotia insignis Baill. Adansonia 10: 182. 1872. Tepic to Oaxaca and Veracruz. This is the plant described on page 737 under the name *Belotia mexicana*.

Belotia grandifolia Sprague, Kew Bull. 1921: 275. 1921. Veracruz; type from Zacuapan.

Belotia mexicana (DC.) K. Schum. in Engl. & Prantl, Pflanzenfam. 3⁶: 28. 1890. *Grewia mexicana* DC. Prodr. 1: 510. 1824. *Belotia galeottii* Turcz. Bull. Soc. Nat. Moscou 19: 504. 1846. Veracruz and Oaxaca. Guatemala. This is the plant described on page 737 under the name *Belotia grewiaefolia*. That name pertains to a Cuban plant and should be excluded from the Mexican flora.

Belotia tabascanica Sprague, Kew Bull. 1921: 278. 1921. Type from Lomas de San Sebastián, Tabasco. Called "palencano." One collection from Oaxaca is probably referable to this species, although it seems scarcely separable from the common *B. campbellii* of Guatemala and British Honduras.

Page 738. *Apeiba tibourbou*. "Pachiote" (Oaxaca).

Heliocarpus. The genus has been treated by E. E. Watson (Bull. Torrey Club 50: 109-128. 1923).

Page 740. *Heliocarpus tomentosus*. This is a synonym of the following: **Heliocarpus americanus** L. Sp. Pl. 448. 1753. Type from Veracruz. See Sprague, Journ. Bot. Brit. & For. 61: 255. 1923.

Heliocarpus tigrinus. This is a species of *Triumfetta*; see below.

Heliocarpus glabrescens. This name is a synonym of the following: **Heliocarpus mexicanus** (Turcz.) Sprague, Kew Bull. 1921: 272. 1921; *Adenodiscus mexicanus* Turcz. Bull. Soc. Nat. Moscou 19²: 504. 1846; *Triumfetta mexicana*

Turez. Bull. Soc. Nat. Moscou 31¹: 230. 1858. Type from the mountains of Oaxaca.

Page 741. After *Heliocarpus palmeri* insert:

Heliocarpus viridis E. E. Wats. Bull. Torrey Club 50: 120. 1923. Type from Sonora.

Page 745. *Triumfetta mexicana*. This name refers to a species of *Heliocarpus*; see above.

Page 746. After *Triumfetta discolor* insert:

Triumfetta dioica T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 412. 1924. Type from Hacienda Montserrate, Chiapas.

Triumfetta sanctae-luciae Sprague, Kew Bull. 1923: 114. 1923. Type from Santa Lucía, Sinaloa.

Triumfetta tigrina (Hochr.) Standl. *Heliocarpus tigrinus* Hochr. Ann. Cons. Jard. Genève 18-19: 123. 1914. Type from Moreno, Michoacán. The position of this species is doubtful because of the lack of fruit, but the combination of flower and foliage characters distinguish it from other Mexican species of *Triumfetta*.

MALVACEAE.

Page 751. *Abutilon percaudatum*. The entry for this species should read: **Abutilon percaudatum** Hochr. Ann. Cons. Jard. Genève 21: 439. 1920.

Page 752. *Abutilon glabriflorum*. The entry should read: **Abutilon glabriflorum** Hochr. Ann. Cons. Jard. Genève 21: 439. 1920.

Abutilon sphaerostaminum. The entry should read: **Abutilon sphaerostaminum** Hochr. Ann. Cons. Jard. Genève 21: 441. 1920.

Page 754. *Abutilon membranaceum*. "Colotague" (Sinaloa).

Page 755. After *Abutilon dentatum* insert:

Abutilon mochisense Hochr. Ann. Cons. Jard. Genève 21: 447. 1920. Type from Las Mochis, Sinaloa.

Abutilon subsagittatum Hochr. Ann. Cons. Jard. Genève 21: 444. 1920. Type from Victoria, Tamaulipas.

Abutilon tultitlanapense Hochr. Ann. Cons. Jard. Genève 21: 443. 1920. Type from San Luis Tultitlanapa, Puebla.

Page 761. *Robinsonella cordata*. "Jonote," "nojonote" (Puebla).

After *Robinsonella cordata* insert:

Robinsonella subcordata Hochr. Ann. Cons. Jard. Genève 21: 449. 1920. Type from Oaxaca.

Page 770. After *Malvastrum ribifolium* insert:

Malvastrum foliosum S. Wats. Proc. Amer. Acad. 20: 356. 1885. Baja California, the type from Santo Tomás. A low shrub.

Page 772. After *Malache purpusii* insert:

Malache ortegiana Standl. Proc. Biol. Soc. Washington 37: 46. 1924. Type from Nayarit.

Page 775. *Malvaviscus arboreus*. "Obelisco de la sierra," "quesito" (Sinaloa).

Page 781. *Hibiscus biseptus*. "Malvita" (Sinaloa).

BOMBACACEAE.

Page 786. Bombacaceae. No specimens of *Ochroma* from Mexico have been seen by the writer, but *O. lagopus* Swartz (= *O. pyramidale* (Cav.) Urban) has been reported from Tabasco. This species is a West Indian one, but it seems probable that one of those described recently by Rowlee occurs in southern Mexico. The vernacular names "jopi," "jubiguy," and "pomoy" are reported from Tabasco. The trees of this genus furnish the balsa wood of commerce, one of the lightest woods known.

STERCULIACEAE.

- Page 798. *Helicteres baruensis*. Also in Sinaloa, where it is called "chico."
 Page 800. *Waltheria acuminata*. "Guacimilla" (Sinaloa).
 Page 801. *Waltheria americana*. "Hierba del pasmo" (Sinaloa).
 Page 802. *Physodium corymbosum acuminatum*. "Sapo," "papasolte,"
 "algodoncillo" (Sinaloa).
 Page 809. *Guazuma ulmifolia*. "Guacimilla" (Sinaloa).
 Page 811. *Ayenia pusilla*. "Hierba del cáncer" (Sinaloa).
 Page 813. *Buettneria catalpifolia*. Also in Sinaloa, where it is called "bejuco chino."

DILLENIACEAE.

- Page 819. *Curatella americana*. "Rasca la vieja" (Nayarit).
 After *Curatella* insert:

DOLIOCARPUS Roland, Vet. Akad. Handl. Stockholm 17: 256, hyponym.
 1756; Gmel. Syst. Veg. 805. 1796.

1. **Doliocarpus oaxacanus** Szysz. Diss. Math-nat. Acad. Litt. Cracov. 27:
 139. 1894.

Described from Oaxaca.

OCHNACEAE.

Page 819. *Ouratea*. The genus has been treated by Riley (Kew Bull. 1924:
 101-111. 1924).

Ouratea mexicana. This name belongs to the plant described as *O. pallida*
 (p. 820); see below. The proper name for the plant described here as *O. mexicana*
 is *Ouratea jurgensenii* (Planch.) Engl. The type was collected in the Sierra
 San Pedro Nolasco. Oaxaca.

Page 820. *Ouratea pallida*. According to Riley, the proper name for the
 shrub described under this name is *Ouratea mexicana* (H. B. K.) Engl. (see p. 819
 or citations).

After *Ouratea pallida* insert:

Ouratea globosa Engl. in Mart. Fl. Bras. 12²: 323. 1876. Type from
 "Lizando."

Ouratea pyramidalis Riley, Kew Bull. 1924: 107. 1924. Type from
 Atasta, Tabasco. Guatemala.

Ouratea oblita Riley, Kew Bull. 1924: 108. 1924. Type said to have been
 collected in Mexico by Sessé and Mocino.

Ouratea theophrasta (Planch.) Baill. Hist. Pl. 4: 359. 1873. *Gomphia*
heophrasta Planch. in Linden, Cat. 8. 1859. *Wolkensteinia theophrasta* Regel,
 Gartenflora 14: 131. pl. 471. 1865. Described from Tabasco.

CLUSIACEAE.

Page 826. *Calophyllum rekoii*. A tree perhaps of this species grows in Tepic,
 where it is called "palo María." In El Salvador the species is known as
 "barillo," "marío," and "varillo."

FOUQUIERIACEAE.

Page 830. *Fouquieria formosa*. "Tlapacón" (Puebla).

CISTACEAE.

Page 833. *Halimium exaltatum*. A synonym is *Halimium discolor* Riley,
 Kew Bull. 1923: 107. 1923.

COCHLOSPERMACEAE.

Page 836. *Maximiliana vitifolia*. Among the vernacular names, for "poró-poró" read "poro-poro." "Rosa amarilla" (Sinaloa).

FLACOURTIACEAE.

Page 841. *Myroxylon velutinum*. "Junco" (Sinaloa). The citation for the synonym *Xylosma velutinum* should read: Triana & Planch. Prodr. Fl. Novogran. 97. 1862.

Page 846. *Casearia dolichophylla*. "Garrapatilla" (Nayarit).

TURNERACEAE.

Page 847. *Erblichia odorata*. "Suelda con suelda" (Nayarit).

LOASACEAE.

Page 854. *Mentzelia konzattii*. "Yaga-duchi" (Oaxaca, Zapotec, Reko).

Page 855. After *Petalonyx linearis* insert the following genus:

EUCNIDE Zucc. Del. Sem. Hort. Monac. 28. 1844.

1. **Eucnide cordata** Kell.; Curran, Bull. Calif. Acad. 1: 137. 1885.

Baja California, the type from Cedros Island. A low shrub,

CACTACEAE.

Page 862. After *Pereskiopsis aquosa* add:

Pereskiopsis scandens Britt. & Rose, Cactaceae 4: 252. 1924. Yucatán, the type from Mérida.

Page 889. After *Opuntia chaffeyi* add:

Opuntia arenaria Engelm. Proc. Amer. Acad. 3: 301. 1856. Northern Mexico near the United States boundary. Also in western Texas and southern New Mexico.

Opuntia alamosensis Britt. & Rose, sp. nov.

Shrub 1 meter high or so, very much branched above; joints bright green; tubercles prominent, elongate; areoles circular, brown-felted; spines on young branches 3 or more, long-acicular, up to 4 cm. long, brown, covered with a loose papery sheath; glochids numerous, whitish to brown; flowers yellow, 3 to 4 cm. long, including the ovary; ovary strongly tubercled; areoles subtended by small ovate leaves and often bearing 1 slender spine or more, 2.5 cm. long; fruit not seen.

Type collected by J. G. Ortega near La Cruz, Sinaloa, Mexico, in 1924 (no. 5235; U. S. Nat. Herb. no. 1,209,382).

This seems to be the same as the plant obtained by Rose near Alamos, Sonora, in 1910, which is referred to under *O. kleiniae* in the Cactaceae (1: 51). It differs from that species in its more spiny branches and yellow flowers.

Opuntia feroacantha Britt. & Rose, sp. nov.

Bushy shrub with large joints and very formidable spines, glabrous throughout; joints oblong to obovate, 1.5 to 2.5 cm. long, more or less cuneate at base; areoles rather few, 2 to 4 cm. apart, rather large, circular, brown-felted; glochids yellow, numerous; spines usually 1 or 2, sometimes a third or even a fourth one but these shorter, the longest one sometimes 8 cm. long or even longer, dull white or becoming brownish at base in age, very stout, often twisted; flowers small, rotate, about 4 cm. broad; petals yellow, 1.5 cm. long; filaments very short; stigma lobes about 7.

Type from Sinaloa (J. G. Ortega 5228; U. S. Nat. Herb. no. 1,209,383). Also collected at Acaponeta, Tepic, Rose, Standley & Russell 1447.

Page 893. After *Cephalocereus purpusii* add:

Cephalocereus collinsii Britt. & Rose, *Cactaceae* 4: 269. 1923. Oaxaca, the type from Gerónimo.

Page 901. After *Lemaireocereus dumortieri* add:

Lemaireocereus beneckeii (Ehrenb.) Britt. & Rose, *Cactaceae* 4: 273. 1923. *Cereus beneckeii* Ehrenb. Bot. Zeit. 2: 835. 1844; *Cereus farinosus* Haage in Salm-Dyck, Allg. Gartenzeit. 13: 355. 1845; *Piptanthocereus beneckeii* Riccobono, Boll. Ort. Bot. Palermo 8: 226. 1909. Central Mexico.

Page 916. After *Selenicereus spinulosus* insert:

Selenicereus nelsonii (Weingart) Britt. & Rose, *Cactaceae* 4: 283. 1923. *Cereus nelsonii* Weingart, Zeitschr. Sukkul. 1: 33. 1923. Southern Mexico.

Page 931. *Ariocarpus kotschoubeyanus* and *A. fissuratus* (p. 932) should be referred to a distinct genus, as follows:

ROSEOCACTUS Berger, Journ. Washington Acad. Sci. 15: 45. 1925.

Roseocactus kotschoubeyanus (Lemaire) Berger, Journ. Washington Acad. Sci. 15: 48. 1925. See page 931 for synonymy.

Roseocactus fissuratus (Engelm.) Berger, Journ. Washington Acad. Sci. 15: 46. 1925. See page 932 for synonymy.

Roseocactus lloydii (Rose) Berger, Journ. Washington Acad. Sci. 15: 48. 1925. *Ariocarpus lloydii* Rose, Contr. U. S. Nat. Herb. 13: 308. pl. 62. 1911. Considered by Berger a distinct species, known only from Zacatecas.

After *Ariocarpus retusus* add:

Ariocarpus trigonus (Weber) Schum. Gesamtb. Kakt. 606. 1898. *Anhalonium trigonum* Weber, Diet. Hort. Bois 90. 1893. Northern Mexico. Often confused with *A. retusus*, but characterized by its longer and narrower tubercles.

Page 932. After *Ariocarpus fissuratus* insert:

OBREGONIA Frič, Zivot v Prinode 29²: 3. 1925.

The genus resembles *Strombocactus* and *Ariocarpus*, but seems to be distinct from both.

Obregonia denegrii Frič, Zivot v Prinode 29²: 3. 1925. Vicinity of Victoria, Tamaulipas.

Page 949. After *Ferocactus rostrii* add:

Ferocactus johnstonianus Britt. & Rose, *Cactaceae* 4: 287. 1923. Type from Angel de la Guardia Island, Baja California.

Page 955. After *Cactus salvador* add:

Cactus oaxacensis Britt. & Rose, *Cactaceae* 4: 289. 1923. Oaxaca.

Page 961. After *Neolloydia conoidea* add:

Neolloydia stuetzlei (Frič) Britt. & Rose.

Coryphantha stuetzlei Frič, Zivot v Prinode 29: 65. 1925.

Solitary (rarely several heads from one root, or proliferous), oblong to clavate, 5 cm. in diameter, 14 cm. high, rounded at apex, densely long-lanate at top when in flower; tubercles dark green, short and thick, arranged in 8 or 9 spiral rows, the grooves on upper side of tubercles woolly but not glandular; areola at top of tubercle somewhat longer than broad, at first densely woolly; spines usually all radial, 18 to 24, white, often with black tips, spreading or recurved, 6 to 10 mm. long, a few areoles on old plants producing a central spine, this solitary, erect or ascending, 1 to 1.5 cm. long, black; flowers magenta, 3 cm. long or more; perianth segments oblong, acuminate; filaments short, pale; style and stigma lobes (5) white; fruit not seen.

Collected by C. R. Orcutt at La Maroma ranch, 10 miles north of Jaumave, Tamaulipas, Mexico, in 1925 (no. 554). Also collected at the same place and time by Robert Runyon (no. 31).

According to Mr. Runyon, the flowers open about 10 in the morning and close at 3 p. m. and open again on the following day.

Page 1009. After *Neomammillaria verhaertiana* add the following species:

Neomammillaria moelleriana (Bödeker) Britt. & Rose.

Mammillaria moelleriana Bödeker, Zeitschr. Sukkulent. 1: 213. 1924.

Solitary, 5 to 8 cm. in diameter; tubercles and plant body hidden under a mass of spines; tubercles not milky, somewhat flattened, almost imbricate, blue-green; spine areole circular, white-felted when young; radial spines acicular, about 40, glossy white, spreading, 3 to 5 mm. long; central spines much stouter than the radials, 8 or 9, one or more strongly hooked, 1.5 to 2.5 cm. long, dark brown; flowers 15 mm. long, light yellow; filaments and style white; stigma lobes 5 or 6; fruit clavate, pale green to white; seeds numerous, black, shining.

Known only from the type locality, Sierra de Santa María, Durango.

Neomammillaria eschaueri (Coulter) Britt. & Rose.

Cactus eschaueri Coulter, Contr. U. S. Nat. Herb. 3: 104. 1894.

Single or often cespitose, very small, 2 to 5 cm. in diameter, somewhat depressed; tubercles green, not milky; spines all pubescent; radial spines 20 or fewer, spreading, with dark tips, 12 mm. long or less; central spine solitary, reddish, 15 to 25 mm. long, hooked at the tip; flowers 15 mm. long; outer segments short, reddish green along the median vein; inner perianth segments oblong, acute, entire, greenish white; stamens included, greenish white; style white; stigma lobes 4, greenish white; fruit reddish, 10 mm. long; seeds reddish.

State of San Luis Potosí, where it has been collected recently by C. R. Orcutt (no. 22, 1925). Type from Zapatlillo.

The species was discovered near San Luis Potosí in crevices in limestone rocks by Doctors Francis and Luis Eschauer.

THYMELAEACEAE.

Page 1013. *Daphnopsis salicifolia*. "Ahuejote" (Veracruz).

After *Daphnopsis cestrifolia* insert:

Daphnopsis americana (Mill.) Johnston, Proc. Bost. Soc. Nat. Hist. 34: 242. 1909. *Laurus americana* Mill. Gard. Dict. ed. 8. *Laurus* no. 10. 1768. Type from Veracruz. The description given by Miller is too brief for identification. See Fawcett and Rendle, Journ. Bot. Brit. & For. 63: 51. 1925.

COMBRETACEAE.

Page 1031. *Combretum mexicanum*. Also in Nayarit, where it is called "cuaumecate."

Page 1032. *Combretum farinosum*. "Bejuco angarilla" (Sinaloa).

MYRTACEAE.

Page 1037. *Pimenta officinalis*. "Patololote" (Oaxaca). The aromatic leaves are employed for brewing a delicious tea (*Reko*).

Page 1043. *Eugenia oaxacana*. For this name substitute the following:

Eugenia purpusii Standl. *Eugenia oaxacana* Standl. Contr. U. S. Nat. Herb. 23: 1043. 1924. Not *E. oaxacana* Berg, 1860.

Page 1046. *Eugenia acapulcensis*. "Palo agrio" (Nayarit).

After *Eugenia acapulcensis* insert:

Eugenia oaxacana Berg, Linnaea 30: 683. 1860. Type from Oaxaca.

MELASTOMACEAE.

Page 1057. Before *Calyptrella* insert the following genus, accidentally omitted:

11. ADELOBOTRYS DC. Prodr. 3: 127. 1828.

1. **Adelobotrys adscendens** (Swartz) Triana, Journ. Bot. 5: 210. 1867.

Melastoma adscendens Swartz, Fl. Ind. Occ. 2: 772. 1800.

Southern Mexico. Jamaica; Central and South America.

Page 1064. *Miconia mexicana*. To the synonymy add: *Miconia purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 185. 1922.

ARALIACEAE.

Page 1083. *Gilibertia arborea*. "Mano de oso" (Sinaloa). To the synonymy add the following: *Gilibertia smithiana* I. M. Johnston, Contr. Gray Herb. n. ser. 70: 81. 1924; *Gilibertia eurycarpa* I. M. Johnston, Contr. Gray Herb. n. ser. 70: 82. 1924.

CLETHRACEAE.

Page 1089. *Clethra lanata*. "Jicarillo" (Nayarit).

ERICACEAE.

Page 1091. *Befaria mexicana*. "Madroño del agua" (Sinaloa).

MYRSINACEAE.

Page 1110. After *Icacorea compressa* insert:

Icacorea konzattii (Blake) Standl. *Ardisia konzattii* Blake, Contr. Gray Herb. n. ser. 53: 64. 1918. Type from Los Naranjos, Departamento de Miahuatlán, Oaxaca.

Page 1111. *Parathesis rekoii*. Probably not distinct from this is *Ardisia chiapensis* T. S. Brandeg. Univ. Calif. Publ. Bot. 10: 413. 1924. Type from Hacienda Montserrate, Chiapas. Brandeg's name has priority of publication, but it is invalidated in *Parathesis* by *Parathesis chiapensis* Fernald.

Page 1112. After *Parathesis lanceolata* insert:

Parathesis prionophylla Standl. Proc. Biol. Soc. Washington 37: 46. 1924. Type from Arroyo de Jalio, Nayarit.

SAPOTACEAE.

Page 1117. *Bumelia spiniflora*. "Jos" (Tamaulipas).

DIOSPYRACEAE.

Page 1125. *Maba verae-crucis*. A synonym is *Maba purpusii* T. S. Brandeg. Univ. Calif. Publ. Bot. 7: 329. 1920.

Page 1128. After *Diospyros sphaerantha* insert:

Diospyros californica (T. S. Brandeg.) I. M. Johnston, Proc. Calif. Acad. IV. 12: 1124. 1924. *Diospyros texana californica* T. S. Brandeg. Zoe 5: 164. 1903; see page 1127. A form with glabrate leaves is *D. californica tonsa* I. M. Johnston, loc. cit.

STYRACACEAE.

Page 1130. *Styrax argenteus*. "Lebadura" (Nayarit).

OLEACEAE.

Page 1141. After *Osmanthus* insert:

MAYEPEA Aubl. Pl. Guian. 81. 1775.

1. **Mayepea macrocarpa** Rusby, Bull. Torrey Club **38**: 145. 1911.

Type from Mount Limón, near Balsas, Guerrero.

After examination of the type specimen, the writer is inclined to doubt that this plant belongs to the Oleaceae, but it has been impossible to make a satisfactory disposition of it in any other family.

LOGANIACEAE.

Page 1141. *Gelsemium sempervirens*. The entry should read: **Gelsemium sempervirens** (L.) Pers. Syn. Pl. **1**: 267. 1805.

Page 1147. After *Buddleia parviflora* insert:

Buddleia purpusii Standl. Journ. Washington Acad. Sci. **16**: 15. 1926. Near Monserrate, Chiapas.

APOCYNACEAE.

Page 1156. After *Stemmadenia mollis* insert:

Stemmadenia calycina T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 188. 1922. Type from Remudadero, Veracruz. Not seen by the writer.

ASCLEPIADACEAE.

Page 1193. After *Vincetoxicum xanthotrichum* insert:

Vincetoxicum edule (Hemsl.) Standl. *Gonolobus edulis* Hemsl. Biol. Centr. Amer. Bot. **2**: 331. 1882. Oaxaca. Central America, the type from Guatemala. A woody vine with large 5-angled fruits which are cooked and eaten as a vegetable. "Gueto" (Oaxaca); "cuayote," "guayote" (Costa Rica).

CONVOLVULACEAE.

Page 1198. After *Jacquemontia smithii* insert:

Jacquemontia eastwoodiana I. M. Johnston, Proc. Calif. Acad. IV. **12**: 1133. 1924. Baja California, the type from Ildefonso Island.

Jacquemontia mollissima Standl. Journ. Washington Acad. Sci. **16**: 15. 1926. Monserrate, Chiapas.

Page 1201. *Calonyction muricatum*. "Nata," "maxh" (Chiapas, *Endlich*). The milky juice is said to be employed for coagulating rubber sap.

Calonyction aculeatum. "Hedrón" (Morelos).

Page 1202. *Exogonium bracteatum*. "Empanada" (Morelos); "bejuco blanco" (Sinaloa).

Page 1204. *Ipomoea crassicaulis*. "Hiedra" (Nayarit); "flor de la mañana" (Tamaulipas).

Page 1205. *Ipomoea intrapilosa*. Related to this is *Ipomoea pauciflora* Mart. & Gal. Bull. Acad. Brux. **12**²: 266. 1845. From the description given by Martens and Galeotti it is not possible to determine definitely to which of the Mexican tree Ipomoeas the name belongs.

Page 1208. *Turbina corymbosa*. "Manto" (Veracruz).

POLEMONIACEAE.

Page 1210. *Loeselia tenuifolia*. The distribution should be changed to read as follows: Mountains of northern Baja California, the type from Cantillas Canyon.

BORAGINACEAE.

Page 1218. *Cordia alba*. "Baboso" (Tamaulipas).

Cordia alliodora. "Amapa hasta" (Sinaloa).

Page 1219. *Cordia boissieri*. Doctor Reko states that the words anacahuite and nacahuite are not derived from the Nahuatl *amacuahuitl* but from the root *natl*, signifying an edible fruit.

Page 1221. *Cordia sonora*. "Amapa bola" (Sinaloa).

Page 1224. After *Cordia cylindrostachya* insert:

Cordia ovata T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 187. 1922. Type from Remudadero, Veracruz.

MENTHACEAE.

Page 1269. After *Salvia coccinea* add:

Salvia chiapensis T. S. Brandeg. Univ. Calif. Publ. Bot. **10**: 415. 1924. Type from Jalisco, Chiapas.

Page 1271. Before *Salazaria* insert the following genus, accidentally omitted:

5. SCUTELLARIA L. Sp. Pl. 598. 1753.

1. *Scutellaria suffrutescens* S. Wats. Proc. Amer. Acad. **25**: 160. 1890.

Scutellaria spinescens Fernald, Proc. Amer. Acad. **45**: 416. 1910.

Coahuila, the type from Sierra de la Silla, near Monterrey.

A small shrub.

Page 1276. *Hyptis emoryi*. A synonym is *Hyptis emoryi amplifolia* I. M. Johnston, Proc. Calif. Acad. IV, **12**: 1149. 1924. Type from Escondido Bay, Baja California.

SOLANACEAE.

Page 1300. *Solanum amazonium*. "Mala mujer" (Sinaloa).

GESNERIACEAE.

After *Columnea schiedeana* insert:

Columnea purpusii Standl. Journ. Washington Acad. Sci. **16**: 15. 1926. Mountains near Fenix, Chiapas.

Columnea stenophylla Standl. Journ. Washington Acad. Sci. **16**: 16. 1926. Chiapas (type from Finca Irlanda) and Oaxaca.

RUBIACEAE.

Page 1365. After *Calycophyllum* insert the following genus:

HILLIA Jacq. Enum. Pl. Carib. 3. 1760.

1. *Hillia chiapensis* Standl. Journ. Washington Acad. Sci. **16**: 16. 1926.

Mountains near Fenix, Chiapas.

Page 1391. After *Psychotria oaxacana* insert:

Psychotria chlorobotrya Standl. Journ. Washington Acad. Sci. **16**: 17. 1926. Fenix, Chiapas.

Psychotria phoeniciana Standl. Journ. Washington Acad. Sci. **16**: 17. 1926. Mountains near Fenix, Chiapas.

ASTERACEAE.

Page 1419. *Aschenbornia heteropoda*. The type of this species is identical with *Calea zacatechichi* Schlecht.

Page 1512. *Gnaphalium rhodanthum*. The correct name of this species is ***Gnaphalium salicifolium*** (Bertol.) Schultz Bip. Bot. Zeit. **3**: 172. 1845. (*Helichrysum salicifolium* Bertol. Nov. Comm. Acad. Sci. Bonon. **4**: 433. 1840.)

Page 1541. *Tithonia scaberrima* Benth. This species is properly known as ***Tithonia longeradiata*** (Bertol.) Blake, Bull. Torrey Club **53**: 217. 1926. (*Helianthus longeradiatus* Bertol. Nov. Comm. Acad. Sci. Bonon. **4**: 436. 1840.)

INDEX

[Synonyms in italic>

The present index is complete for Part 5. It includes the generic and family names of the whole volume, but not the vernacular and specific names. The indexes for Parts 1 to 4 should, therefore, be bound with the complete volume.

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